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Convolutional Neural Networks with Transfer Learning for Recognition of COVID-19: A Comparative Study of Different Approaches

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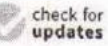

Abstract: To judge the ability of convolutional neural networks (CNNs) to effectively and efficiently transfer image representations learned on the ImageNet dataset to the task of recognizing COVID-19 in this work, we propose and analyze four approaches. For this purpose, we use VGG16, ResNetV2, InceptionResNetV2, DenseNet121, and MobileNetV2 CNN models pre-trained on ImageNet dataset to extract features from X-ray images of COVID and Non-COVID patients. Simulations study performed by us reveal that these pre-trained models have a different level of ability to transfer image representation. We find that in the approaches that we have proposed, if we use either ResNetV2 or DenseNet121 to extract features, then the performance of these approaches to detect COVID-19 is better. One of the important findings of our study is that the use of principal component analysis for feature selection improves efficiency. The approach using the fusion of features outperforms all the other approaches, and with this approach, we could achieve an accuracy of 0.94 for a three-class classification problem. This work will not only be useful for COVID-19 detection but also for any domain with small datasets.

Keywords: convolutional neural networks; transfer learning; K-means clustering; principal component analysis

1. Introduction

COVID-19, a global pandemic, is still spreading in many parts of the world since its identification in late December 2019. In these nine to ten months, this disease has become one of the most significant public health emergencies requiring remedial measures and early diagnosis. In many countries till recently, reverse transcription-polymerase chain reaction (RT-PCR) tests are the most popular diagnostic method for detecting COVID-19. Although popular, this method suffers from limitations in its long wait time and low sensitivity. Therefore, for the early diagnosis of COVID-19, many have started using molecular tests to determine the coronavirus. For example, many existing machines like Genmark's ePlex Respiratory Pathogen instrument or Abbott's ID, etc., have a COVID-19 feature for testing, which takes much less time [1,2]. The other advantage is that the sensitivity of these molecular tests is around 90% better than the RT-PCR method having a sensitivity of about 70%. However, both the RT-PCR method or molecular testing approach need expensive equipment and trained professionals. Further, the availability of these methods is limited in remote areas and low and middle-income

Recognition of Islanding and Operational Events in Power System With Renewable Energy Penetration Using a Stockwell Transform-Based Method

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***Abstract*—Integration of RE sources to the utility grid offers technical and operational challenges causing problems of PQ, stability, identification of operational events, etc. This article presents an algorithm to identify events including islanding, grid integration, and outage of the solar PV and WG plants in grid using a ST. Islanding event may occur in the presence of any kind of plant. Processing of negative sequence component of voltage is performed by utilizing ST based multiresolution analysis at the test node and the output matrix is evaluated. The features (F1–F4), VI and STD indexes are obtained from this matrix. These features are utilized for identifying the events and transient phenomenon. The VI and STD indexes are used to recognize the type of RE source present during the islanding and outage events. Moreover, for recognizing the type of RE source at the time of synchronization event, an SI is proposed. This is computed by the ST depended processing of voltage signals. Performance of the algorithm is found satisfactory for all incidence angles and complete voltage cycle under the noisy conditions of 10 dB SNR. As compared to the time–frequency transform based coefficients of the voltage signal, the proposed technique is found to be superior in terms of small NDZ and low computation time and least affected by noise. Further, the developed technique is also efficient to detect various events stated above and the type of RE source. Study is performed using MATLAB/Simulink software and validated in real time using RTDS.**

***Index Terms*—Grid synchronization event, islanding event, outage event, power system network, renewable energy (RE), Stockwell transform (S-transform), transient phenomenon.**

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NOMENCLATURE

AC	Alternating current.
ACSR	Aluminum conductor steel reinforced.
AI	Artificial intelligence.
ANFIS	Adaptive neuro-fuzzy inference system.
DC	Direct current.
CWT	Continuous wavelet transform.
DFIG	Double fed induction generator.
DG	Distributed generation.
FT	Fourier transform.
HID	Human interface device.
IDI	Islanding detection index.
IEEE	Institute of Electrical and Electronics Engineers.
IID	Island interconnection device.
MGP	Multigene genetic programming.
NDZ	Nondetection zone.
NSC	Negative sequence component.
PHEV	Plug-in hybrid electric vehicle.
PQ	Power quality.
PV	Photovoltaic.
RE	Renewable energy.
RTDS	Real-time digital simulator.
SAM	Sum absolute magnitude.
SAV	Sum absolute values.
SI	Synchronization index.
SNR	Signal to noise ratio.
SPS	System protection schemes.
STD	Standard deviation.
ST	Stockwell transform.
STA	Absolute values matrix of ST-matrix.
STFT	Short time Fourier transform.
SVM	Support vector machine.
VI	Variance index.
WG	Wind generator.
WT	Wavelet transform.
kW	Kilowatt.
kVAr	Kilovolt ampere reactive.
kV	Kilovolt.
MVA	Megavolt ampere.
MW	Megawatt.
Ω	Ohm.

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Estimation of Faults in Grid Connected Solar Photovoltaic Farm Using Voltage Based Median and Summing Values Features of Stockwell Transform Based Algorithm

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***Abstract*—Research work under taken in this paper is concentrated to design an algorithm using Stockwell Transform for estimation of faults in grid integrated solar PV farm. An algorithm based on Features such as median and summing absolute values of Stockwell Transform using the voltage signal has been presented in this manuscript. Proposed algorithm can be utilized in protection schemes of the transmission and distribution feeders in the grid integrated solar PV farms. Algorithm has been tested for the estimation of the faults such as phase to ground, phase to phase, two phases to ground and three phases to ground fault on the AC side of the grid. Algorithm is also tested for estimation of faults on the DC bus of the solar PV farms. Study is carried out using MATLAB software.**

***Keywords*—AC grid; DC bus; fault; Solar PV farm; Stockwell Transform.**

I. INTRODUCTION

Power utility network is complex in nature which may be considered as spatial and temporal complexity. This network is also nonlinear and non-stationary in nature which includes many uncertainties at different levels of generation, transmission and distribution of electrical power. Transmission lines are constructed with long distances in different geographical regions having variable nature like deserts, plains and hills. These lines are used to transfer power in bulk quantity from generator station to centres of loads over long distances. Hence, possibility fault occurrence on the transmission lines is very in comparison to other components of the utility power network. Frequently observed faults on the transmission line may be included in the categories such as line to ground (LG) fault, double line (LL) fault, double line to ground (LLG) fault, three phase (LLL) fault, three-phase to ground (LLLG) fault and faults of nature inter circuits [1]. Long distance transmission lines are essential requirement of the electric power utility grid to transfer bulk power over long distances from generators to load centres. This includes multiple sending end generators and the multiple receiving load centres. In recent years the power system network transmission system deployed the high voltage direct current (HVDC), ultra high voltage DC (UHVDC), multi-terminal DC (MTDC) and multi-terminal AC for transmission of bulk power from one point to the other [2]. Power transfer capability of the existing corridors of the transmission lines have been increased by the use of the compensations devices like series and shunt. In addition of power transfer capability of transmission lines, these compensations also help to increase the voltage profile and improve the transient stability of the system. However, presence of renewable power generation creates additional problems related to protection due to the uncertain in nature of RE sources. The issues observed due to deployment of compensation devices include [3] as detailed.

- Sudden change impedance of line at compensation point
- Inversion of current and voltage
- Frequency components other than the power frequency are introduced in voltage and current signals.

When the solar PV farms are integrated with network of distribution part of the power system, protective devices faces change in behaviour due to fact related to flexibility of changes in number of solar PV plant units. Further, these units are spread over the large area and power output of these units may change due to the variation in solar insolation and wind speed. The solar energy source production capacity is low in terms of volume. It has low operational cost compared to the large sized generators and power plants. Also integration of these units to distribution and transmission networks has been gaining interests due to the economic issues associated with the development of the power plants, reduced environmental pollution, increased power generation efficiency, improved quality of power supplied to customers, reduced losses in power network, improved voltage profile, and liberalized network capacity [4].

Time frequency methods play important role on the detection of transmission line faults to design the efficient

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Information Processing in Extended Hodgkin-Huxley Neuron Model

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***Abstract*— Models of a variety of neurons share the same form as the Hodgkin-Huxley (HH) neuron and evidence suggests that single-compartment models can capture the key properties of in vivo and in vitro neurons. In this paper we are going to discuss about how the conductance of the excitatory and inhibitory synapse vary when the pre synaptic action potential arrived at the synapse and how this synaptic conductance affects the information transfer in the single neuron. In our model the injected current is replaced with the synaptic current in the HH model. In order to validate the impact of excitatory and inhibitory synapse in the generation of action potential, the extended HH model is examined with various synaptic inputs.**

***Index Terms*— HH Model, Mean Firing Rate, Entropy, Synaptic Conductance, Spike Train.**

I. INTRODUCTION

Many models of brain function have been built; they differ in their objectives, requirements and limitations. Based on the questions what, how and why that a model can answer, the models can be classified as conceptual/phenomenological/black box type, mechanistic type/realistic or interpretive type models respectively. Hodgkin & Huxley model is a biological model which is accurately designed to describe and predict the behaviour of the neuron .Izhikevich[6] in his paper reviewed neuro-computational features of various spiking models and ranked the models based upon the neuro-computational behaviour, their implementation efficiency, etc. HH model is the only biological model which finds its way to achieve the complete fit of data which Izhievich have discussed.

II. HODGKIN &HUXLEY MODEL

Intracellular recordings of the neuron state that the action potential is characterized as the sudden increase in the membrane potential (depolarization) followed by a slow sharp decrease towards the resting potential. This may be followed by a fall below the resting potential due to the fall in membrane potential below the resting potential called after hyperpolarisation phase. Hodgkin and Huxley (partly in collaboration with Katz) were the first to describe the active mechanisms quantitatively [5].The final paper of Hodgkin and Huxley [5] shows the complete expression for the three ionic currents. The description of how the membrane potential changes in time is explained in the equation

$$C_m \frac{dV}{dt} = -\bar{g}_{Na} m^3 h(V - E_{Na}) - \bar{g}_K n^4 (V - E_K) - \bar{g}_L (V - E_L) + I_{inj} \quad (1)$$

The HH model is stimulated by the external injected current. Similar to real neuron this model generates repetitive firing and the greater the input current, the faster the firing rate. However the real single neuron firing traces show high variability, for instance, the coefficient of variation in the spike interval (ISI) of neuron firing in response to the stimulus for a period of several seconds is approximately equal to 1 as expected from the Poisson process[4].Furthermore, the neuron receives inputs from several other neurons. The current generated by these neurons may be from the excitatory or from inhibitory, which are approximately balanced to each other [10].To study this behaviour, the original HH model described in the equation 1.1 is extended by adding additional synaptic currents. Simulations based upon applying Poisson distributed excitatory and inhibitory inputs demonstrate that the neuronal firing output shows considerable variability in the ISI. Depolarizing with balanced synaptic current reduces the membrane time constant and also affects the information processing in several aspects[1-2],[7-9].

In this paper the extended HH model is modelled with the network consisting of 1000 excitatory and 200 inhibitory synapses. The excitatory and inhibitory synapses are activated by the spike train generated by a Poisson process of various rates f_{ex},f_{in} respectively [3].The behaviour of the membrane potential is approximated using the conductance-based relationship is now given below by (2).

$$C_m \frac{dV}{dt} = -\bar{g}_{Na} m^3 h(V - E_{Na}) - \bar{g}_K n^4 (V - E_K) - \bar{g}_L (V - E_L) + I_{syn} \quad (2)$$

where, I_{syn} is the synaptic current and the synaptic current is given by (3).

$$I_{syn} = -\bar{g}_{exe}(V - E_{Na}) - \bar{g}_{in}(V - E_K) \quad (3)$$

The time course of synaptic input can de described by a simple decaying exponential function. The synaptic conductance [4], [11] is calculated as given below in (4).

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Protection of Distribution Feeder Using Stockwell Transform Supported Voltage Features

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***Abstract*— This paper presents a research work focussed on the identification of faults on the distribution feeder supported by Stockwell transform based summing of absolute values and median features using the voltage signals. A fault index is proposed which is obtained by the multiplication of H-index (obtained summation of absolute values S-matrix evaluated by ST supported decomposition of voltage) and VS-index (obtained median of absolute values S-matrix evaluated by ST supported decomposition of voltage). Classification of faults is achieved using decision rules. Investigated faults include phase to ground, fault between two phases, two phases to ground fault and fault involving all three phases and ground. Performance of algorithm is tested on high fault impedance and fault incidence angle. Proposed study is performed using MATLAB software in Simulink environment.**

Keywords*— *Distribution Feeder Fault, Hilbert transform, protection, Stockwell Transform, voltage.

I. INTRODUCTION

Feeders used to transform power from grid substations (GSS) to the consumer ends are normally known as power distribution lines. These are exposed to different various natures of failures which are commonly not expected due to involvement of the random causes. These failures adversely affect the availability as well as reliability of the network. Accurate detection and identification of type of fault on these distribution feeders help to restore the power supply timely and also avoid the severe damage to the power system equipments [1]. Many schemes have been reported in last decades for the recognition of faults to design protection scheme for the radial distribution feeders. Signal processing methods have played a significant role for the identification of the faults. Signal analysis approaches like Wavelet transform (WT), Fourier transform (FT), Short time Fourier transform (STFT), fast Fourier transform (FFT), Stockwell transform (ST), Gabor transform (GT) etc. are reported for identification of faults [2]. Mahela et al. [3], introduced an approach using Stockwell transform for identification of faults on the transmission line in the presence of Thyristor switched capacitor (TSC). An intelligent scheme for identification of HIF on distribution network based on a combination of probabilistic neural network (PNN) and adaptive extended Kalman filter (AEKF) is found in [8]. AEKF is implemented for estimation of separate components of harmonic in HIF as well as no-fault (NF) associated with the current signals in the presence of non-linear loads. These harmonic components have been used utilized for training and testing of PNN which helps for classification of HIF from NF accurately. In [9], authors introduced an approach for location of fault in network of power system based on the processing of voltage signals. Voltage signals are converted into absolute values of phasor of complex valued which indicate travelling waves associated with the faults. This has been processed further for localization of faults using Hilbert–Huang transform (HHT). Results are validated on in mixed feeder for all types of faults including HIF of arcing. In [10], authors presented modelling of HIF on distribution feeder. Proposed model uses resistance of non-linear nature which represents high impedance path in the faulty event. Performance analysis of various parameters which are electric in nature and pertains to the fault of high impedance has been evaluated. In [11], a methodology for detection of HIF in distribution feeder of power network using Mathematical Morphology (MM) is proposed. Current signals are utilized for detection of HIF faults. MM is implemented for extraction of the features (in time domain) and a classification of HIF faults has been achieved using the rule supported algorithm. Data has been collected on network of power distribution utility. Low impedance faults (LIF) and switching transients have been simulated in MATLAB. It is established that proposed method is effective in detection and differentiation of HIF from switching transients. This is achieved is time lesser compared to that utilized by different approaches maintaining high security as well as dependability. Performance of introduced algorithm is independent on location of fault, time of fault inception, and fault type. Following is the main contribution of the paper:-

- An algorithm supported by Stockwell transform using voltage signals for identification of faults on the distribution feeder is proposed.
- Classification of faults is achieved using decision rules.
- Performance of algorithm is tested on high fault impedance and fault incidence angle.

II. PROPOSED DISTRIBUTION TEST SYSTEM

Proposed study related to fault identification and classification associated with distribution feeder is performed with the help of IEEE-13 bus distribution network. IEEE-13

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Effect of Solar Radiation on the Thermal Performance of Power Transformer and its Life Estimation

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***Abstract*—With the continuous rise in the load demand at consumer end, the performance of the existing operating electrical machines gets affected. The increasing temperature of earth's surface due to solar radiation is another reason of the rise in the temperature of the electrical machines. Power transformers are one of the electrical machines whose performance is directly affected by its inner and outer temperature values as they are generally installed outdoors. The life of the power transformer reduces gradually with the time and sometimes the severe outdoors surface temperatures may lead to sudden explosions that also obstruct the operation of the other associated machines as well. Therefore, thermal modeling of outdoor power transformers should include the consideration of variation in environmental temperature. This is expected to create an opportunity for the research in this field. This includes developing computational thermal models simulation using appropriate software tools. These models can be employed to evaluate the actual operational age of power transformers by estimating equivalent life at the reference temperature on the basis of the time period of the estimated temperature cycle causing acceleration of aging. This paper presents a MATLAB/ Simulink based thermal model determining temperature in increasing the aging acceleration factor, which has been used for estimation of the loss of life of the transformer. Further, the effect of outdoors surface temperature due to the influence of solar radiation for increasing the loss of life of power transformer has also been studied and verified by using the thermal model. The proposed model has been validated using real time data gathered from the power transformer in operation at 220kV GSS, Jhalamand, Jodhpur.**

Keywords*—*life of power transformers, solar radiation, thermal modeling, aging acceleration factor, loss of life.

I. INTRODUCTION

Power transformers are one of the main electrical machines in any electrical substation whose functioning directly governs the operational efficiency and the economic capability of the power system. The reliability of any electrical substation is directly affected by the performance of the constituent power transformers. Any kind of failure in the power transformer normally occurs due to the failure of inner insulation materials caused by high stress, under abnormal or critical operating conditions. The most challenging problem in every power transformers is heat dissipation. Greater the heat accumulated without being dissipated, lesser is the life of the power transformer. Although, the design concept of the power transformers include a robust cooling arrangement system, still the changing environmental conditions outside the power transformers always affect its thermal performance. The inner temperature of the power transformer is directly affected by its inside as well as outside conditions.

The inside conditions include the increase in the power losses of the windings and the core which rises the temperature of the power transformer drastically. This generally happen due to the increase in the load of the power transformers. The insulating oil circulating inside the power transformer absorbs heat from the interior of transformer windings and core through conduction. This heat must be transferred to the transformer oil by convection and further, from the oil to the cooling medium via a heat exchanger.

The outside surrounding conditions that impact on the heat dissipation process may include natural conditions as well as built in conditions. The natural conditions include the effect of solar radiation, wind, rain, dust, natural landscape and humidity. Likewise, the built in condition includes transformer external layout, sheds, buildings, abstractions and design of enclosures, etc. The IEEE loading guides and IEC standard documents of the oil- immersed power transformers provide no such information regarding the above surrounding effects and their impact on the thermal performance of power transformer. By doing the thorough study of the above mentioned environmental conditions, it was found that all those factors have different level of harshness which affects the safe and reliable operation of the power transformers.

This paper presents a technique for estimating the loss of life of power transformer with the help of computational thermal model and employing it to calculate the accelerated aging. Further, the proposed thermal model is modified by incorporating the effect of solar radiation on the surface of power transformer. The most important factor while determining the accelerated aging is the hot spot temperature (HST), which is a major reason for the loss of life of transformer. The HST of a transformer primarily depends on the ambient temperature, the rise in the top oil temperature (TOT) over the ambient temperature and the rise in the winding HST over the top oil temperature. HST values for different load conditions can be estimated with the help of these thermal models on the basis of the thermal characteristics of the power transformer and the cooling system.

The proposed thermal model has been used to predict the loss of life of a 160MVA power transformer in operation at 220kV GSS, Jhalamand, Jodhpur (Rajasthan, India). After Introduction section, the paper includes four more sections that present the state of art, proposed methodology, MATLAB/ Simulink model, results and discussion.

II. STATE OF ART

The research work in the field of thermal modeling of power transformers is having some commonly accepted procedures that primarily come under either IEEE or IEC guidelines. IEEE Guide for Loading Mineral Oil-Immersed Transformers [1] is applicable to oil- immersed distribution and power transformers, with different types of constructions, along with

M.B.M ENGINEERING COLLEGE, JODHPUR

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- Automobile Electrical & Electronics

Time: 08:00a.m. To 02:00pm

Venue: Mechanical Dept. (lecture Theater)

VEHICLE FABRICATION

- Material Optimization
- Bending & Mounting
- Material Identification
- Cutting & Drilling
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- Workshop Safety & Importance
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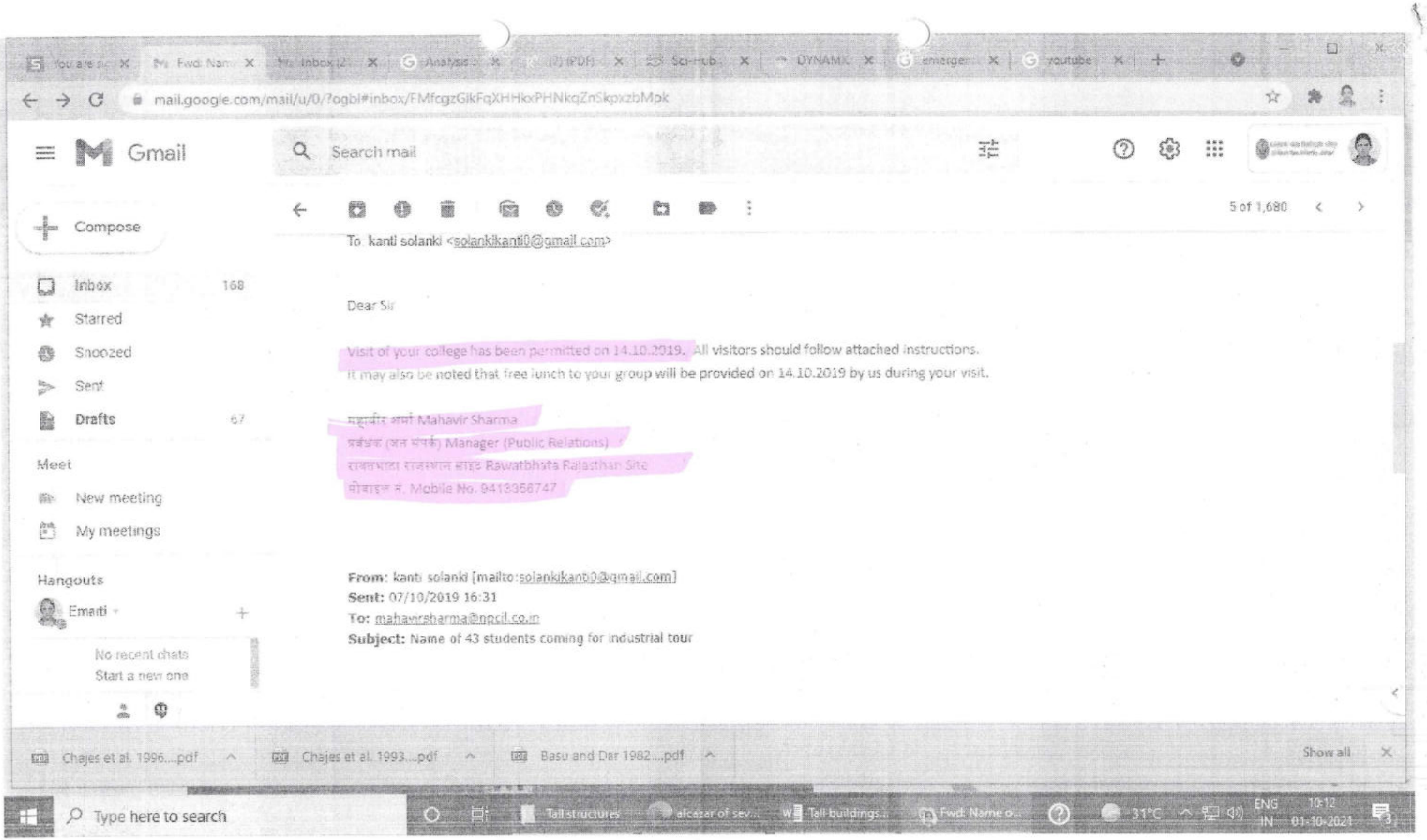
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Gmail
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Compose
Inbox 168
Starred
Snoozed
Sent
Drafts 67
Meet
New meeting
My meetings
Hangouts
Emanti
No recent chats
Start a new one
5 of 1,680
To: kanti solanki <solankikanti0@gmail.com>
Dear Sir
Visit of your college has been permitted on 14.10.2019. All visitors should follow attached instructions.
It may also be noted that free lunch to your group will be provided on 14.10.2019 by us during your visit.
महावीर शर्मा Mahavir Sharma
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रावतभाटा राजस्थान साइट के भ्रमण हेतु विशिष्ट निर्देश
Specific Instructions for RR Site Plant Visit

1. एक समूह में सामान्यतया 50 से अधिक व्यक्तियों की अनुमति नहीं दी जाती। 18 वर्ष से कम आयु के बच्चों को लाने अनुमति नहीं दी जाएगी।

1. Not more than 50 persons in a group is allowed normally. Children below 18 years of age will not be permitted

2. एक बार अनुमोदन के पश्चात आगंतुक सूची में कोई परिवर्तन की अनुमति नहीं होगी।

2. No change is allowed in the visitor list once it is approved..

3. सभी आगंतुकों के पास वैध मूल पहचान पत्र हो।

3. All Visitors should possess their original valid ID proof.

4. संयंत्र स्थल के भीतर भ्रमण के दौरान केमरा/मोबाइल/ इलेक्ट्रॉनिकस उपकरण/सिम/पेन ड्राइव ले जाने की अनुमति नहीं हैं।

4. No Camera/Mobile/Electronic devices/Sim/ PAN Drive is allowed during visit inside plant.

5. वाहन के अंदर और अपने साथ कोई बैग/सामान ले जाने की अनुमति नहीं हैं।

5. Baggage / Luggage in the vehicle or with visitors is not allowed.

6. वाहन चालक के पास वैध ड्राइविंग लाईसेंस तथा वाहन की पंजीकरण पुस्तिका अवश्य हो।

6. Vehicle driver must have valid driving license and RC book of the vehicle.

7. सभी आगंतुकों को सुरक्षा प्रक्रिया के अनुसार व्यक्तिगत सुरक्षा जाँच से गुजरना होगा।

7. Entry of all visitors are subject to personal security frisking as per security procedure.

8. रावतभाटा राजस्थान साइट के सुरक्षा द्वार पर आपको 11 बजे तक पहुँच जाना चाहिए क्योंकि सुरक्षा जाँच में लगभग आधा घंटा और संयंत्र को देखने में लगभग 3 घंटे का समय लगने की सम्भावना है, अतः उसी हिसाब से समय लेकर आएं।

8. You should reach Rawatbhata Rajasthan Site Security Gate by 11 hours because security formalities will take half an hour and visit may take about 3 hours. Hence, manage time accordingly.

JAI NARAIN VYAS UNIVERSITY, JODHPUR
(ACADEMIC SECTION)

No. JNVU/Aca/R/19/ Dated

All the Members of the Academic Council
Jai Narain Vyas University,
JODHPUR.

Sir/Madam,

The viva-voce examination of Ms./Mr. Ramesh Parihar for award of the degree of Ph.D. in **"POTENTIAL OF WIND ENERGY AND IT'S TECHNOLOGY DIFFUSION"** has been fixed to be held on 20th December, 2019 at 11.30 a.m. in the Department of **Mechanical Engineering.**

All the members are requested to witness his/ her performance.

Yours faithfully,

ASSTT. REGISTRAR

No. JNVU/Aca/R/19/ 4161 Dated: 07/12/19

Copy to:

1. All the Members of the Syndicate.
2. The Head, Deptt. of **Mechanical Engineering**, JNVU, Jodhpur with a request to make necessary arrangement for the viva-voce examination.
3. **Prof. Kamlesh Purohit,** Res. Sup. Deptt. of **Mechanical Engineering**, JNVU, Jodhpur.
4. **Ms. Ramesh Parihar,** 'Dev Villas' Shiv Nagar, Behind Mahamandir Railway Station, Jodhpur.

ASSTT. REGISTRAR

JAI NARAIN VYAS UNIVERSITY
JODHPUR 342001 (Rajasthan)

Professor and Head
Department of Mechanical Engr. (1307), Faculty of Engineering & Architecture
JNV University
Jodhpur

Sub: MPET 2019 results

Sir/Madam:
Regards, the list of qualified students of MPET 2019 for your esteemed Department is enclosed. You are requested to initiate the admission procedure as per vacancy at your Department for these students in Pre-Ph.D. program as per University regulations and the essential points as approved by the Honourable Vice Chancellor for communication to you are as under:

i. The Pre-Ph.D. courses shall commence from August 2019 i.e. after JNVU PG examination 2018-19 result declarations; so that there is no problem even for those who are in final year of postgraduation and have qualified MPET examination 2019.
ii. Department-wise reservation for various categories (SC/ST/OBC/SBC /Specially-abled) shall be the same as to be notified for admission to PG classes by the University for the Academic session 2019-20.
iii. Merit shall be computed in a similar way as that of previous session i.e. as approved by the Academic Council and notified by the University
    a. Percentage of Postgraduate marks and MPET marks be averaged, and be considered for computing benefits
    b. Residential benefit (5% for State of Rajasthan and 5% for the Students of JNV University) be added to computed percent
    c. Benefit for the candidates qualifying the UGC/UGC-CSIR, GATE qualified for Lecture then 10%, and if qualified for JRF then 20%
    d. No other benefit is allowed.
    e. The sum of the computed percent and benefits is the sole basis of merit

For Example; if a student has obtained 70% in postgraduation and 60 marks in MPET, and did his/her postgraduation from JNVU, qualified NET (LS), then his/her merit score shall be:

1. PG marks in percent = 70
2. MPET Score = 60
3. Average for benefit = 65
4. Residential benefit = 65 X 5/ 100 = 3.25
5. JNV University benefit = 65 X 5/ 100 = 3.25
6. NET (LS) benefit = 65 X 10/100 = 6.5
7. Marks for Merit = 65 + 6.5 + 6.5 + 13 = 78

The list of qualified students is enclosed, for postal address if required you may ask Academic section for the same. You may advise all the qualified students to submit the printed MPET application form along with statement of marks from schooling as per the requirements for Ph.D. admission, valid category (caste) certificate, domicile certificate, etc. providing sufficient time to these students so that they can submit these to your office. After proper verification of these documents at your end, you may proceed for admission as per rules.

Thanking you

Sincerely yours,

(Sundaramoorthy)

Roll number	Reg No	Student Name	Father Name	Category	MPET Score (Marks)	Mobile	Email
1307001	J18P693047	Abhilasha Chaudhary	Motiram Chaudhary	OBC	81	7715954864	achaudhary693@gmail.com
1307002	J18P633989	Amit Meena	Prabhu Lal	ST	72	8058593597	amit08310004@gmail.com
1307003	J18P958654	Anita Kuradiya	Ram Dayal	SC	52	9521233720	anita.kuradiya@gmail.com
1307004	J18P209649	Arjun Ram	Banshi Lal	OBC	50	7976055404	arbanawariya@yahoo.co.in
1307009	J18P649325	Pradeep Kumar	Bajrang Lal	ST	64	9462425726	pkmech1992@gmail.com
1307011	J18P538147	Ravikant Mordia	Natthi Lal	SC	64	7742067254	ravi.mordia@gmail.com
1307012	J18P420003	Sandeep Yadav	Hajari Lal	OBC	78	9001385963	ydv.sndp3004@gmail.com

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Effect of Derating Factor on the Thermal Performance of Earth Air Tunnel Heat Exchanger: A Review

Ankit Goyal[1], Chandral Pal Singh Inda[1], Sunil Kumar Bhati[1], Dr. Jai Gopal Gupta[2]

Guest Faculty, Department of Mechanical Engineering, Government Women Engineering College Ajmer, India[1]

Head of Department, Department of Mechanical Engineering, Government Women Engineering College Ajmer, India[2]

ABSTRACT: For the transient operating conditions derating factor is used to evaluate deterioration of Earth Air Tunnel Heat Exchanger's thermal performance. Derating factor depends upon soil's thermal conductivity, duration of continuous operation and the pipe length. Collection/rejection of heat from pipe to nearby sub soil is one the major problem in operating earth air tunnel heat exchanger because it alters the soil temperature which have adverse effect on the thermal performance of EATHE system with time. Hence the efficiency of EATHE system greatly depends upon extent of thermal saturation and the time required for self-recovery of soil around the buried pipe. Problem of derating factor are more severe with the soil having poor thermal conductivity.

KEYWORDS: Derating factor, Transient operation, Continuous operation, Thermal saturation

I. INTRODUCTION

Earth air tunnel heat exchanger used underground soil as heat source/sink and air as heat transfer medium. Earth can be considered as huge energy collector and storage medium. Ground has high heat capacity and have a large insulation potential. Hence soil temperature up to a depth of about 3-4 m remain constant throughout the year. Air after passing through underground tunnel exchange heat with surrounding soil and thus outlet air temperature higher in winter and lower in summer. Several researchers studied the EATHE system such as Ghosal et al. [10] investigate the performance of EATHE integrated with green house. Svec et al. [14] presented numerical model for steady-state, transient and cyclic behaviour of several configurations, and it was shown that substantially reduced heat flows were obtained when plastic pipe was used. Sodha et al. [11] also investigated the effect of length, radius of pipe and air mass flow rate on the seasonal cooling potential of an underground air pipe system. Sensitivity analysis based on system parameters such as inlet air temperature, air velocity, pipe length, pipe radius and the pipe depth for evaluating the performance of earth-to-air heat exchangers was carried out by Tzaferis et al. [12] using eight different algorithms. Hakan et al. [13] investigated the performance of Ground Heat Exchangers (GHE) system consisted of pipes buried in the soil, which was used for transferring heat between the soil and the heat exchanger pipes of the Ground Source Heat Pump (GSHP) using a software developed in MATLAB environment. Bansal et al. [7] have studied the effect of three different types of soils with thermal conductivities of 0.52, 2, 4 ($W\ m^{-1}\ K^{-1}$). It was found that maximum performance deterioration with prolonged operation takes place with soil having lowest thermal conductivity. It has been clearly seen through the literature review that thermal performance of EATHE system deteriorates upon its continuous operation, especially in case of lower soil thermal conductivity. Various researcher works on intermittent operation of EATHE to solve the system deterioration problem. Mathur et al. [2] investigated the transient conditions for three different soil conditions considering three operating modes. In first mode EATHE system works continuously for 12 h, in mode-2 it works for 60 min then turn off for 20 min. and in the mode-3 EATHE runs for 60 min and remain off for 40 min. The 3-different soil used i.e. soil-1, soil-2, soil-3 having thermal conductivity 0.52, 1.00, 1.28 ($W\ m^{-1}\ K^{-1}$) respectively.

A Experimental Study on Performance and Emission Characteristics of JATROPHA & DIESEL blend

Chandral Pal Singh Inda[1], Ankit Goyal [2], Sunil Kumar Bhati [1] , Dr. Jai Gopal Gupta [3]

1 Guest Faculty Mechanical Engineering, Government Women Engineering College Ajmer

2 M.Tech scholar Malaviya National Institute of Technology, Jaipur

3 Head of Department Mechanical Engineering, Government Women Engineering College Ajmer

ABSTRACT

The objective of this experimental study is to check the performance characteristics of four stroke single cylinder air cooled diesel engine by using different blends of biodiesel (Jatropha). Two different types of emulsion fuels were taken: B5 (95% diesel and 5% bio-diesel by volume) and B10 (90% dieseland 10% bio-diesel by volume) to compare its' performance with the 100 % diesel. Experiments on the engine were conducted with varying loads from 0 watts to 2000 watts with the help of electrical dynamometer by keeping engine speed constant at 1500 rpm. Experimental study shows the effect on fuel consumption, Mechanical efficiency, exhaust gas temperature and CO_2 (carbon dioxide), CO (carbon monoxide), NO_X (Nitrogen Oxides) and HC (hydro carbon) emission etc. with respect to the load on the engine. Emission of smoke, CO, CO_2, HC and NO_X of blend mixture were higher than the diesel but exhaust temperatures were lower than diesel.

Keyword : *Jatropha, Straight vegetable oil, Blend, Mechanical efficiency*

INTRODUCTION

Continuous increase in fuel prices and fast depletion of the available petroleum reservoirs has renewed an interest in the field of Alternative fuels. Some popular proposed alternatives include ethanol and gasoline blended fuels, plant based oils blended with or substituted for diesel fuel, waste vegetable oil in diesel engines. Biodiesel refers to a vegetable oil or animal fat-based diesel fuel consisting of long chain alkyl (ethyl, methyl or propyl) esters. Biodiesel is typically made by chemically reacting lipids (e.g. Vegetable oils, animal fat {tallow}) with an alcohol producing fatty acid esters. The national biodiesel board (USA) also has a technical definition of "biodiesel" as a mono alkyl ester. As per the National Biodiesel Policy, 2008 government of India aims that 20% of the diesel consumption from plants. To reach these targets we have to cultivate the biodiesel plants in 140,000 km^2 of land, presently in India fuel yielding plants cover less than 5,000 km^2. Most cultivated plant for biodiesel production in India is "JATROPHA". It was reported that the research on the production of biodiesel has increased significantly in recent years because of the need for an alternative fuel which endows with biodegradability, low toxicity and renewability.

Some other alternate fuels which contain hydrogen and oxygen molecule like alcohol fuels, dimethyl ether and biodiesel fuels etc., have been analyzed. Many researches on biodiesel have been found to employee biodiesel as a fuel for diesel engine without modification in the available design. Biodiesels are one of the most promising alternate fuels for diesel engines because of its biodegradable, oxygenated, sulphur free and renewable characteristics. But the viscosity of biodiesel is higher than the diesel which put restriction over the use of larger volume of biodiesel in a blend mixture. To eliminate the problem of viscosity, Turpentine have been used in many researches as matching blend with Jatropha as it has lower viscosity and greater calorific value than Jatropha. Turpentine contains comparable auto-ignition temperature, boiling point and flash point with that of diesel so as to form a homogeneous mixture having more conducive physical properties. Some other problems such as carbon deposition on cylinder wall, fouling of injector nozzles due to unburned fuel, polymerization and gum formation in the presence of oxygen. The issue of gum arrangement can be mitigated by transesterification of bio-fuel and oxidation can be forestalled through the expansion of greasing up oil to bio-fuel. The advantages of biodiesel also includes as follows:

- Closeness to important diesel properties
- Renewable in nature and local availability
- High miscibility with diesel without a blending agent in any proportion
- Excellent lubricity to reduce wear and to increase life of fuel injection pump
- Safe storability and ease in handling and transport
- Ability to reduce CO_2 emissions compared to fossil diesel or remaining CO_2 neutral

Recd
18/5/18 10:15

JAI NARAIN VYAS UNIVERSITY, JODHPUR
(ACADEMIC SECTION)

No.JNVU/Aca/A/ 33

Date: 17/5/2018

The Head
Department of Mechanical Engg.
Jai Narain Vyas University
Jodhpur.

Dear Sir/Madam,

We are sending herewith a list of the candidates who have qualified MPET-2017 for admission in Ph.D. course. You are requested to allot Research Supervisor as per vacant seats in your department. Kindly allot seats on the basis of merit and as per reservation policy.

Yours faithfully,

Asstt. Registrar

Encl: As above

Roll No	Student Name	Father's Name	Subject	Marks	Categor
1757001	RAVI SHEKHAR KINJA	PREMCHAND KINJA	Mechanical Engg.	51	OBC
1757003	LALIT JYANI	RAMDEEN JYANI	Mechanical Engg.	50	OBC
1757007	SANJAY MANGHNANI	PRABHU DAYAL MANGHNAN	Mechanical Engg.	52	GEN

Waste Heat Recovery from the Exhaust of Internal Combustion Engines for the Purpose of Refrigeration and Air Conditioning: A Review

Swaraj Das[1**], Chandrapal Singh Inda[1], Prof. Dilip Sharma[2]
[1]M.Tech in Thermal Engineering, Malaviya National Institute of Technology, Jaipur-302017, Rajasthan
Professor, Mechanical Engineering, Malaviya National Institute of Technology, Jaipur-302017, Rajasthan
**e-mail: swaraj.das30@gmail.com

Abstract— **The depletion of fossil fuels is a serious concern now a days. Internal combustion engines are one of the major consumers of fossil fuels. A large amount of energy from the internal combustion engine is wasted into the environment. Out of the total heat supplied to an internal combustion engine in the form of fuel, approximately 30-40% is converted into useful mechanical work; the remaining heat is expelled to the environment through exhaust gas and engine cooling systems, resulting into entropy rise and serious environmental pollution. So it very important to utilize this waste heat into useful work. The recovery and utilization of waste heat not only conserves fuel but also reduces the amount of waste heat and greenhouse gases dumped into the environment. In this paper a detailed study has been presented about the various conventional and recent methods of refrigeration and air conditioning used for the recovery of waste heat from internal combustion engines.**

Keywords—waste heat recovery, vapour absorption refrigeration, adsorption

I. INTRODUCTION

Waste heat can be defined as the heat which is generated in a process by way of combustion of fuel or chemical reaction, and then rejected into the environment even though it could still be reused for some useful and economic purpose. The essential quality of heat is not the amount but rather its "value". The strategy of how to recover this heat depends in part on the temperature of the waste heat gases and the economics involved. Waste heat recovery is the collection of heat created as an undesired by-product of the operation of a piece of equipment or machinery to fill a desired purpose elsewhere. Large quantity of hot flue gases is generated from Boilers, Kilns, Ovens and Furnaces. If some of this waste heat could be recovered, a considerable amount of primary fuel could be saved. The energy lost in waste gases cannot be fully recovered. However, much of the heat could be recovered and loss minimized by adopting various measures [3].

Depending upon the type of process, waste heat can be rejected at virtually any temperature from that of chilled cooling water to high temperature waste gases from an industrial furnace or kiln. Usually higher the temperature, higher the quality and more cost effective is the heat recovery. In any study of waste heat recovery, it is absolutely necessary that there should be some use for the recovered heat. Typical examples of use would be preheating of combustion air, space heating, or pre-heating boiler feed water or process water. With high temperature heat recovery, a cascade system of waste heat recovery may be practiced to ensure that the maximum amount of heat is recovered at the highest potential

Out of the total heat supplied to an internal combustion engine in the form of fuel, approximately 30-40% is converted into useful mechanical work; the remaining heat is expelled to the environment through exhaust gas and engine cooling systems, resulting into entropy rise and serious environmental pollution. So it very important to utilize this waste heat into useful work. The recovery and utilization of waste heat not only conserves fuel but also reduces the amount of waste heat and greenhouse gases dumped into the environment.

Waste heat losses occur both from the equipment inefficiencies and thermodynamic limitations on equipment and processes. For example, let us consider an internal combustion engine converting 30-40% of supplied energy into useful mechanical work. This implies 60-70% of the supplied energy is lost as waste heat. Exhaust gases leaving the engine can have temperatures as high as 400-600°C which means that these gases have high heat content. Figure 1.1 shows the total energy distribution of an internal combustion engine [19].

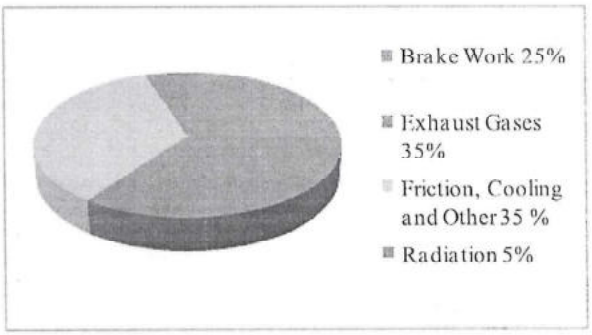

Figure 1: Total fuel energy distribution in I.C Engine

Chandrapal Singh Inda

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Review

A comprehensive review of biodiesel production from waste cooking oil and its use as fuel in compression ignition engines: 3rd generation cleaner feedstock

Digambar Singh [a,*], Dilip Sharma [a], S.L. Soni [a], Chandrapal Singh Inda [b], Sumit Sharma [a], Pushpendra Kumar Sharma [a], Amit Jhalani [a]

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ARTICLE INFO

Handling editor: Prof. Jiri Jaromir Klemeš

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Biodiesel
Physicochemical properties
Performance
Emissions

ABSTRACT

Latest research on fuels focused on exploring better alternatives for compression ignition engines. A large number of studies reported that the properties of biodiesel are comparable with traditional diesel fuel, which makes it a suitable alternative source of energy. Among various available feedstocks, waste cooking oil is considered as the most viable source for biodiesel production. Apart from being economical, it also reduces waste disposal issues. High free fatty acids and water content in waste cooking oil cause the production of biodiesel difficult. In order to overcome this difficulty, two-step transesterification method is preferred for commercial-scale biodiesel production. Several factors like catalyst concentration, alcohol to oil molar ratio, reaction temperature, and time of reaction affect the yield of biodiesel. This article provides a comprehensive review of biodiesel production from waste cooking oil and its use in compression ignition engines. In this review, fatty acid composition, pre-treatment process, catalytic and non-catalytic approaches of biodiesel production with their advantages and limitations are included. The effect of transesterification reaction parameters on biodiesel yield is also covered. The high viscosity of biodiesel than diesel fuel causes an increase in brake specific fuel consumption and a decrease in brake thermal efficiency of engines. Significant reduction in CO, HC, PM, and smoke emissions are identified; however, NO_x and CO_2 emissions found increased due to the oxygenating nature of biodiesel. Overall, it could be concluded that biodiesel produced from waste cooking oil serves as a cleaner and economical alternative source of fuel for compression ignition engines.

1. Introduction

Continuous increase in the world population causes a rapid rise in energy demand. By the y 2030, the world demand for energy was projected to rise by 53% in comparison with y 2001 (Talebian-Kiakalaieh et al., 2013). Non-renewable fossil fuels will soon be depleted at this rate of consumption (Maceiras et al., 2011). The continued use of fossil fuel reserves like coal, oil, and gas may take another 200, 40, and 70 y, respectively (Shafiee and Topal, 2009). Transportation, manufacturing industries, and power production are the major sectors of fossil fuel consumption (Yin et al., 2020). The burning of these fuels generated environmental issues, such as carbon emissions and global climate change (Fan et al., 2018). The growing world's energy demand and global climate change create the need to explore alternative cleaner sources of energy (Yadav et al., 2014). Solar, wind, nuclear, hydro, and biofuels are possible alternative sources of energy (Sharma et al., 2020). Alternative fuel should be technologically viable, affordable, environmentally sustainable, and readily accessible (Lee et al., 2017). In this search, biofuels are the promising renewable source of energy with less carbon emissions (Mikulčić et al., 2020). Biodiesel is found to be the most suitable alternative to diesel fuel due to its comparable properties and cleaner-burning in compression ignition (CI) engines. It is classified into four generations on the basis of the type of feedstocks. First-generation biodiesel is derived from edible feedstocks like palm, sunflower, soybean, etc. Commercialization of biodiesel produced from these feedstocks is difficult due to the high cost of feedstock and food versus fuel competition (Jamil et al., 2018). If these oils are used to produce biodiesel, it will require more plantations, and due to this, unnecessary clearing of forests will happen (Mansir et al., 2018). These

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Review article

A comprehensive review of physicochemical properties, production process, performance and emissions characteristics of 2nd generation biodiesel feedstock: Jatropha curcas

Digambar Singh[a,*], Dilip Sharma[a], S.L. Soni[a], Chandrapal Singh Inda[b], Sumit Sharma[a], Pushpendra Kumar Sharma[a], Amit Jhalani[a]

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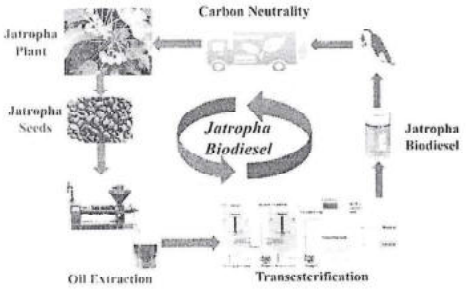
GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords:
Non edible feedstock
Jatropha curcas
Biodiesel production
Biodiesel stability
Physicochemical properties of jatropha
Performance and emissions analysis

ABSTRACT

Due to limited reserves of conventional fossil fuels and their negative impact on global climate and human health, researches are focused to find the alternate energy substitute. Comparable properties of biodiesel make it one of the most promising alternatives of conventional diesel fuel. Jatropha curcas oil (non-edible oil) belongs to the second-generation of biodiesel. In this review, the physicochemical properties, fatty acids distribution, stability of jatropha oil are discussed in detail. The change in fatty acid profile affects the fuel properties, performance and emissions of diesel engines operated on jatropha biodiesel. Oxidation stability of jatropha biodiesel is poor due to the high amount of unsaturated fatty acids. Blending, thermal cracking, micro-emulsification, and transesterification are four basic approaches for production of biodiesel. Transesterification is the most adoptive method due to less expensive operation and high product yield. This article also highlighted the performance and emissions of compression ignition engines operated on jatropha biodiesel and its blends. The lower calorific value of jatropha biodiesel is responsible for the decrease in brake thermal efficiency and an increase in brake specific fuel consumption. High availability of oxygen in jatropha biodiesel reduces HC, CO, and PM emissions, while NOx emission increases significantly. This article provides the most of details of optimum parameters for jatropha biodiesel production and its efficient use in diesel engines.

Abbreviations: JCO, jatropha curcas oil; CI, compression ignition; EASAC, European academies science advisory council; ASTM, American society for testing and materials; LHV, lower heating value; SIT, self-ignition temperature; NTP, normal temperature and pressure; BSFC, brake specific fuel consumption; RDJO, refined deodorized jatropha oil; CSTR, continuous stirred tank reactor; PM, particulate matter; FAME, fatty acid methyl ester; B, biodiesel-diesel blend; FFA, free fatty acid; HHV, higher heating value; BTE, brake thermal efficiency; BP, brake power; RPM, rotation per minute; CC, cubic capacity; FAAE, fatty acid alkali ester

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BioEnergy Research
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A Comprehensive Review on 1st-Generation Biodiesel Feedstock Palm Oil: Production, Engine Performance, and Exhaust Emissions

Digambar Singh[1] · Dilip Sharma[1] · S. L. Soni[1] · Chandrapal Singh Inda[2] · Sumit Sharma[1] · Pushpendra Kumar Sharma[1] · Amit Jhalani[1]

Received: 26 April 2020 / Accepted: 24 July 2020

Abstract

The rapid depletion of conventional fuel reserves and the increase in environmental pollution prompted the search for a sustainable energy solution. Biodiesel is one of the most promising energy substitutes with similar properties as conventional diesel fuel. Surplus availability of palm oil makes it suitable for biodiesel production. Due to the lack of availability of review articles that cover the entire process of palm biodiesel production and its optimum use in diesel engines, the authors were motivated to write this article. Cultivation parameters of palm trees, extraction of oil, and physicochemical properties of palm oil–based biodiesel are explained in this review. The production of palm biodiesel from raw oil can be done through pyrolysis, micro-emulsification, blending, hydro-esterification, and transesterification processes. For high biodiesel yield and less cost of operation, the transesterification method is adopted. The performance and emission parameters of diesel engines that operated on palm biodiesel and its blends are also explained. There is a decrease in brake thermal efficiency and an increase in brake-specific fuel consumption observed with the use of palm biodiesel in diesel engines. A reduction in CO and HC emissions and an increase in NOx emissions are found due to the oxygenating nature of palm biodiesel. This article provides the scientific approach to find out the optimum parameters for palm biodiesel production and its efficient use in compression ignition engines.

Keywords Edible oil feedstock · Palm biodiesel · Biodiesel standards · Physicochemical properties · Palm oil fatty acid profile

Nomenclature

ASTM	American Society for Testing and Materials
BTE	Brake thermal efficiency
CI	Compression ignition
CN	Cetane number
SVO	Straight vegetable oil
CPO	Crude palm oil
BX	Biodiesel blend level
BP	Brake power
EASAC	European Academies' Science Advisory Council
FFA	Free fatty acid
BSFC	Brake-specific fuel consumption
FAME	Fatty acid methyl ester
RPM	Rotation per minute
PM	Particulate matter
SIT	Self-ignition temperature
MW	Molecular weight
AN	Acid number
CP	Cloud point
SV	Saponification value
PP	Pour point
OSI	Oxidation stability index
FP	Flash point
MTBE	Methyl tert-butyl ether
IV	Iodine value
DI	Direct injection
HHV	Higher heating value
IDI	Indirect injection
WC	Water cooled
AC	Air cooled
S	Stroke

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s12155-020-10171-2) contains supplementary material, which is available to authorized users.

✉ Digambar Singh
2017rme9033@mnit.ac.in

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[2] Department of Mechanical Engineering, Faculty of Engineering, Jai Narain Vyas University, Jodhpur, Rajasthan, India

Published online: 31 July 2020

Evolution of solar still : A review

Amrit Lal*, Rishi Purohit, Chandrapal Singh Inda

Department of Mechanical Engineering, Mbm Engineering College, Jai Narayan Vyas University, Jodhpur, Rajasthan, India

*Presented in International Conference on Advancements and Futuristic Trends in Mechanical and Materials Engineering held at Indian Institute of Technology Ropar (IITR), Rupnagar, during December 5-7, 2019.

ABSTRACT

Solar still is a device which gives distilled water as a yield using solar thermal energy on a distillation of brackish water and seawater. This study discusses the results of previous efforts ratify that insulation thickness has a significant impact on the performance of the device. Also, the basin material has an ample effect on the production of distillate. Use of solar storage material in the basin increases productivity. Previous researches show that nano-fluids are widely used to enhance the evaporation rate, which increases distillate production. The results intimate that basin water level plays a significant role in the performance of still. Some modifications like installation of solar mirrors, fins, shallow solar pond, mini solar pond are done on still, which shows an increase in productivity of the device. This review paper gives an overview of the basics of solar still working, performance, and developments to enhance its efficiency.

Keywords:
Nano-Fluids,
Solar Still,
Heat Transfer,
Evolution,
Thermal Efficiency.

1. Introduction

Water is an important constituent for human life. Now a time water is a fundamental human need for domestic and industrial use. As earth is covered from 71% of water, of which 97.5% being salt water and 2.5% is fresh water and only 1% is easily accessible, most of it trapped in glaciers and snowfield, only 0.007% of the whole water is available for use and to fulfil human fresh water demands. Now a time water scarcity is a global issue and due to urbanisation and industrialisation, human population had increased so demand for fresh water is also increasing day by day.

To solve this problem, Solar still water desalination technique was developed. Solar desalination is an alternative method to provide fresh water from saline sea water, brackish water. Solar stills can serve ultimate solution for providing potable water in those areas where availability of solar energy is in abundance but water quality is not up to standards. It uses solar radiation to evaporate water vapour from brackish water (waste water) which is then condensed and collected to give distilled water to be served as potable water.

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Along with fresh water as global need, energy demand is also a major issue, 80% of global energy demands are fulfilled by fossil fuel [3] which are non-renewable sources of energy, which create carbon emission issues , which leads to unexpected climate change, global warming such environmental issues rises due to use of non-renewable resources to meet global demand. Total worldwide renewable energy desalination installation amount to capacities less than 1% of that of conventional fossil fuel desalination plants. This revive us to make renewable energy as an alternate source for clean, efficient energy [4] source and so comes the solar still water desalination technique which provide fresh potable water. Solar distillation uses solar energy as a renewable source of energy which makes it eco-friendly and feasible for clean energy crises. Also, the construction material required is easily available and subtly fabricated.

Solar still has advantages like its simplicity, low installation cost, great advantage in remote areas, easy maintenance, uses zero cost solar energy, pH and other water qualities of distillate are claimed to acceptable and are under standards [1],[2]. Although the major disadvantages with

Synthesis of steam through parabolic trough collector-a review

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**Presented in International Conference on Advancements and Futuristic Trends in Mechanical and Materials Engineering held at Indian Institute of Technology Ropar (IITR), Rupnagar, during December 5-7, 2019.*

ABSTRACT

From the early days of ancient Egyptians, human has known the power of the Sun. Solar energy is innocuous, and due to increasing enervation of fossil fuels, it has become essential for having alternate sources of energy. Over the years, researchers and technocrats have advanced in the technology of converting solar energy, obtained from sunshine to heat energy. This paper reviews the practical development of solar steam generation system through Parabolic Trough Collector (PTC), using concentrated solar power, and making all this happen in an economically feasible way. This paper reviews the design, construction, and optical proficiency of Solar Parabolic Trough Concentrator (PTC) with different reflector surfaces.

Keywords:
Parabolic Trough Collector (PTC),
Steam Generation System,
Concentrated Solar Power (CSP).

1.Introduction

The modern era has been dealing with the deficiency of energy, and the introduction of renewable energy sources is the need of the hour. Energy crisis and increased demand for energy have also spiked the energy costs. The current situation has compelled the industries, to use conventional fuels and for paying high prices to generate the same amount of heat that could be generated by a simple setup of renewable sources of energy. Solar energy is one such renewable, high exergy, radiant, and adaptable form of energy. With modern devices and techniques, the use of solar energy is made possible and economically feasible not only at industrial scale but also at small scale for the use at homes and commercial places in the form of solar heaters, boilers, and air heaters and also generate steam which is further used in cooking and for other purposes.

The primary requirement of most of the industries, i.e., thermal energy, which used to drive a range of simple and complex industrial processes, is called Industrial Process Heat (IPH). The thermal energy demand for IPH is generally below 300°C. According to Stadjuhar [1], 37.2% of the total IPH demand is utilized in the temperature range of 92-204°C.

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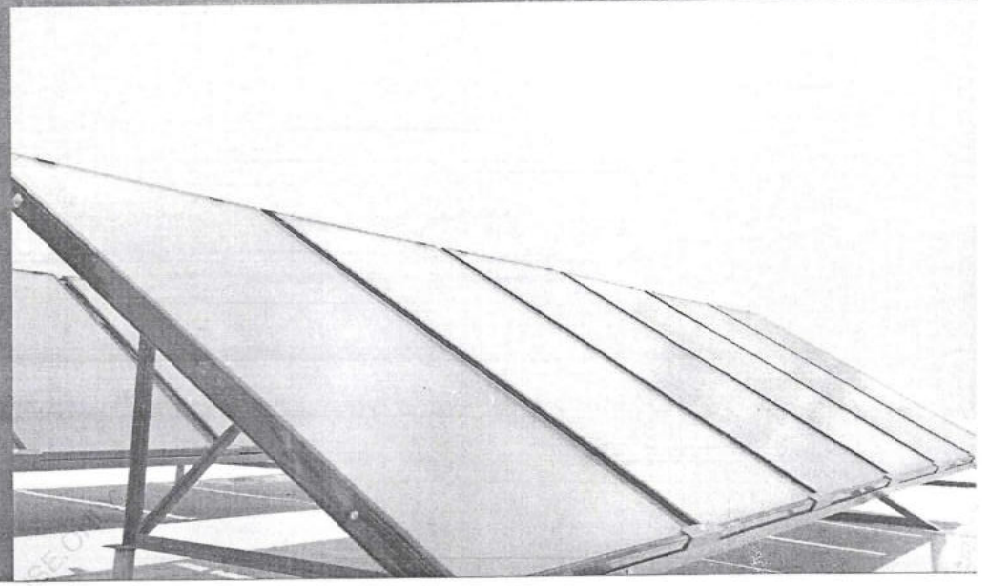
The solar thermal collector works as a heat exchanger that transform solar radiation energy into internal energy of the transport medium. The significant component of any solar system is the solar collector. A collector is a device that absorbs the incoming radiation of solar energy and transmits or concentrates this energy onto a receiver. Solar collectors are either concentrating or non-concentrating type. In non-concentrating collectors, the collector area is much larger than the absorber area.

Among the two, concentrated plate collectors are more efficient and are capable of achieving high temperatures. There are various designs of concentrated collectors available currently like - parabolic trough collector, power tower, Fresnel concentrator, and parabolic dish collector. Among these, the parabolic trough collector is the most efficient.

The very first working module of a parabolic trough collector was developed by a Swedish engineer John Ericsson with a total collector surface of 3.25m2 and was able to drive the small steam engine of 373W. Later, in 1913, the

Renewable energy is an alternative source of energy which can be useful to meet the difference between the supply and demand of energy. Solar is an effective renewable energy source for a region like Rajasthan that is blessed with high solar radiation. Due to its simplicity flat plate collector has gaining more popularity. Solar air heater is type of flat plate collector which utilizes solar energy into thermal energy to heat the air.Use of thermal energy storage gaining importance with the solar based applications since it can be very helpful in improving the performance of the solar collectors. Energy stored in the form of heat and cold can be use later. Solar energy can be collected by means of absorbing solar radiation therefor absorber plate is used in the flat plate collector. Solar air heater is a flat plate collector i.e. use for transfer collected heat to air. Solar air heater is used for the purpose of space heating and drying the crops, seeds, etc. Performance analysis of solar air heater with and without thermal energy storage was the objective of the work. Improvement in the performance was found when thermal energy storage medium used.



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Analysis of Solar Air Heater with and without Heat Storage material

Integrated with Thermal Heat Storage

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Thermally sprayed alumina and ceria-doped-alumina coatings on AZ91 Mg alloy

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ABSTRACT

Present study deals with the development of ceramic based coatings for Mg alloys using thermal spray technique, where Al_2O_3 is doped with CeO_2. Coatings characteristics and other responses are recorded using Nano-indenter, Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDS), X-ray Diffraction (XRD) and Tribometer. The tribological behavior is recorded in terms of specific wear rates and coefficient of friction under lubricated reciprocating sliding condition for different loads and speeds. Ceria doped alumina coatings showed improved responses. The elastic modulus and nano-hardness of CeO_2 doped alumina coating was 13% and 53% higher than alumina coating, respectively. Under high load and high velocity conditions, ceria doped coating registered 40% reduction in specific wear rate. Also, the ceria doping helped in lowering the coefficient of friction during sliding.

1. Introduction

With promising mechanical and physical properties, Mg alloys can be seen as a futuristic material of the 21st century. Mg alloys have been used in many applications for aerospace, automotive and electronic, biomedical industries [1]. However, the low corrosion and wear resistance of these alloys restricts their widespread use [2]. Corrosion and wear resistance are surface related properties and can be enhanced by surface protection. According to Archard's equation surface hardness controls the wear resistance [3]. Being one of the economical and versatile method, hard coating on Mg alloys can enhance the surface related responses. There are many coating techniques such as chemical vapor deposition (CVD) [4,5], physical vapor deposition (PVD) [4–6], electrodeposition [7,8], micro-arc oxidation [7,9], thermal spray [10,11], cold spray [11,12], etc. Thermal spray techniques are found to be promising tool to deposit wear and corrosion resistant coatings because of their good density and adherence to substrate. These coatings are well suited even at higher temperature applications [13–15]. The tribological behavior of thermal spray coatings are significantly improved than that of the bulk material [16]. Among thermal spray techniques, Detonation gun provides the coatings with low porosity, high bond strength and hardness [17]. Many researchers [5,8,10,18–20] have attempted coating to enhance the surface properties of Mg alloys but through thermal spray is barely reported.

Ceramic coatings have been extensively used in various industries such as power generation, automotive, aerospace for heat and wear resistance requirements. Especially, Al_2O_3 or Al_2O_3 based coatings possess high stability to chemical attack, high hardness and refractoriness which make them suitable for wear resistant applications [21]. He et al. [22] and Zhang et al. [23] reported that doping with rare earth elements into ceramic based coatings improves the mechanical properties and microstructural characteristics. Sharma et al. [24,25] reported that flame sprayed La_2O_3 doped Ni based coatings led to improvement in tribological properties of the coating. Li et al. [26] observed that addition of Y_2O_3 in laser cladded TiB/TiC reinforced coatings improves the sliding wear resistance and refines microstructure of the coatings. So it can be sought that doping with rare earth oxides in thermally sprayed coating can lead to improvement in ceramic based coatings.

Among rare earth elements, ceria has promising characteristics leading to improved mechanical and chemical properties [22,27]. Zhang et al. [28] conducted a tribological study on Fe based Ni-Cr-RE coatings, and concluded that addition of ceria in a small amount strengthen the metallurgical bond between coating and substrate thereby strengthening the interface by refining the microstructure and making more fine and compact. In another study conducted by He et al. [22], microstructural and wear properties of Al_2O_3 – CeO_2/Ni based plasma sprayed

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EXPERIMENTAL ANALYSIS OF A SOLAR PARABOLIC TROUGH COLLECTOR

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ABSTRACT

In this study, an experimental analysis of a small-sized solar parabolic trough collector (PTC) has been done to investigate its performance. A PTC system with 4.075 m^2 aperture area was evaluated in this paper. The experimental setup is made up of stainless steel reflector. The performance of PTC was investigated in two parts. In the first part, performance investigation was done by using copper and stainless-steel (1 inch diameter) as receiver tube material at different mass flow rates. In the second part, a comparison was done using bare receiver tube and receiver tube (0.5-inch) covered with acrylic cover at different mass flow rates. Both the cases were studied by using water as the heat transfer fluid. This study was conducted for finding out the better combination of receiver tube, receiver tube material, diameter of receiver tube and mass flow rate. From first analysis, it was observed that the copper receiver tube is showing better performance at both the mass flow rates 0.01 kg/s and 0.02 kg/s in comparison of stainless steel tube. The maximum thermal efficiency of 35.9% is obtained in case of a copper receiver at 0.01 kg/s mass flow rate. From the second analysis, it was observed that receiver tube with acrylic cover is showing better performance than a bare tube. The maximum thermal efficiency of 61.4% was obtained in case of a receiver with an acrylic tube.

Key words: Parabolic trough collector, receiver tube, acrylic tube, thermal efficiency

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1. INTRODUCTION

Population explosion and advancements in technologies increase world's energy demand. At present, most of these energy demands are fulfilling by the non-renewable energy sources such as fossil fuels: coal, oil and natural gas. These energy sources produce harmful emissions along with electricity generation which is dangerous for human health and to the environment. Therefore, consideration of renewable energy sources is very important to reduce harmful gases and to meet the requirements of the living population. On our planet, renewable energies are present in various forms such as solar energy, hydropower, geothermal energy, wind energy, biomass power and others. Solar energy is one of the biggest energy sources

among all these renewable energy sources. It is one of the promising and most proven renewable energy option to substitute these non-renewable energy sources [1]. Solar energy on the earth surface can be harness by various concentrating and non-concentrating technologies such as flat plate collector, linear fresnel collector, parabolic trough collector (PTC) and parabolic dish collector. Among all the concentrating and non-concentrating solar energy technologies, PTC is the most suitable and used technology.

Experimental analysis on PTC was conducted by various researchers to investigate and enhance its performance. Zou et al. [2] experimental study has been done to evaluate the performance of PTC using mirror reflector and evacuated aluminum receiver. They obtained 67% thermal efficiency even with solar radiation less than 310 W/m^2. Results of this study indicated that when temperature of working fluid is under 100°C, thermal efficiency improves

Narendra Sing

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ANALYZING THE EFFECT OF WORKPIECE STIFFNESS VARIATION ON THE STABILITY IN FLANK MILLING OF AN IMPELLER BLADE

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ABSTRACT

While the blade like components of uniform thickness have been investigated for their stability in machining, impeller blade like components with varying thickness along the length and with varying width along the height have received little attention so far. Therefore, this work focuses on analyzing the effect of variation in workpiece flexibility, stiffness and rigidity on the stability of flank milling operation on impeller blade like component. Extensive experimentation was done on work specimens of (i) varying thickness along length and (ii) varying width along height. Cutting forces, acceleration and deflection of tool and work specimens were captured during all the experiments through FFT plots, chatter boundary plots followed by the stability region diagrams. The cutting force data was acquired in time domain at five different locations under varying conditions of spindle speeds and depths of cut, and were the main inputs for plotting stability region diagram. The consolidated stability region diagram shows that the stable machining, having the few chatter peaks of low frequency and magnitude, is possible at the feed rate of 240 mm/min and depth of cut of 1.5 mm, when the thickness as well as the width variations in the impeller blade like specimens are considered.

INTRODUCTION

Impeller blades have applications in turbines and impellers for the transformation of hydraulic or pneumatic energy into useful mechanical work. They are usually machined out of a solid block to maintain its integrity and structure. While manufacturing the blades through machining, it is generally observed that due to a variation in cross section, high cutting forces are generated. These forces cause a significant blade deflection, which eventually could lead to variation in dimensional tolerances. The forces may lead to structural instability of the process. Thus, modeling and analysis of impeller blades during machining has been a topic of great interest especially in the aerospace manufacturing domain.

Several researchers have investigated machining of impeller blades, to understand and to analyze the effect of workpiece thickness on the machining stability. Experimental methods have been used to investigate the machining process stability on thin structures [1]. Budak [2] evolved the speed and depth of cut by using variable pitch to avoid chatter vibrations while milling impeller surfaces. Shamoto et al. [3] performed double sided milling. Lee et al. [4] found that vertical upward cutting orientation was the most stable among the horizontal upward, horizontal downward, vertical upward and vertical downward for machining of thin walled structures.

Analytical models have been developed to predict and control chatter vibrations by controlling the machining parameters. Thevenot et al. [5] generated a 3D SLD for thin walled structures to obtain vibration frequency at each position of cutting operation. The authors suggest the use of variable speed and depth of cut to reduce chatter vibrations. Bravo et al. [6] included the stiffness and natural frequency of the combined system of tool and workpiece for predicting stable depth of cut and speed for flexible plates. Tang et al. [7] proposed 3D SLD for thin wall workpiece including axial depth of cut, radial depth of cut and spindle speed. Unlike the usual axial depth of cut (or radial depth of cut) dependent SLD, they proposed a method, where axial as well as radial depths of cut and spindle speeds were considered while plotting a 3D SLD. Fuminaro et al. [8] suggested that not only the stable depth of cut can be found out for a given stiffness and workpiece thickness, but also the stiffness and workpiece thickness can be predicted for stable machining under given speeds and depths of cut conditions. Altintas and Budak [9] used time varying dynamic cutting force coefficients that are approximated by their Fourier series components to calculate chatter free axial depth of cuts and spindle speeds using analytical models. Sekar et al. [10] proposed an analytical model for stability analysis in turning process of tailstock-supported workpiece based on a dynamic

cutting force model that considers relative motion between the cutting tool and workpiece.

Thus, there are several methods, experimental and analytical to minimize the chatter vibrations in a thin-walled workpiece. Researchers have focused either on changing the system parameters, like spindle speed or using variable helix angle. They have also proposed different SLD approaches by including different cutting parameters like radial DOC, angle of cutting, stiffness, etc. Most of the methods and models have focused on chatter minimizing techniques for simple rectangular workpieces. Some of them have also worked on thin rectangular workpieces. Thus, it can be concluded that very little attention has been paid to analyzing the chatter in thin workpieces as the cross sections of the workpieces vary, like impeller blades, which may affect the dynamic machining behavior and stability.

Therefore, the objective of this work is to understand and investigate the effect of varying workpiece stiffness on the stability of flank milling on thin and tapered workpieces. This work accordingly involves experimentation with two different kinds of specimens: (i) one with varying thickness along the length and (ii) the other with varying width along the height. The following sections give details of the experimental work and the associated results.

EXPERIMENTAL WORK

The work involves pre-processing and post-processing of results of flank milling of thin-walled tapered impeller like components. In pre-processing, data acquisition was done from NCTC sensor, piezoelectric dynamometer and contact type accelerometers. The post processing involves FFT generation, SLD formation and finding optimal cutting conditions. Impeller blades are very complex and ...

leading edge to 24.99-25.01 mm at the trailing edge. The length of the blade is around 180 mm at the top and is 120 mm at the bottom. The thickness of the blade at the leading edge is 0.50 mm at the top and 2.00 mm at the bottom. The thickness also varies from 0.50 mm at the top and 0.75 mm at the bottom for the trailing edge. The thickness of the blade at the middle section of its length is about 1.15 mm. The model essentially represents machining over structures that have varying stiffness. In general, the structure of the blade is considered to have low thickness at the leading and trailing edges and a maximum thickness at the central length of the blade.

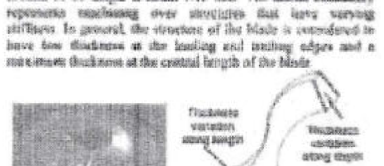

Fig. 1(a-b): a. CAD model of impeller b. Schematic of complex structure of an impeller blade

Also, the blade is considered to have a variation in its thickness along its height. At the same time, the variation in the height of the blade over its entire length has been neglected. Thus, the impeller like work specimens used in the experimental work have the following features: i) thin sections at the leading and trailing edges, ii) the strongest section at the center of the length, iii) uniform variation in the thickness of the work specimens along its height spread over the entire length of the work specimen, and iv) the length of the work

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Erosive Corrosive Wear Performance of Single Layer CrN Coatings on AISI 304 Stainless Steel in Sea Water Centrifugal Pumps using Steady State Analysis

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***Abstract*— The purpose of present study was to investigate the erosive corrosive wear behavior of single layer (CrN) coatings on AISI 304 Stainless Steel samples with varying coating thickness (0-200 nm) in the range of 50 nm. The slurry jet erosive test was conducted on Slurry Jet Erosion Tester in saline slurry (3.5wt% salt) under the different working conditions with varying impact velocity (10-25 m/s), impingement angle (30°-75°) and erodent discharge (160-280 gm/min). Steady state analysis was applied to find optimum parameters for the minimization of erosion rate of various coated and uncoated samples. The finding of steady state condition tests indicated that the erosion rate increased with the increase in impact velocity and erodent discharge but decreased with the increase in coating thickness. The results also indicated that erodent discharge was the most significant factor, followed by impingement angle and impact velocity for the CrN coated samples. The SEM characterization of the eroded samples was carried out in order to analyze the topography of the eroded surface to investigate the wear mechanisms induced by slurry jet erosion test.**

***Keywords*— Erosive wear, corrosive wear, single layer coating, Steady state analysis, Scanning electron microscope (SEM).**

I. INTRODUCTION

Erosion corrosion is the increase in the rate of degradation of the material caused by the combined action of electrochemical corrosion and mechanical wear processes. Corrosion is a material degradation process which occurs due to electrochemical action, while erosion is a mechanical wear process. When these two processes act together especially in the marine environments, it is known as erosion-corrosion. It is one of the major causes of failure in the nuclear power plants, chemical, petrochemical industries and marine environments where combined effect of erosion and corrosion phenomena occurs. In the marine field, this study applies to ship and boats. The study is equally beneficial in those areas where the underground salty water is supplied for household purposes, and the same has to be delivered to the overhead tank.

In the liquid- particle flow, the sand particles get impinged on steel surface which remove a layer of protective film from its surface. The chloride ions act rapidly on the exposed surface having discontinuity. In this way pure erosion and erosion enhanced corrosion are the dominant mechanisms that degrade the metal surface in erosion corrosion [1-6]. In order to improve the physical, mechanical and surface wear of metal such as steel, surface treatment such as modification of surface using silane, electroplating, Nitriding and coating etc are used [7-13]. A majority of surface modification lead to improved corrosive characteristics of the steel. Hence, they are also called corrosion inhibitors and are used on variety of steels. Neville et al. [7] studied erosion-corrosion of engineering steels by the use of chemicals on X65 pipeline steel, 13Cr martensitic stainless steel and super-duplex stainless steels. They concluded that inhibitor has a greater effect on the corrosion component of carbon steel but offers no protection on super-duplex stainless steel under the conditions tested. In another research, Hu et al.[14] assessed the effect of corrosion inhibitor on erosion corrosion of API-5L-X65 stainless steel in multi-phase jet impingement conditions and found that corrosion inhibitor provides up to 20% protection in erosion corrosion conditions and that oil phase reduces the erosion component by reducing the particle velocity in the flow conditions. Yao et al. [15] investigated a new method for protecting bends from erosion in gas-particle flows and reported that adding ribs on the outer-wall of the inside bend can significantly improve bend's erosion protection ability. Surface coating technology has also been deployed to enhance the erosive corrosive characteristics of the metals. Multilayer coatings offer protection against synergistic effects on bare stainless steel surfaces.

Corrosion Measursement, Friction testing and XRD Analysis of Single Layer CrN Coatings on AISI 304 Stainless Steel

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Keywords—*Erosive -corrosive wear, single layer coating, Potentiostat, Coefficient of friction, XRD analysis.*

I. INTRODUCTION

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Corrosion resistance can also be increased by providing an interlayer of a suitable material [16]. Coatings of CrN and CrCN have been commonly used in industry and research to improve surface properties of materials. However, CrCN coatings provide better corrosion resistance than CrN coated samples due to its superior mechanical properties [17]. Shan et al. [18] fabricated CrN coatings on 316L stainless steel substrate by multi-arc ion plating system, performed Polarization tests and

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Taguchi analysis of single layer CrN coatings on AISI 304 Stainless Steel to study its erosive corrosive wear behaviour

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Abstract— *The purpose of present study was to investigate the erosive corrosive wear behavior of single layer (CrN) coatings on AISI 304 Stainless Steel samples with varying coating thickness (0-200 nm) in the range of 50 nm. The slurry jet erosive test was conducted on Slurry Jet Erosion Tester in saline slurry (3.5wt% salt) under the different working conditions with varying impact velocity (10-25 m/s), impingement angle (30°-75°) and erodent discharge (160-280 gm/min). Taguchi analysis was applied to find optimum parameters for the minimization of erosion rate of various coated and uncoated samples. The results of Taguchi experiments also indicated that among all the factors, impact velocity became least significant when samples were coated with CrN whereas it was most significant for uncoated samples. Coating thickness was the second most significant factor in the case of CrN coated samples. PVD- CrN coatings reduced the wear rate by nearly 2 times.*

Keywords— *Erosive wear, corrosive wear, single layer coating, Taguchi Orthogonal Array.*

I. INTRODUCTION

Erosion corrosion is the increase in the rate of degradation of the material caused by the combined action of electrochemical corrosion and mechanical wear processes. Corrosion is a material degradation process which occurs due to electrochemical action, while erosion is a mechanical wear process. When these two processes act together especially in the marine environments, it is known as erosion-corrosion. It is one of the major causes of failure in the nuclear power plants, chemical, petrochemical industries and marine environments where combined effect of erosion and corrosion phenomena occurs. In the marine field, this study applies to ship and boats. The study is equally beneficial in those areas where the underground salty water is supplied for household purposes, and the same has to be delivered to the overhead tank.

In the liquid- particle flow, the sand particles get impinged on steel surface which remove a layer of protective film from its surface. The chloride ions act rapidly on the exposed surface having discontinuity. In this way pure erosion and erosion enhanced corrosion are the dominant mechanisms that degrade the metal surface in erosion corrosion [1-6]. In order to improve the physical, mechanical and surface wear of metal such as steel, surface treatment such as modification of surface using silane, electroplating, Nitriding and coating etc are used [7-13]. A majority of surface modification lead to improved corrosive characteristics of the steel. Hence, they are also called corrosion inhibitors and are used on variety of steels. Neville et al. [7] studied erosion corrosion of engineering steels by the use of chemicals on X65 pipeline steel, 13Cr martensitic stainless steel and super-duplex stainless steels. They concluded that inhibitor has a greater effect on the corrosion component of carbon steel but offers no protection on super-duplex stainless steel under the conditions tested. In another research, Hu et al.[14] assessed the effect of corrosion inhibitor on erosion corrosion of API-5L-X65 stainless steel in multi-phase jet impingement conditions and found that corrosion inhibitor provides up to 20% protection in erosion corrosion conditions and that oil phase reduces the erosion component by reducing the particle velocity in the flow conditions. Yao et al. [15] investigated a new method for protecting bends from erosion in gas-particle flows and reported that adding ribs on the outer-wall of the inside bend can significantly improve bend's erosion protection ability. Surface coating technology has also been deployed to enhance the erosive corrosive characteristics of the metals. Multilayer coatings offer protection against synergistic effects on bare stainless steel surfaces.

Corrosion resistance can also be increased by providing an interlayer of a suitable material [16]. Coatings of CrN and CrCN have been commonly used in industry and research to improve surface properties of materials. However, CrCN coatings provide better corrosion resistance than CrN coated samples due to its superior mechanical properties [17]. Shan et al. [18] fabricated

Jagmohan Rao

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ACGT2016 ***

COMBUSTION IN THERMALLY AND COMPOSITIONALLY STRATIFIED MIXTURE: A 2D DNS STUDY

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ABSTRACT

HCCI mode of combustion suffers from drawbacks like lack of ignition control, rapid pressure rise. Stratification of charge prior to combustion is one of the ways to control the combustion in the HCCI engine. 2D DNS has been carried out to study the effect of thermal and charge stratification on combustion in *n*-Heptane/air mixture at high pressure and constant volume. Peak HRR falls in the stratified environment compared to homogeneous environment due smaller number of sites favorable for combustion in the stratified environment. Peak HRR was found to drop sharply and combustion duration increased with increasing level of temperature stratification. Equivalence ratio stratification also affected the peak as well as duration of combustion. These effects were attributed to the primary dependence of ignition delay on temperature.

Keywords: DNS, HCCI, Stratification, Ignition delay

NOMENCLATURE

2D	Two Dimensional
C_{pm}	Specific heat at constant pressure of m^{th} species
DNS	Direct Numerical Simulation
HCCI	Homogeneous Charge Compression Ignition
HRR	Heat Release Rate
RMS	Root Mean Square
$V_{d,j}$	j^{th} component diffusion velocity of m^{th} species (m/s)
W	Molecular weight (kg/mole)
$\overline{W}$	Mean molecular weight of mixture (g/mole)
Y_m	Mass fraction of m^{th} species
e_t	Total energy per unit volume (J/m^3)
h_m	Enthalpy of m^{th} species (J/kg)
$\Delta h^0_{f,m}$	Heat of formation of m^{th} species (J/kg)
p	Pressure (N/m^2)
q_i	Heat flux in i^{th} direction (W/m^2)
t	Time (s)
u_i	i^{th} component of velocity (m/s)
δ_{ij}	Kronecker delta
μ	Dynamic viscosity (N-s/m^2)
ρ	Density (kg/m^3)
τ_{ij}	Stress tensor (N/m^2)
$\dot{\omega}_m$	Molar rate of production of m^{th} species (mole/m^3-s)

INTRODUCTION:

Combustion in the internal combustion engines takes place at the extremes of stratification levels, from nearly homogeneous mixture in SI engine to mixture with high temperature and composition gradients in conventional CI engines. High fuel concentration regions in CI engine produce soot and high flame temperature regions produce NOx. Attempts are underway to combine properties of SI and CI engines through HCCI technology to avoid such regions. However HCCI mode of combustion possesses drawbacks like lack of ignition control, high noise, pressure rise at high loads. Stratification of temperature and composition midway between homogeneous and conventional CI engine is one of the strategies proposed for eliminating these drawbacks . Yao *et al.*[1]. Study of influence of stratification on the ignition and combustion is thus essential and applicable to the gas turbine combustor as well.

n-Heptane is reference fuel used to study auto-ignition in CI engines environment and engine knock because cetane number of *n*-Heptane, approximately 56, is closer to commercially available diesel fuel. Curran *et al.*[2]. It has been observed that depending on the initial temperature and pressure conditions, *n*-Heptane can undergo ignition and combustion in two stages [3-4]. Several Direct Numerical Simulation (DNS) studies have been done to understand its ignition and combustion. Based on 2D as well as 3D DNS studies of *n*-Heptane in a non-premixed mixture, Sreedhara and Lakshmisha [5,6] found that auto-ignition occurred at places where low scalar dissipation and most reactive mixture fraction value jointly exist. Location of auto-ignition points relative to vortices was also studied and auto-ignition spots were found at core of vortices. Bansal and Im [7] studied the auto-ignition of H$_2$/air mixture with different correlations between temperature and equivalence ratio fluctuations. Different modes of

combustion were observed and the criterion to distinguish between these modes was also proposed. Liang *et al.*[8] performed the DNS of n-Heptane/air mixture only in presence of temperature fluctuations. Again different patterns of combustion were observed depending on level of stratification. Common feature of many studies is that, with stratification heat release spreads over a longer duration and peak of heat release rate also falls. However behavior of ignition delay with various levels of stratification is not monotonic, Takei *et al.*[9].

The objective of the present study is to investigate the effect of thermal and composition stratification on heat release rate and ignition delay. Single step mechanism of *n*-Heptane oxidation is used. In our study five different cases with thermal and mixture stratification have been considered. Local fluctuations in temperature have negative correlation with fluctuations in equivalence ratio. Thermal stratification of 15 K, 30 K, 60 K and compositional stratification of 0.1, 0.15 and 0.2 have been used.

Numerical Schemes and Initial Conditions

Conservation of Species:

$$\frac{\partial \rho Y_m}{\partial t} + \frac{\partial \left(\rho Y_m u_j\right)}{\partial x_j} = \frac{\partial \left(\rho Y_m V_{m,j}\right)}{\partial x_j} + W_m \dot{\omega}_m \qquad (4)$$

Where,

Total energy $\left(e_t\right)$ is defined as:

$$e_t = \rho \frac{u^2 + v^2 + w^2}{2} + \rho \sum_{m=1}^{N} \left(h_m Y_m\right) - p \qquad (5)$$

The pressure p is computed using the perfect gas law:

$$p = \rho \frac{R}{\overline{W}} T \qquad \text{And} \qquad \overline{W} = \rho \sum_{m=1}^{N} \left(\frac{Y_m}{W_m} \right)^{-1} \qquad (6)$$

Viscous stress tensor $\left(\tau_{ij}\right)$:

Ankit Dev

ISES International Solar Energy Society

Conference Proceedings

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11th ISES EuroSun2016 – Design and Dynamic Simulation of a Small Multipurpose Solar Thermal System for Rural Necessities

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Abstract

The proposed paper explains in detail the sizing process and dynamic simulation of a solar powered system designed to satisfy the energy demand of a school in the rural area of Haridwar district, India. The system is able to satisfy heterogeneous power demands for typical rural applications: hay pasteurization process, refrigerated storage for vegetables (explained in a second publication) and steam cooking. The considered layout is first described and evaluated under steady state assumption to identify the rough size of the main components. The specific configuration is then implemented and simulated using a Modelica-based layout, specifically developed for the case study. The dynamic behaviour of the system for different power requirements is simulated and analyzed over a typical day of usage. The goal to properly size and study the solar field, Phase Change Material (PCM) thermal storage and overall Balance Of Plant (BOP) is achieved.
Simulations results show that an optimal sizing can be achieved despite the large area of solar collectors required to ensure the power requirements of the facility. A better trade off between economic investment and system effectiveness can be accomplished slightly shifting the daily cooking activities.
The final designed system is going be implemented and commissioned in the proposed rural area. Future work will consist in comparing experimental data with the dynamic model predictions.

Keywords: CSP, Solar cooking, Solar cooling, Solar hay processing, Dynamic modeling, Dymola.

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Conference Proceedings of the Society for Experimental Mechanics Series

Kanti Lal Solanki

Carter Ralph · Meredith Silberstein
Piyush R. Thakre · Raman Singh *Editors*

Mechanics of Composite and Multi-functional Materials, Volume 7

Proceedings of the 2015 Annual Conference on Experimental and Applied Mechanics

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National Project Implementation Unit

(A UNIT OF MINISTRY OF HUMAN RESOURCE DEVELOPMENT, GOVERNMENT OF INDIA FOR IMPLEMENTATION OF WORLD BANK ASSISTED PROJECTS IN TECHNICAL EDUCATION)

18th June 2019

CERTIFICATE OF SANCTION

This is to certify that a Research Proposal entitled, "Development of HVOF coatings on Al alloy composites for impeller blades in centrifugal pumps." has been approved under "TEQIP Collaborative Research Scheme" to the team of following Collaborators:

1	Mr. ALOK VATS	Principal Investigator	MBM Engg College, Jodhpur
2	Mr. PRADEEP KUMAR	Co-Principal Investigator	MBM Engineering College, Jodhpur
3	Mr. AMAR PATNAIK	Co-Principal Investigator	MNIT JAIPUR
4	Mr. MAKKHAN MEENA	Co-Principal Investigator	MNIT JAIPUR

A grant of ₹1307000 (*Rupees Thirteen Lakh Seven Thousand Only*) has been sanctioned for the project, as per following details:

S.No.	Expenditure Head	Sanctioned Amount (₹)
1	Non-recurring	950000
2	Recurring	
	(i) Domestic Travel	90000
	(ii) Contingencies	83333
	(iii) Consumables	133333
	(iv) Miscellaneous	50000
	Total	1307000

The project is to be completed with expected outcomes achieved on or before 30th Sept 2020.

Prof. (Dr.) P M Khodke
Central Project Advisor

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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This is to certify that Mr./ ~~Mrs./ Ms./ Dr.~~ .....ALOK.....VATS..... has actively participated in the **Ministry of Steel sponsored One Week Workshop on "Wear Resistant steels for mining and railway industries – it's microstructural engineering and integrity assessment"** organized by Department of Mechanical Engineering, Malaviya National Institute of Technology Jaipur, India during 27thDecember to 31st December, 2018.

Mr. Saktimoy Ghosh
Chairman, MOS Project

Prof. M.K. Banerjee
Convener

Dr. Amar Patnaik
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Microsoft

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This is to certify that

Mr./Ms. Alok Vats *of*

M.B.M Engineering College, Jodhpur *College/University*

has successfully completed **SAKSHAM – TEACHING WITH TECHNOLOGY TRAINING** *from* 26th March *to* 27th March, 2018

Vinnie Jauhari

ELECTRICAL ENGINEERING DEPARTMENT
M.B.M. ENGINEERING COLLEGE
FACULTY OF ENGINEERING, JNV UNIVERSITY,
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Certificate of Participation

is hereby presented to

Alok Vats

For the active and invaluable participation during the conduct of TEQIP-III Workshop on "Innovative Pedagogical Orientation of Engineering Education" held on Feb 23-24, 2018

Prof. S.S.Mehta	Prof. S.K. Parihar	Prof. Jayashri Vajpai
Dean	TEQIP-III Coordinator	Head

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This is to certify that *Mr./Ms. ALOK VATS, MECHANICAL ENGINEERING, M. B. M. ENGINEERING COLLEGE JODHPUR* attended the Workshop on Virtual Labs under the National Mission on Education through ICT, (MHRD Govt. of India) on 3-4 April 2019 jointly conducted by Virtual Labs, IIT Roorkee and MBM Engineering College, Jodhpur.

Dean
MBM Engineering College

Nodal Coordinator, Virtual Labs
MBM Engineering College

Team Virtual Lab
IIT Roorkee

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Review on Fabrication of Aluminium Metal Matrix Composite

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Abstract

Engineering works are full of exploration and always seeking for the better material to build with. The properties that are shown by already existing pure materials have their own limitations in terms of strength to weight ratio. Thus, the composite materials are used in many engineering applications due to their excellent properties. The sandwich composite materials replace the metals owing to their excellent strength with low weight. This work gives an introduction about Metal Matrix Composite to fabricate the composite of Aluminium with other constituents. Fabrication is not the only part, further AMC (Aluminium Matrix Composite) is tested for different aspects to achieve the required tailored properties. Various tests refer to mechanical strength testing of the material and investigation of the matrix at micro level which is known as Micro Structural Investigation. SEM (Scanning Electron Microscope) and XRD (X-Ray Diffraction) are the test and analyses which are performed to obtain the best results in machining and smoothness in fabrication.

Keywords: **MMC (Metal Matrix Composite), AMC (Aluminium Matrix Composite), Microstructural Investigation, SEM (Scanning Electron Microscope), XRD (X-Ray Diffraction)**

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INTRODUCTION

Current engineering applications require lighter as well as stronger materials i.e. major focus is given on strength to weight ratio. Modern manufacturing sector demands for materials with broad range of properties like high thermal resistance, minimum wear rate, good damping properties, high specific stiffness etc. Metal-matrix composites (MMCs) are engineered combinations of two or more materials (one of which is a metal) where tailored properties are achieved by systematic combinations of different constituents. Typically, a composite material is made of reinforcement and a matrix. The reinforcement material provides the mechanical strength and transfers loads in the composite. The matrix binds and maintains the alignment or spacing of the reinforcement material and protects the reinforcement from abrasion or the environment.

MMCs are classified into different categories depending upon the matrix materials. Some examples of most commonly used metallic matrix configurations are:

- Aluminium-based composites; aluminium as matrix can be either cast alloy or wrought alloy (i.e., Al Mg Si, Al Mg, Al Cu Si Mn, Al Zn Mg Cu, Al Cu, Al Si Cu Mg)
- Magnesium-based composites
- Titanium-based composites
- Copper-based composites

Aluminium Matrix Composite

International Journal of Engineering and Advanced Technology (IJEAT)
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A study on Life Cycle Assessment

Arjun Ram, Piyush Sharma Dr. Dinesh Shringi

Abstract—

Over the last decades, stringent regulations forced the manufacturing industry to take concrete steps towards greener production. Despite reduction in total emissions through implementation of best available techniques (BATs), industrial waste generators still need guidance to minimize environmental impacts of manufacturing processes. Environmental impact assessment will soon become a compulsory phase. An impact assessment tool is therefore used for the environmental evaluation. The evaluation method used is the life cycle assessment (LCA) method. The quick and easy assessment of energetic and environmental performances contributes to determine the weak points of various products technologies and services or production processes or the best suited treatment in a specific context.

Index Terms— **Life cycle assessment (LCA); Environmental impact; Energy consumption; Potable water supply**

I. INTRODUCTION

The global ecological footprint of humans, which considers human resource use, has increased by 80% from 1960 to 2000.Presently, every year 1.2 times more resources are consumed than can be renewed in the world [1]. The scarcity of natural resources is reflected in increases in the price of raw materials and natural substances. As environmental awareness increases, industries and businesses are assessing how their activities affect the environment. The environmental performance of products and processes has become a key issue, which is why some companies are investigating ways to minimize their effects on the environment. Many companies have found it advantageous to explore ways of moving beyond compliance using pollution prevention strategies and environmental management systems to improve their environmental performance[2]. One such tool is LCA. Life cycle assessment is a "cradle-to-grave" approach for assessing industrial systems. "Cradle-to-grave" begins with the gathering of raw materials from the earth to create the product and ends at the point when all materials are returned to the earth[3]. LCA evaluates all stages of a product's life from the perspective that they are interdependent, meaning that one operation leads to the next. LCA enables the estimation of the cumulative environmental impacts resulting from all stages in the product life cycle, often including impacts not considered in more traditional analyses (e.g., raw material extraction, material transportation, ultimate product disposal, etc.). LCA provides a comprehensive view of the environmental aspects of the product or process and a more accurate picture of the true environmental trade-offs in product and process selection [4]. Figure 1. illustrates the possible life cycle stages that can be considered in an LCA and the typical inputs/outputs measured.

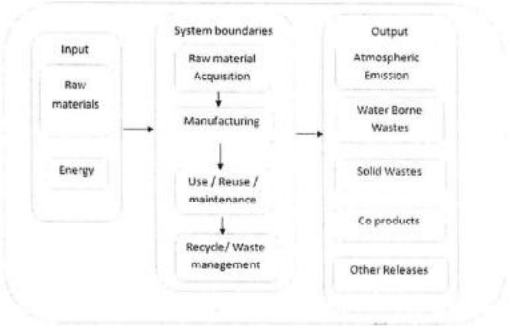

Fig 1 Life Cycle Stages

The LCA process is a systematic, phased approach and consists of four components [5]: goal definition and scoping, inventory analysis, impact assessment, and interpretation as illustrated in Fig 2:

1. Goal Definition and Scoping - Define and describe the product, process or activity. Establish the context in which the assessment is to be made and identify the boundaries and environmental effects to be reviewed for the assessment.
2. Inventory Analysis - Identify and quantify energy, water and materials usage and environmental releases (e.g., air emissions, solid waste disposal, waste water discharges).

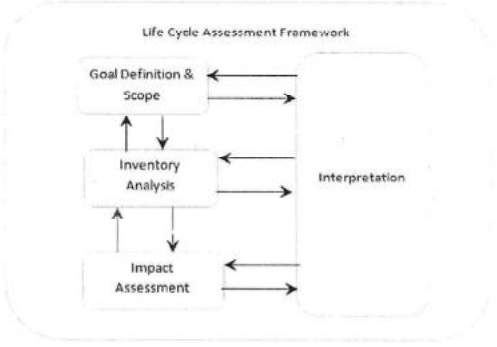

Fig 2 Life cycle framework

3. Impact Assessment - Assess the potential human and ecological effects of energy, water, and material usage and the environmental releases identified in the inventory analysis.
4. Interpretation - Evaluate the results of the inventory analysis and impact assessment to select the preferred product, process or service with a clear

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A REVIEW OF DEVELOPMENT AND FINITE ELEMENT MODELING OF THERMO-MECHANICAL BEHAVIOR OF NANOPARTICLE REINFORCED ALUMINUM BASED COMPOSITE

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Abstract

Metal matrix composites reinforced by nano-particles are very promising materials, suitable for a large number of applications. These composites consist of a metal matrix filled with nano-particles featuring physical and mechanical properties very different from those of the matrix. The nano-particles can improve the base material in terms of wear resistance, damping properties and mechanical strength. Different kinds of metals, predominantly Al, Mg and Cu, have been employed for the production of composites reinforced by nano-ceramic particles such as carbides, nitrides, oxides as well as carbon nanotubes. The main issue of concern for the synthesis of these materials consists in the low wettability of the reinforcement phase by the molten metal, which does not allow the synthesis by conventional casting methods. Several alternative routes have been presented in literature for the production of nano-composites. This work is aimed at reviewing the most important manufacturing techniques used for the synthesis of bulk metal matrix nanocomposite.

Keywords- *Nano particles, bulk metal matrix nano-composite, nano ceramic particles.*

I. INTRODUCTION

Aluminum is one of the most exploited materials in various fields of applications including constructions, packaging, and transportation and of course product design. It can be recycled numerous times wielding to products of almost equal quality. Some of its basic properties such as exceptional strength, low density and resistance in corrosion have placed it as an ideal matrix for the creation of composite materials.

Particulate reinforced metal matrix composites (PRMMCs), especially aluminum alloy matrix composites, are currently being used in many automotive components such as drive-shafts in trucks, brake rotors and liner of engine blocks, etc. Addition of ceramic particulates into aluminum alloy matrix improves the stiffness and strength of the reinforced matrix while conserving a quasi-isotropic nature and traditional manufacturing techniques for casting alloy. However, the microstructure of PRMMCs becomes as very complicated due to the variation in the size, shape and distribution of particulates, and then a precise prediction to its mechanical

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A REVIEW OF FABRICATION, CHARACTERIZATION AND MATHEMATICAL MODELING FOR DESIRE RESPONSES DURING MACHINING OF ALUMINUM METAL MATRIX COMPOSITES

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Abstract

This work deals with study of producing aluminum based Metal Matrix Composite and then observing its microstructure and mechanical properties such as tensile strength, impact strength and Hardness of produced test specimen. A composite material is a combination of two or more chemically distinct and insoluble phases; its properties and structural performance are superior to those of the constituents acting independently. Metals and ceramics, as well, can be embedded with particles or fibers, to improve their properties; these combinations are known as Metal-Matrix composites. Aluminum alloy constitutes a very important engineering material widely employed in the aircraft and aerospace industry for the manufacturing of different parts and components. It is due to its high strength to density ratio that it a sought after metal matrix composite. Various processing techniques for the fabrication of Aluminium matrix composites, testing of their mechanical properties are available.

Keywords- *Aluminum alloy, metal matrix composite, insoluble phases*

I. INTRODUCTION

In the present scenario, automobiles, recreational industries and aerospace applications require materials that have high strength, hardness, wear resistance and strength to weight ratio and less expensive where fuel economy with improved engine performance are becoming more important. It is very difficult to achieve these properties in any monolithic material (Tjong,2014). Metal matrix composites (MMCs) materials has been noted to offer such tailored property combinations due to their unique mechanical and physical properties such as high specific strength, low coefficient thermal expansion and high thermal resistance, good damping capacities, superior wear resistance, high specific stiffness and satisfactory levels of corrosion resistance (Rino, et al., 2012; Alaneme and Bodunrim, 2011; Surappa, 2003; Kok, 2005).

In recent year, MMCs are widely used engineering material which replacing conventional metallic alloys in so many applications likes aerospace and

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Facility Layout Optimization Using Simulation: A Case Study of a Steel Utensils Industry

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Abstract- Facility Layout Problem (FLP) is one of the essential problems of several types of manufacturing and service sector. It is an optimization problem on which the main objective is to obtain the efficient locations, arrangement and order of the facilities. The utensils industry in this study is a typical instance of a work-flow shop based production system. The efficiency of production system depends on how well the various machines, services production facilities and employee's amenities are located in a plant. This research paper aims to study and improve the current plant layout. An attempt is made to simulate the current and the proposed factory layouts by using ARENA software. The efficiency of the current and the proposed plant layouts are compared.

Keywords: Computer simulation, Factory Layout, facility-layout problem, Manufacturing system, ARENA, Layout design.

1. Introduction

Plant layout is the arrangement of facilities such as machinery, equipment, furniture etc. within the factory building for flow of material at the lowest cost and with the minimum material handling in processing the product from the raw material to the finished product [1].

A good facility-layout problem (FLP) is known for to make significant impact on the manufacturing costs, work in process, lead-time and productivity. A good facility layout affect the overall efficiency and as well as reduced total operating costs up to 50% [2]. FLP used to finding the optimal facility-arrangement in the existing layout in such a manner that a set of criteria is met and/or some objectives are optimized. Also, it is a fundamental optimization-problem can be used in many industry such as manufacturing and service organizations [3].

This study focuses on developing a new production layout for a utensils industry in view of the need to increase the production capacity .The simulation is used to solve facility layout problem and hence minimizing the total material handling cost.

2. Literature review

Spending a little time to plan the arrangement before installation can prevent unnecessary losses [4. Producing products with high quality and provides good service with low cost in short time using the fewest resources is the objective of properly managing a facility [5]. It is important that the facilities must be managed properly in order to attain the objective. [6]

Stefan Bock [7], proposed the detailed layout-planning by simulation for determining machine-arrangement and transportation-paths. Facilities planning could be arranged the entire layout may have irregular shapes and sizes [8].Iqbal and Hashimi [9] demonstrate that factory-layout is the focal point of facility-design. It dominates the thinking of most managers.

Simulation is applied in various field such as manufacturing, services, defense, healthcare, and public services, etc. Simulation is recognized as the second mainly used technical instrument in the field of operations management [10].

Fox [11] presented the definition of factory simulation is defined as "extendable and interactive discrete simulation system constructed to interpret the factory model directly. It allows the user to dynamically query the simulation for state information (e.g., state of a machine, process, etc.), where objects are located (e.g., what operation is being carried out on an order), and regular statistical analyses. It also allows the user to alter the factory model before and during simulation. The factory can be simulated and displayed at variable levels of detail".

Bobby John et al simulate the factory layout using the software ARENA (student's version). They defines that production efficiency depends on various factors such as machines, production facilities and employee's amenities. A simulation study was under taken to find out the efficiencies of the machines in the industry [12].

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(6)

CFD Based Thermal Efficiency Analysis of Solar Air Heater with Smooth Plate & Perforated Plate

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Abstract: *This paper presents study of computational fluid dynamics (CFD) based thermal efficiency analysis to determine heat transfer characteristics of solar air heater. Artificial roughness is used in one side wall of solar air heater absorber plate to break laminar boundary sub layer. It enhances rate of heat transfer from the absorber plate to flow of air stream. A CFD-based investigation of 3-dimensional forced convective fluid flow over solar air heater rectangular duct with smooth plate &half perforated transverse baffles plate has been performed in ANSYS FLUENT software. The system & operating parameter studied are duct width-to-height ratio of 7.77; the baffle relative roughness pitch ratio is 7.06; the relative baffle height ratio is 0.495 for the Reynolds number ranges from 3000 to 9000. The effect of roughness geometry [i.e., relative roughness height of baffle (e/h), relative roughness pitch of baffle (p/e), open area ratio (β)] on the heat transfer coefficient and Nusselt number are predicted. Solar air heater with artificial roughness experimental model's 3-dimensional geometrical modeling made with aid of ANSYS Workbench. The simulation results were predicted by ANSYS FLUENT 14.5 solver. Validation of results compared with performed experimental work and found to be in good agreement. Over the range of study the raise in heat transfer coefficient of half perforated absorber plate in range of 7-13 W/m^2K over smooth absorber plate of solar air heater for variable mass flow rate. The 15% minimum raise in thermal efficiency of roughen plate compare with smooth plate of solar air heater.*

Keywords: *Solar air heater, CFD, Artificial roughness, Thermal efficiency, ANSYS-FLUENT.*

1. Introduction

This paper present computational fluid dynamics approach to determine the thermal performance of flat plate solar air heater by considering the different system and operating parameters to obtain maximum thermal performance. The report ascertains about thermal performance for different mass flow rates, for absorber plate, at same solar flux intensity. Several methods are used to increase rate of heat transfer and thermal efficiency. Some of these are, use of fins, electro hydrodynamic method, packed bed, use of artificial roughness on absorber plate etc. Among these the easiest and most acceptable method to enhance the thermal and Thermo-hydraulic efficiency is the creation of artificial roughness on the absorber plate of solar air heater. It is observed that thermal resistance to the heat transfer is due to the formation of laminar sub-layer on absorber plate. Roughness elements have been used to improve the convective heat transfer by creating turbulence in the flow. However, it would result in an increase in friction losses and hence, greater power requirement by fan or blower. (Karmare,cfd.2010)

There are different factors affecting the solar collector efficiency, e.g. collector length, collector depth, type of absorber plate, glass cover plate, wind speed, etc. Increasing the absorber area or fluid flow heat-transfer area will increase the heat transfer to the flowing air (Chaaneet *al.*, 2013a-e).

B. K. Maheshwari et al. [1] Roughness elements in the form of ribs (small height projections), baffles (thin elements of greater heights) or blocks (the thick elements) have been employed to enhance heat transfer in gas turbine blade cooling channels and solar air heaters. Chaube et al. [2] conducted two dimensional CFD-based analysis of an artificially roughened solar air heater having ten different ribs shapes, namely, rectangular, square, chamfered, triangular, and so forth, provided on the absorber plate. CFD code, FLUENT 6.1 and SST k-ωturbulence model were used to simulate turbulent airflow. The best performance was found with rectangular rib of size 3 × 5 mm, and CFD simulation results were found to be in good agreement with existing experimental results.

Experimental studies of evaluation performance of various design of solar air heating system with specific value adding parameter has been conducted more as compare to computational and numerical analysis of such system, due to complicated flow simulation methodology and

Different designs and parametric study of solar water distillation system

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Abstract

Solar desalination is one of the promising methods of harnessing the solar renewable energy for fulfilling potable water requirement for small communities where the natural fresh water supply is inadequate. This paper presents the literature review to categorize solar stills into six sorts based on the design guidelines and their parametric study. It presents designs and the studies carried out by various researchers to find out the effect of various design and operating parameter on the efficiency (out put) of distillation units suggested. Basin type solar still with simple symmetrical still, vertical basin with improved condensation, increased surface area and basin still with a built in sandy heat reservoir, weir type solar still with cascade and concave type have been enlisted as per studied by various researchers.

Keywords: Solar still, basin type solar still, vertical basin, weir type, stepped solar still, evacuated tubes.

Contents

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QUALITY IMPROPVEMENT THROUGH SIX SIGMA DMAIC PHASES

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Abstract: - *An organisation has several objectives. These are not only in form of products to be manufactured and marketed but also include goals of capacity utilisation, achieving profitability as well as intangible objectives of customer satisfaction and societal goals. Resources are utilized as inputs to achieve these objectives. If an organisation wants to improve its capacity, it will have to improve its plans, identify the action which is desirable to improve its working, will have to fix the responsibility and lay down the time schedule. Operational management includes all facts related to the art and practice of capacity and for its successful implementation; it is desirable for an organization to have a well-planned audit system and proper monitoring plan.*

Keywords: Six sigma, DMAIC, DOE, Quality management, TQM.

I. INTRODUCTION

Quality in business, engineering and manufacturing has a practical interpretation as the non-inferiority or superiority of something, it can be defined as fitness for purpose. Quality is a perceptual, conditional and somewhat subjective characteristic and may be understood differently by different people. It is supposed that consumers focus on the specification/quality of a product /service, or how it compares to competitors in the market environment. Producers must measure the conformance quality, or degree to which the product /service was produced correctly.

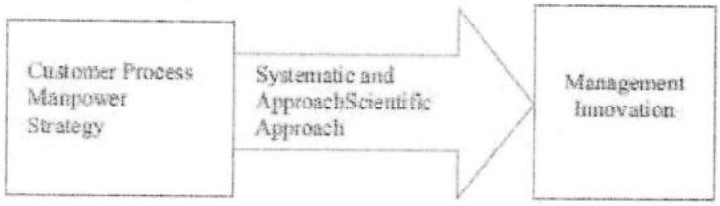

Fig. 1 Systematic and Essence of Six-Sigma

Numerous definitions and methodologies have been developed to improve product or service quality. There are two common quality related functions within a business. One is quality assurance which means the prevention of defects, such as by the implementation of quality management system and preventative activities like Failure Mode and Effect Analysis (FMEA). The other is quality control which is the detection of defects, most commonly associated with testing which takes place with in a quality management system typically termed as verification and validation.

II. QUALITY MANAGEMENT AND TOOLS

The term quality management has a specific meaning within many business sectors. This specific definition, which doesn't aim to assure 'good quality' by the more general definition, but rather to ensure that an organization or product is consistent, can be considered to have four main components: quality planning, quality control, quality assurance and quality improvement. Quality management is focused not only on product /service quality, but also the means to achieve it. Quality management therefore uses quality assurance and control of processes as well as

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Review of Six Sigma DMAIC Methodology

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Abstract: - *During the past 50 years, more than 69 quality related initiatives have been taken. Statistical Process Control (SPC), Quality Circles (QC), Total Quality Management (TQM), Bench Marking, Quality Management System (QMS), Standard and other such initiatives have created a visible impact in the business world. 'Keep it Simple' formula has always been the basic concept of specialists for performance measurement over the past 70 years in an effort to have the greatest impact on business. In a competitive environment different types of classic tools and metrics have been applied in a different manner.*

Keywords: Six sigma, DMAIC, DOE, Quality management, TQM.

I. INTRODUCTION

Six Sigma is both a philosophy and a methodology that is mainly used to improve quality of product by analysing data with application of statistics method to find out the root cause of quality problems and to implement controls. Although Six Sigma is a method which is first implemented to improve manufacturing but it can also be used in other business processes, such as product design and supply chain management. Although Six Sigma has its roots in large corporations, it can be used in small to medium - sized companies as well. Small companies are typically more agile and may have an easier time getting management team commitment, but they may have more difficulty with committing employee time and funds for training. As an improvement drive, the major advantage of Six Sigma is to introduce a common metric of customer perceived quality, which should be applicable to any size and any type of organization.

II. LITERATURE REVIEW

Mach Pavel et al. (2001) stated that a constant improvement has been accepted as the main objective of companies for all the fields, but this improvement is always keeping SPC and its Seven Ishikawa tools as the base. One of the latest strategies utilized is a six sigma strategy, which works having as the base the quality statistical tools and techniques combined with a well- focused management. There is an important relation between the Seven Ishikawa tools and the six sigma strategy. Six sigma strategies require tools that enables visualize, analyse, and make conclusions about processes, problems, and activities in general. The Seven Ishikawa tools contribute to that purpose, they are important elements that belong to the SPC which is an essential part for the implementation of the six sigma strategy.

Prasad (2002) discussed the six sigma initiatives taken by a bulb manufacturing company to reduce the shell cracking during the manufacturing of bulbs. The company started the initiative with training for champions and black belts. By using DMAIC methodology, the whole process was operating at 4.5 sigma levels, which was earlier at 3.2 sigma level, resulting in significant improvement in the bottom line.

Rowlands et al. (2003) reported the application of design of experiment to spot welding process in order to discover the key process parameters, which affect the tensile strength of welded joints. They have used statistical analysis to identify the process parameters, which affect the mean strength and variability in weld strength. The objectives of the experiment in this study were two-fold. The first objective was to identify the precarious welding process

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Estimation of Changes in the Effectiveness of Parabolic Trough Solar Collector Due to Dust Particles

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Abstract *— Present work provides the insight of dust particle effect on the overall efficiency of collector-receiver tube water heating used in the power plant. Since the characterisation of dust particles deposited on collector plate and its controlled effect on plant efficiency has limitation for field scale study, we have proposed a new methodology to carry lab scale experimentation to characterise dust concentration followed by simulation to estimate the plant performance. Present study showed the effect of dust with respect to the clean surface efficiency. It should be noted that thermal efficiency of the system against clean surface is 20.59% and due to dust deposition efficiency of system reduced to 8.91 % at dust concentration 26.637 x 10-6gm/m2. Comparatively change in maximum thermal efficiency is reduced upto 56.726 %. Efficiency curve with dust concentration suggests that cleaning of the collector should be done in an optimised time interval rather than fixed time interval for better efficiency.*

Keywords - *Solar radiation, Solar parabolic trough concentrator, Image J, Plot Digitizer, Optical properties.*

I. Introduction

In modern world, energy is primary requirement for human culture. All the energy sources we are using today can be classified into two groups; renewable and non-renewable. Renewable and non-renewable energy sources can be used to produce secondary energy sources as electricity. The release of large amounts of waste heat from power plants has caused thermal pollution in lakes and rivers leading to the destruction of many forms of plant and animal life. In the case of nuclear power plants, there is also concern over the possibility of radioactivity being released into the atmosphere and long term of problems of disposal of radioactive wastes from these plants.

So, solar energy is alternative source of energy. A worthy investment option is concentrating solar power (CSP) technology which has the capacity to provide for about 7% of the total electricity needs projected for the world by 2030 and 25% by 2050 (Izquierdo et al., 2010).

The performance of a parabolic trough solar collector measured experimentally differs slightly from the simulation results due to inaccurate prediction of absorbed solar energy. The amount of absorbed energy of such systems mainly depends on various parameters like reflector/collector, absorptivity of absorber tube and transmissivity of glass cover of absorber tube etc. The optical properties of these systems are strongly affected by the dust deposition Singh et al., [1]. Solar absorption and thermal power production are strongly related to the optical properties of the collectors (Yaghoubi et al., 2011 and Sahin, A.D., 2007) [2,3].

Several authors have tried to quantify the effect of dust deposition on flat plate collectors at field scale as well as in laboratory setups with some assumptions. Garg (1974) investigated the effect of dust on the transmittance of solar radiation through various inclined glass plates and plastic film [4]. Sayigh et al., (1985) observed 64, 48, 38, 30 and 17% reduction in the transmittance of the glass plates after 38 days of exposure to the environment with tilt angles of 0, 15, 30, 45 and 60° [5]. El-Shobokshy and Hussein (1993) investigated the effect of dust on the performance of photovoltaic cells [6]. Goossens and Van Kerschaever (1999) investigated the effect of wind velocity and airborne dust concentration on the drop of photovoltaic (PV) cell performancecaused by dust accumulation on such cells. Performance drop and I-V characteristics were investigated at four wind velocities and four dust concentrations [7]. Hegazy (2001) investigated dust accumulation on glass plates with different tilt angles and associated reductions in solar transmittance experimentally over a period of one year under the climate conditions of the Minia region, central Egypt. His results show that the fractional reduction in glass normal transmittance depends strongly on dust deposition in conjunction with plate tilt angle, as well as on the exposure period and site climate conditions [8]. El-Nashar (2009) studied the seasonal effect of dust deposition on a field of evacuated tube collectors of a solar desalination plant. The system is located near the city of Abu Dhabi, UAE, and the results are therefore relevant to this region. It was found that dust deposition can cause a monthly drop in glass tube transmittance of 10–18%.The drop in transmittance of the glass tubes due to dust deposition can cause a large drop in plant production [9].

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Review Paper on Optimizations of Thermoelectric System

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ABSTRACT
Thermal management and energy crisis have been two major problems in this 21st century. Engine exhaust has tremendous amount of energy which can be recovered by waste heat recovery systems. The thermoelectric concept is seen as a perfect solution for recovering waste heat from engine exhaust and converts in to electric energy. Since the use of semiconductor materials for thermoelectric applications, there has been a huge quest for improving its figure of merits (ZT) to make it commercially viable. This synopsis report presents the simulation and experimental validation study on the transient behavior of a proposed combined exhaust heat recovery device and thermoelectric power generation system. The proposed system consists of waste heat recovery that provides a heat flux source for thermoelectric generators. In this research, thermoelectric generator device are consist of two major part, first one is exhaust recovery device and second one is thermoelectric generation system. In the first phase of study, optimize the waste heat recovery system design, performed cfd analysis and get heat and temperature data then cfd model coupled with thermoelectric model, find out the thermoelectric effect on particular devices. This paper presents of numerical simulation for several the thermoelectric materials. Numerical simulation is carried out by using a finite element package ANSYS.

Keywords
Thermoelectric Generator (TEG), Thermoelectric Material (TEM) Automotive Exhaust, Numerical Simulation.

1. INTRODUCTION
Thermoelectric generators are all solid-state devices that convert heat into electricity. Unlike traditional dynamic heat engines, thermoelectric generators contain no moving parts and are completely silent. Such generators have been used reliably for over 30 years of maintenance-free operation in deep space probes such as the Voyager missions of NASA.1 Compared to large, traditional heat engines, thermoelectric generators have lower efficiency. But for small applications, thermoelectric can Become competitive because they are compact, simple (inexpensive) and scale able. Thermoelectric systems can be easily designed to operate with small heat sources and small temperature differences. Such small generators could be mass produced for use in automotive waste heat recovery or home co-generation of heat and electricity. A thermoelectric produces electrical power from heat flow across a temperature gradient. As the heat flows from hot to cold, free charge a carrier (electrons or holes) in the materials are also driven to the cold end. The resulting voltage (V) is proportional to the temperature difference (ΔT) via the Seebeck coefficient, α, ($V = \alpha \Delta T$). By connecting an electron conducting (n-type) and hole conducting (p-type) material in series, a net voltage is produced that can be driven through a load. A good thermoelectric material has a Seebeck coefficient between 100μV/K and 300μV/K; thus, in order to achieve a few volts at the load, many thermoelectric couples need to be connected in series to make the thermoelectric device. A thermoelectric generator convert's heat (Q) into electrical power (P) with efficiency η.

$$P = \eta Q \quad (1)$$

The amount of heat, Q, that can be directed though the thermoelectric materials frequently depends on the size of the heat exchangers used to harvest the heat on the hot side and reject it on the cold side. The thermoelectric systems have been the subject of major advances in recent years, due to the development of semiconductors and the incorporation of the thermoelectric devices into domestic appliances. Generally, if a thermal gradient is applied to a solid, it will always be accompanied by an electric field in the opposite direction. This process is called as the thermoelectric effect. Thermoelectric material applications include refrigeration or electric power generation. The efficiency of a thermoelectric material is given by the figure of merit, Z, which is defined as [2].

$$Z = \alpha^2\sigma/k, [1/k] \quad (2)$$

Where:
α - Material's Seebeck coefficient, V/K,
σ - Electrical conductivity of material, S/m,
k – Thermal conductivity of material, W/ (m. K).

The numerator in equation (2) is called the power factor. Therefore, the most useful method in order to describe and compare the quality and thermoelectric efficiency of different material systems is the dimensionless figure of merit (ZT), where

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Thermal Energy Storage in Sensible Materials: A Review

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Abstract: ***The intermittent, variable and unpredictable nature of solar energy lead to mismatch the rate and time of solar energy collection and its thermal applications. As a result, it is necessary to have energy storage unit which stores solar energy when the collection is in excess of load and discharges the same when the direct collection is inadequate. To store solar energy in sensible heat storage materials, pebble bed systems are simpler, economical in design and development as compared to latent or thermo-chemical energy storages. A number of studies are available on heating and cooling of pebble beds describing their parameters like pebble size/diameter, bed porosity, surface area, a shape factor of storage media/pebbles to observe the behaviour and characteristics of storage devices. Many correlations are available to analyse the heat transfer coefficients, friction factors and pressure drops in between the solids and circulating fluids in pebble beds. The relations are of importance and best suited for energy storage system modelling.***

Keywords: Pebble Bed, Solid-fluid Interface, Thermal Stratification, Heat Transfer and Pressure Drop in Beds.

I. INTRODUCTION

Availability of cheap and abundant supply of energy is an index of national prosperity. The man has needed and used energy at an increasing rate for his sustenance and well-being ever since he came to the earth. The large scale use of commercial energy has led man to a better quality of life. Indeed, energy starvation could be more widespread than food starvation. But the conventional energy supplier fossil-fuel resources are finite, depleting fast and this fossil fuel-era is gradually coming to an end. The potential applications of solar energy in space and water heating, industrial process heating, refrigeration/air conditioning, cooking and power generation can reduce the dependence on fossil fuel usages, environmental pollution, and global warming issues.

But the intermittent, variable and unpredictable nature of solar heat lead to a mismatch of the rate and time of energy collection and thermal applications. As a result, it is necessary to have thermal energy storage (TES) unit in between the energy demand and supply to alleviate the energy mismatch. The storage system stores solar energy when the collection is in excess of load or in no load conditions and discharges the same when the direct collection is inadequate of load/demand for off sun shines hours' applications. Storage system allows the more effective use of capital equipment by improving capacity and permit cost effective substitution of scare conventional fuels. Thus, thermal energy storage is required to ensure round the clock heat supply. A relation between solar collector average collection temperature and heat delivered directly to load / thermal storage can be written as,

$$T\,(\text{collector}) - T\,(\text{delivery}) = \Delta T\,(\text{collector to storage}) + \Delta T\,(\text{into storage}) + \Delta T\,(\text{storage loss}) + \Delta T\,(\text{out of storage}) + \Delta T\,(\text{storage to application}) + \Delta T\,(\text{into application}) \quad \ldots \quad (1)$$

The thermal energy can be secured as shown in Fig. 1, sensibly/latent heat storage, chemical and solid sorption processes. Sensible and latent heat storages systems are in practical use while thermo-chemical reaction and fuel cell systems are proposed for medium and high temperature applications. The choice of material depends on the product of density and specific heat of material ($\rho.C_p$) values and temperature limits, water being used for less than 100°C heat storage and refractory /bricks for high temperature applications, about 1000°C.

CFD simulation of thermoelectric generator installed on waste heat recovery system

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Abstract: In the present research work, thermoelectric generation is numerically solved for waste heat recovery based hot junction point. All experiments are designed as per DOE methodology 'Taguchi method'. In the first part of this study, CFD simulation is performed for waste heat exchanger run on IC engine exhaust gas. Total nine cases are designed for this task using the Taguchi method. Wall temperature is the response variable for CFD work. In the second part, CFD based results are carried forward to FEM simulation which was conducted for thermoelectric generation numerical work. The same nine cases are used for this task also. It is found that the number of fins used in WHRS is not the prime factor, but mass flow rate is the main factor for this study. S/N ratio and ANOVA analysis are performed for wall temperature and current density of TEG system.

Keywords: thermoelectric generator; CFD simulation; Taguchi method; linear regression model equation; ANOVA analysis.

Reference to this paper should be made as follows: Purohit, K.K. and Meena, P.M. (2017) 'CFD simulation of thermoelectric generator installed on waste heat recovery system', *Int. J. Renewable Energy Technology*, Vol. 8, Nos. 3/4, pp.268–285.

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Computational Fluid Dynamics Simulation and Benchmarking for Ranque Hilsch Vortex Tube

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ABSTRACT
The objective of this work is to gain an insight into complex fluid dynamic phenomena inside the working of vortex tube. For this a fabricated vortex tube was tested experimentally, CFD simulations were carried out, generalizing simulation process with dimensional analysis, initialization and benchmarking the results obtained locally with numerical forward differencing technique using spreadsheet and computer program. It can be concluded that vortex tube can generate a heat sink near the hot end while making the objects (air) near the cold end acting as heat source simultaneously. From both these source and sink, heat is carried away by diffusion and convection consistently even at steady state.

Keywords: *dimensional analysis, fluid dynamics, numerical finite difference methods, circular iterations, partial difference equations.*

1. Introduction

Physicist James Clerk Maxwell postulated in 19th century, that since heat involves movement of molecules, it would be possible to get hot and cold air from the same device which would sort out and separate the hot and cold molecules of air. Vortex tube was invented by French physicist George R. (1934) accidently. It was thought that the separation of hot and cold streams occurred due to adiabatic compression and expansion. Physicist Hilsch (1947) improved the design and gave first conclusive working model on R.H.V.T after adding wall friction and pseudo-adiabatic processes to George's model. Fulton (1950) rejected previous models and reckoned turbulence and fluid friction phenomena responsible for the separation. Fulton (1950) and Nimbalkar (2009) emphasised more on vortex flows inside R.H.V.T. Xue *et al.*, (2010) critically examined the models proposed earlier and found that none was complete and satisfactory.

2. Methodology

A need for developing a generalized process of simulation based on scientific method was felt. Approach analogy, abstraction and quantification were realized as important analysis tools while reviewing, repetition, and simul-tasking involving multiple tools with common objective, were realized as quality control tools. Numerical finite differencing using spreadsheet and dimensional analysis were used for benchmarking and initialization of the problem. Software applications including OpenFOAM, Ansys fluent student version, Salome, Gmsh, office tools, netgen, gnuplot, paraview, qtiplot, mendeley etc. were tested and used in this work. The outline of the paper begins with abstract giving objectives, work done and conclusion in brief, followed by introduction with short literature survey, methodology describing systematic approach and process of working, system selection with description of working and worked system, results and discussion with plots and contours, their analysis, effects of various design and input output parameters on its performance, working of R.H.V.T, explanation of cooling effect produced and V.E.D classification of R.H.V.T parameters and ending with conclusion, future work, source code program and references.

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Computational Fluid Dynamics Simulation on Vortex Tube: A Review

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Abstract: *The main objectives of this work is to investigate Range Hilsch effect and D-Alembert's paradox through literature survey of a mysterious device called vortex tube using a systematic and disciplined. It can be concluded that vortex tube is an application based device. Its design and performance can be tuned for a particular application and all its performance parameters cannot be optimized simultaneously.*

Keywords: *C.F.D, D-Alembert's paradox, R.H.V.T*

1. Introduction and present status

Vortex tube is a mechanical device without any moving parts which separates compressed air into cold and hot streams. This can be of three types counter flow (standard vortex tube), parallel flow (uniflow vortex tube), both of which can be of cylindrical or conical shape. Its general applications can be classified as (1) cooling and air conditioning (2) phase changing and (3) separation. Vortex tube is required for cooling or chilling machining parts, food, chambers, circuits, setting solders, where as its air conditioning applications are found in manned underwater suits, hyperbaric chambers and suits, shot blasting suits etc. Its phase changing applications are found in liquefaction of natural gas while separation applications are found in particle and gas separation units and quick startup of steam power plant given there is considerable density difference in participating matter. Working in multiple stages, its performance can be further enhansed as demonstrated by Guillaume and Jolly (2001) [1] when the cold exit of first tube becomes the input for the next vortex tube. These applications are not stagnant but are diversifying with more research.

Due to high concentration of aerospace organizations in Bangalore, a range of C.F.D activities are now in progress at number of centers including. I.I.Sc, NAL, H.A.L, A.D.E, A.D.A, G.T.R.E. Space launch vehicle related C.F.D activities are in progress at Vikram Sarabhai Space Centre (V.S.S.C) at Trivandrum. Missile related C.F.D activities are in progress at Defense Research and Development Laboratory (D.R.D.L) at Hyderabad. Tejas (multirole L.C.A) developed both for Indian navy and air-force by A.D.A from interactions with H.A.L, I.I.Sc, and I.I.Ts used C.F.D extensively. Around 500 researchers were working in the field of C.F.D by 2010 (Chakraborty D., 2010 [2]). At N.A.L in-house codes (JEWEL3D, JUMBO3D) are being developed for the HANSA and SARAS projects. SARAS project which was abandoned earlier due design problems was promised to be revived in 2017. To summarize, think parallel and do parallel is the motive of Indian C.F.D program.

1.1. Design and performance of R.H.V.T

The design of a vortex tube depends on its geometrical dimensions such as length of tube (L), diameter of tube (D), diameter of orifice (d_ϕ) or cold tube diameter (d_c), number (N), diameter (d_n), area (A_i), shape and location of nozzles, cold exit area (A_c) hot exit area (A_h) or hot side valve opening angle, angle of taper of tube ($0<\alpha<4$, in case of conical tube). These parameters were optimized by various authors for improving its performance parameters (with their typical range of values) such as

$\mu_c = \frac{m_c}{m_i}$, where $0 < \mu_c < 1$

$\Delta T_c = (T_i - T_c)$, where $0 < \Delta T_c < 230$ K ,(Comassar, 1951 [3]).

$Q_c = \mu_c C_p (T_i - T_c)$, where $0 < Q_c < 1000$kW

$COP = \frac{Q_c}{W_c} = \frac{\mu_c C_p (T_i - T_c)}{W_c}$, where $0<COP<0.3$

$\eta_c = \mu_c \frac{(T_i - T_c)}{T_i\{1-(\frac{p_i}{p_a})^{\frac{\lambda-1}{\lambda}}\}}$, where $0 < \eta_c < 0.42$

(Camire, 1995 [4]).

2. Gaps in existing technology and bridging these gaps

Indian C.F.D program still has bottlenecks in the form of computer performance speed (FLOPS) which is 10^{th} order of magnitude below par as compared to those used in developed countries along with computer memory (Chakraborty D., 2010 [2]). Many of the complex problems such as inverse problem, parametric research and multidisciplinary problems have not been address so far. Boandarov and Galaktionov (2014) [5] mentioned factors which

Review Paper on Effect of Dust on the Solar Parabolic Trough and Applications

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ABSTRACT
In the present scenario, the huge demand of energy and economy create the necessity to give importance to all types of energy resources either it is conventional or nonconventional. Since the rapid consumption of fossil fuel over billions of people across the world are still unable to assess electricity. Furthermore, if the consumption of fossil fuel will be continued then our future generation will certainly have to face the shortage of it and the global warming potential and ozone layer depletion will also increase. Solar collectors (mirrors) suffer from the dust deposition which requires frequent cleaning to maintain their efficiency. Since hundred thousand square meters of solar mirror are required even for a relatively small solar power plant, the cleaning on such a large mirror surfaces involves a significant operation and maintenance (O&M) activities and cost in concentrating solar thermal power plants. Dust deposition on solar mirror surface is site specific and the dust characterization for each site is required in order to optimize the solar mirror cleaning activities.

Keywords
Solar Parabolic Trough, Concentrated Solar Thermal (CST).

1. INTRODUCTION
One main reason why the performance of a parabolic trough collector measured experimentally differs from the simulation results is inaccurate prediction of absorbed solar energy. The amount of absorbed energy of such systems mainly depends on optical properties of mirrors, absorber tube, and transmissivity of glass cover of absorber tube. One of the main challenges is to develop a reliable simulation tool to predict accurately the performance of solar thermal plants. Solar absorption and thermal power production are strongly related to the optical properties of the collectors (Yaghoubi et al. 2011 and Şahin, A.D., 2007). Such properties are the reflectivity of mirrors, solar transmissivity of cover glass and absorbtivity of absorber tube (Sansoni et al.2011).

The reflectivity of mirrors and glass cover transmissivity of a collector are highly affected by the amount of dust deposited on these surfaces. This effect has been well understood and different power plants have considered various cleaning schedules to reduce dust effect on the performances of solar systems. Different studies have been performed to study dust effect on various solar systems; for example, Kaldellis et al. (2010) have studied dust deposition impact on photovoltaic-assisted water pumping systems. Several authors have studied the effect of dust deposition on flat plate collectors. Goossens and Van Kerschaever (1999) investigated the effect of wind velocity and airborne dust concentration on the drop of photovoltaic (PV) cell performance caused by dust accumulation on such cells. Performance drop and I-V characteristics were investigated at four wind velocities and four dust concentrations. El-Shobokshy and Hussein (1993) investigated the effect of dust on the performance of photovoltaic cells. Garg (1974) investigated the effect of dust on the transmittance of solar radiation through various inclined glass plates and plastic film. Hegazy (2001) investigated dust accumulation on glass plates with different tilt angles and associated reductions in solar transmittance experimentally over a period of one year under the climate conditions of the Minia region, central Egypt. His results show that the fractional reduction in glass normal transmittance depends strongly on dust deposition in conjunction with plate tilt angle, as well as on the exposure period and site climate conditions. Sayigh et al. (1985) observed 64, 48, 38, 30 and 17% reduction in the transmittance of the glass plates after 38 days of exposure to the environment with tilt angles of 0, 15, 30, 45 and 60°, respectively. Mastekbayeva and Kumar (2000) and Nahar and Gupta (1990) also investigated the effects of dust on transmittance of different materials. El-Nashar (2009) studied the seasonal effect of dust deposition on a field of evacuated tube collectors of a solar desalination plant. The system is located near the city of Abu Dhabi, UAE, and the results are therefore relevant to this region. It was found that dust deposition can cause a monthly drop in glass tube transmittance of 10–18%. The drop in transmittance of the glass tubes due to dust deposition can cause a large drop in plant production. For example, the author states that for a transmittance decrease from an initial value of 0.98 (clean glass condition) to a low value of 0.6, corresponding to a very dusty glass condition, production drops from 100% to 40% of the clean collector production level. Although various studies have been performed to study dust effect on the performance of different solar systems, very limited published studies on dust effects are available for parabolic trough collectors (PTC) of solar thermal power plants.

Dust is the dominant source for solar collectors deposition in CST power plants and regular cleaning is required to recover the reflectance lost caused by mirror deposition. The effective cleaning method has to address the significant characteristics of dust such as the size, distribution, density, shape, composition, chemistry and charge. Shao, et al. (2008) showed that the particle sizes range from 20 to 70 μm has short-term suspension and the long- term suspension particles must be less than 20 μm. This indicates that the particle size deposit on solar mirror should be less than 70 μm if the airborne dust is the main cause for mirror deposition according to this study. The significant characteristics of dust are site specific. The influence of dust on the reflectance of solar mirrors is a complex function of dust deposition behavior,

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Influence of rounding corners on unsteady flow and heat transfer around a square cylinder

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Abstract—A numerical study is performed to study the effect of rounding corners on flow and heat transfer characteristics around a square cylinder. Two square cylinders, one with sharp corners and other with rounded corners are considered. The rounded corners have a corners radius of d/4. Where, d is projected width of the square cylinder. The heated square cylinder is assumed to be horizontally placed in unconfined boundaries and flow of air (Pr = 0.7) is in vertical upward direction. The Reynolds number (Re) of the flow is 100. Numerical simulation results are presented in form of streamlines, vorticity contours, isotherm patterns, time history of lift and drag coefficients, power spectra of lift coefficients, Strouhal number, recirculation length, averaged drag coefficient, local Nusselt number and averaged Nusselt number. A comparison of the results for sharp corners and rounded corners square cylinders are presented. Results show that due to rounding corners of the square cylinder, flow separation becomes smooth and instability in the flow field is delayed. The size of the recirculation region as well as transverse extent of the wake decreases. Therefore, drag coefficient decreases due to reduced pressure drag. An enhancement in heat transfer from the cylinder is observed due to effective utilization of whole front face including rounded corners.

Key words—Heat transfer, Rounded corners, Square cylinder, Vortex shedding.

I. INTRODUCTION

Cylinders of different cross section e.g. circular and square finds many applications in engineering such as heat exchanger tubes, high-rise buildings, electronics cooling etc. When fluid flows over these cylinders, separation occurs from both sides of the cylinder and instability is produced in the flow field that cause periodic shedding of vortices from the cylinder. For a sharp corners square cylinder, the separation points are fixed.

Sharma and Eswaran [1] studied the flow structure and heat transfer characteristics for an isolated sharp corners square cylinder. It is imperative that if sharp corners of the square cylinder are changed with the rounded corners, a drastic change in the flow and heat transfer characteristics of the cylinder can occur. Tamura et al.[2] studied the effect of corner shape on aerodynamic characteristics of the square cylinder. Dalton and Zheng [3] studied uniform flow past square and diamond cylinders with and without corner modifications. Hu et al. [4] experimentally studied the near wake of square cylinder with different corners radii. Park et al. [5] performed numerical analysis for critical Reynolds number with corner radius variation. Kumar et al. [6] studied near wake characteristics of transversely oscillating cylinders with different corner radii. The above mentioned studies involving corner modifications mainly deals with the effect of rounding corners on the aerodynamic behaviour. No systematic study is available in the literature that deals with the effect of rounding corners on flow structures and heat transfer from a square cylinder. Therefore, a numerical study is done to study the influence of rounding corners on flow and heat transfer characteristics of a square cylinder. One sharp corners and other rounded corners cylinder is modelled. The rounded corners cylinder have a corners radius of d/4. Where, d is projected width of the square cylinder. The heated cylinders are placed horizontally and flow of air (Pr = 0.7) is in vertical upward direction. The Reynolds number (Re) of the flow is 100. Numerical simulation results are presented by streamlines, vorticity contours, isotherm patterns, time history of lift and drag coefficients, power spectra of lift coefficients, Strouhal number, recirculation length, averaged drag coefficient, local Nusselt number and averaged Nusselt number. A comparison of the results for sharp corners and rounded corners square cylinders are presented.

II. PROBLEM DEFINITION

Fig. 1 shows a schematic diagram of physical model of the problem, flow geometry and boundaries of two-dimensional computational domain for rounded corners square cylinder. The cylinder has a projected width 'd' and a corner radius 'r'.

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Effect of aiding buoyancy on the wake characteristics of a semi-circular cylinder

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Abstract—**Two-dimensional numerical simulations are performed to investigate the effect of aiding buoyancy on the wake characteristics of a semi-circular cylinder. The heated cylinder is assumed to be horizontally placed in un-confined boundaries with curved surface of the cylinder facing the flow of air (Prandtl number, Pr = 0.7) directed in vertical upward direction. In this flow configuration,upward thermal buoyancy forces are aided to the forced air flow. The flow Reynolds number (Re) based on the projected width of the cylinder is 100. The effect of buoyancy is brought about by Richardson number (Ri), which is varied in the range of $0 \leq Ri \leq 1.0$. The results are presented with the help of instantaneous streamlines, vorticity contours, isotherms patterns, lift and drag coefficients, Strouhal number and averaged Nusselt number. Present results show that at a critical value of Richardson number, vortex shedding around the cylinder is suppressed. The value of critical Richardson number for suppression the vortex shedding around a semi-circular cylinder is much higher as compared to that for a circular cylinderavailable in literature at similar Reynolds number. Therefore, strong buoyancy forces are required to suppress flow instability for a semi-circular cylinder as compared to that for a circular cylinder. This interpretsthat length of afterbody from the separation point into the wake have significant influence on the instability in flow field.**

Keywords—buoyancy;mixed convection; semi-circular cylinder;vortex shedding

I. INTRODUCTION

The flow of fluids over unheated and heated bluff bodies have great significance in engineering applications as well as fundamental importance.Cross-sectional shape of the bluff body influences the wake characteristicspast the body. Literature deals with a variety of bluff body shapes e.g. circular, square and triangular cylinder. In contrast, flow over a semi-circular cylinder has received attention in the recent past and literature is scarce.Considerable changes in the flow field and heat transfer can be obtained with the semi-circular cylinder as compared to circular cylinderdue to manipulated after body. Flow over a semi-circular cylinder is important in the design of heat exchangerwith enhanced heat transfer performance, electronics cooling components of various cross-sectional shapes, under water submarines etc. In all bluff body flows, fundamental instability results in periodic vortex shedding around the body above a critical Reynolds number. These vortices are responsible for flow and heat transfer characteristics of the bluff body. Chandra and Chhabra [1] numerically identified that critical Reynolds number for onset of vortex shedding occursomewhere in the range $39.5 < Re < 40$ for a semicircular cylinder.The authors reported that this value is slightly lower than the value of 46-47 for a circular cylinder cited in literature.Chatterjee etal.[2] numericallystudiedunsteady forced convection heat transfer around a semicircular cylinder at low Reynolds numbers (Re = 50-150)with a fixed Prandtl number (Pr=0.71).Chandra and Chhabra [3] studied flow and heat transfer from a semi-circular cylinder to power-law fluids in the vortex shedding regime for a range of Reynolds numbers, Re = 40-140 and prandtl numbers, $0.7 \leq Pr \leq 50$.Bhinder et al. [4]carried out numerical investigation to study flow over and forced convection heat transfer past a semi-circular cylinder at incidence for Reynolds numbers, $80 \leq Re \leq 180$ utilizing air as working fluid. Above studies [1-4] were carried out inforced convection regime where buoyancy forces are negligible. For low velocity flows, both the buoyancy forces and forced flow determines the flow field and flow is in mixed convection regime. In this case, flow and thermal field is a function of Richardson number ($Ri = Gr/Re^2$). Where Gr is the Grashof number. For a horizontally placed heated cylinder,buoyancy forces act in vertical upward direction and ifthe forced flow is directed in vertical upward direction, it is termed as buoyancy aided flow. Buoyancy aided mixed convection flows past a circular cylinder have been studied by Chang and Sa [5] numerically and Singh etal. [6] experimentally. When the forced flow is directed in horizontal direction over a horizontal heated cylinder, it is termed as cross buoyancy flow.Chatterjee and mondal [7] investigated the effect of cross-buoyancy on unsteady mixed convective flow and heat transfer around a semicircular cylinder.Above literature reveals that no study is available that deals with the effect of aiding buoyancy on the wake characteristics of a semicircular cylinder.Therefore, the aim of the present work is to investigate numerically the effect of aiding buoyancy on flow and heat transfer characteristics around a semicircular cylinder.The cylinder is placed horizontally in unconfined boundaries and the flow of air (Pr = 0.7) is in vertical upward direction. Based on the projected width of thecylinder, the Reynolds number (Re) is kept at 100. Richardson number (Ri) is varied in the range of $0 \leq Ri \leq 1.0$. The results are presented by streamlines, vorticity contours, isotherms, Strouhal number, drag and lift coefficients, and Nusselt number.

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Effect of Orientation on Fluid Flow and Heat Transfer Characteristics of an Equilateral Triangular Cylinder

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ABSTRACT: Two-dimensional numerical simulations are performed to study the effect of geometrical orientation on fluid flow and heat transfer characteristics of an equilateral triangular cylinder. The heated cylinder is assumed to be placed horizontally in un-confined boundaries and flow of air is in vertically upward direction. Reynolds number of the flow is kept at Re = 100 based on projected width of the cylinder. Three different orientations of the cylinder with respect to the flow direction are considered i.e. vertex facing, base facing and slant face facing the flow direction. The results are presented by instantaneous streamlines, instantaneous vorticity contours, instantaneous isotherms, time-averaged isotherms, lift and drag coefficients, Strouhal number and averaged Nusselt number. A comparison of the results for three orientations of the cylinder is presented. Results show that primary instability in the flow field is induced at different rates due to different flow separation mechanisms. Among the three orientations of the cylinder, time averaged drag coefficient is highest for the base facing flow orientation due to a wider wake and a high pressure drag. However, averaged Nusselt number is highest for the vertex facing flow orientation due to the effective utilization of the slant faces for heat transfer.

KEYWORDS: Triangular cylinder, orientation, vortex shedding, forced convection.

I. INTRODUCTION

Fluid flow and heat transfer around bluff bodies of different cross sections have been studied extensively in literature due to wide engineering applications in heat exchangers, electronics cooling and design of vortex flow meters etc. In past, most of the investigations have been done on the circular cylinder. Significant changes in the flow field can be obtained with the sharp-edged square and triangular cross-section cylinders as compared to circular cylinder. Square cylinder has also received a fair attention in literature. However, triangular cylinder has gained attention in last few years and literature is scarce. For a sharp-edged bluff body, separation is likely to occur at the sharp edges. When a fluid separates from a bluff body, it forms a separated region behind the body with periodic generation and shedding of circulating flow structures called vortex shedding. For a triangular cylinder, it is imperative that geometrical orientation of the cylinder with respect to the flow direction also influences flow instability and corresponding vortex dynamics. Most of the available literature e.g. De and Dalal [1], De and Dalal [2], Dhiman and Shyam [3], Chatterjee and Mondal [4] and Srikanth et al. [5] have focused on low Reynolds number flow past an equilateral triangular cylinder with vertex of the cylinder facing the flow direction. There is scarcity of investigations dealing with fluid flow and heat transfer characteristics for other orientations of the triangular cylinder. Therefore, a numerical study has been carried out for forced convection flow around a heated equilateral triangular cylinder with three different orientations of the cylinder with respect to the flow direction i.e. vertex facing, base facing and slant face facing the flow direction. The heated cylinder is placed horizontally in un-confined boundaries and air flow (Pr = 0.7) is in vertical upward direction. All the simulations has been carried for Reynolds number, Re = 100 based on projected width of the cylinder (i.e. same for all three orientations). The Results have been produced related to flow and thermal field by instantaneous streamlines,

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A Review of Unsteady Flow and Heat Transfer around a Triangular Bluff-Body

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ABSTRACT: Fluid flow and heat transfer characteristics of bluff bodies of different cross-sections have been studied by researches due many engineering applications e.g. in electronics cooling, heat exchangers, nuclear reactors and flow dividers etc. Circular and square cross-section bluff-bodies are mostly studied. Triangular cross-section cylinder however being a potential vortex generator has very limited available literature. Present paper first discusses the fundamental aspects and terms related to the fluid flow and heat transfer around bluff-bodies in general. Then the paper reviews recent literature for the flow past a triangular cross-section cylinder. The review has been presented considering the effect of five variables e.g Reynolds number, blockage ratio, geometrical orientation, aspect ratio, and prandtl number on the flow and heat transfer parameters. Struohal number (St), drag coefficient, lift coefficient, critical Reynolds number,local and averaged Nusselt number have been discussed. Flow and thermal field have been illustrated by instantaneous streamlines, vorticity contours, and isotherms.

KEYWORDS: Triangular bluff-body, wake, vortex shedding, forced convection.

I. INTRODUCTION

When a fluid flows around a stationary body, there is a relative velocity between the body and fluid. These flows are referred as flow over immersed bodies. Depending on overall shape of the immersed body, it is said to be streamlined body or bluff body. In a streamlined body, streamlines in the flow conforms to the boundaries of the body. However, a bluff body tends to block the flow and subdivides it by separation at or near leading edges. Bluff bodies are used to enhance unsteadiness, mixing in the flow and heat transfer. The flow of fluid over bluff body finds wide engineering applications e.g. in electronics cooling, heat exchangers, nuclear reactors, design of flow dividers, probes and sensors etc. Fundamental aspects related to the fluid flow and heat transfer around bluff-bodies are discussed below.

1.1 Flow past bluff-bodies

When a fluid separates from a bluff body, it forms a separated region behind the body called wake. In all bluff body flows, there is the periodic formation and shedding of circulating flow structures (vortices) in the wake region and is referred to as vortex shedding. Vortex shedding generates unsteadiness in the flow and thermal fields that governs fluid flow and heat transfer behavior around bluff bodies. Bluff bodies of different cross sections (e.g. circular, square, elliptical and triangular etc.) have been studied by the researches.

1.2 Sharp-Edged triangular cylinder

The literature reveals that the most of the studies have been done on circular cross-section cylinder. The significant changes in the flow and thermal field can be obtained with the sharp edged cylinders (e.g., cylinders of square and triangular cross section, etc.). Square cylinder has also received a fair attention in literature due to its importance in flows over Buildings, heated electrical components etc. However, triangular cylinder being a potential vortex generator has gain attention in recent past with limited literature available. The flow past sharp edged cylinders is

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Effect of Thermal Buoyancy on the Wake Behaviour of a Triangular Cylinder: A Review

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ABSTRACT: Heat transfer characteristics of cylindrical bluff bodyfinds importance in the design of thermal systems. For a heated cylinder, flow becomes complicated due to developed buoyancy forces.Contamination of the thermal buoyancy in low Reynolds number forced flow significantly influencesthe wake dynamics, flow field and heat transfer.Cross-section of the cylindrical body also decides heat transfer from the body. Heated circular and square cross-section bluff-bodies are mostly studied. Heated triangular cross-section cylinder has very limited available literature. Present paper first discusses the fundamental terms related to the effect of thermal buoyancy on the fluid flow around cylindrical bluff-bodies. Then the paper reviews recent literature for the flow past a triangular cross-section cylinderin mixed convection regime considering the effect of buoyancy. The review has been presented for cross-buoyancy, aiding-buoyancy and opposing-buoyancy flow configurations. Effect of buoyancy parameter i.e. Richardson number (Ri) on Struohal number, drag coefficient, lift coefficient, critical Reynolds number,local and averaged Nusselt number have been discussed.Effect of Richardson number on the flow field has been illustrated by instantaneous streamlines.

KEYWORDS:Triangular cylinder, vortex shedding, thermal buoyancy, mixed convection.

I. INTRODUCTION

Heat transfer behavior of cylindrical bluff-bodies has been the topic of great significance due to its engineering applications in heat exchangers, electronics cooling, nuclear reactors and design of thermal systems.Researchers have extensively studied the flow past circular and square cross section cylinders. Triangular cylinder being a sharp edged bluff body has potential to change the flow and temperature field significantly.Rai and Singh (2017) presented a comprehensive review of unsteady flow and heat transfer around a triangular bluff-body. The authors discussed basic terms and parameters related to fluid flow and heat transfer around cylindrical bluff-bodiesand presented recent review of flow past a triangular cross section cylinder in great detail. Rai and Singh (2017),in their review covered investigations of flow across unheated triangular cylinder and heated triangular cylinder without considering the effect of thermal buoyancy. In the present paper, effect of thermal buoyancy on the wake behavior of a triangular cylinder is reviewed. Therefore,related basic terms and parameters are omitted here and can be viewed in Rai and Singh (2017). However, basic theory and definition related to effect of buoyancy are discussed below.

1.1 Heat transfer from a cylindrical bluff-body

When a cylindrical bluff-body is heated and its temperature is higher than the temperature of the surrounding fluid, heat transfer takes place between the body and the surrounding fluid primarily by convection mode.Natural convectiontakes place when fluid motion is caused by thermal buoyancy forces that result from the density variations, due to variations of temperature in the fluid. Heat induced thermal buoyancy force in natural convection heat transfer is characterized by a non-dimensional number known as Grashof number (Gr). It isdefined as:

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A Numerical Study of Buoyancy-Aided Mixed Convection Flow Around A Triangular Cylinder

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Abstract*—Buoyancy-aided mixed convection flow past heated equilateral triangular cylinder with base of the cylinder facing the flow direction is numerically simulated using FLUENT. The heated cylinder is assumed to be placed horizontally in un-confined boundaries and the air flow (Pr = 0.7) is in vertical upward direction i.e. upward buoyancy force added to the forced flow. Reynolds number is kept at Re = 100 and Richardson number (Ri) is varied in the range of $0 \leq Ri \leq 1.0$. Reynolds number and Richardson number are based on the projected width of the cylinder. Flow and heat transfer parameters are presented as a function of Richardson number. The results are presented by instantaneous streamlines, instantaneous vorticity contours, instantaneous isotherms, lift and drag coefficients, Strouhal number and averaged Nusselt number. With increase in the value of the Richardson number, Strouhal number increases and at a critical Richardson number suppression of vortex shedding takes place and Strouhal number reduces to zero. Present simulation results indicate that critical Richardson number for suppression the vortex shedding past an equilateral triangular cylinder is much higher as compared to the value of critical Ri for circular and square cylinders at similar Reynolds number available in literature. This indicates that triangular body induces more instability in the flow field that requires strong buoyant force to suppress the vortex shedding.

***Key words*—Buoyancy, Mixed convection, Triangular cylinder, Vortex shedding**

I. INTRODUCTION

The fluid flow and heat transfer mechanism around bluff bodies (e.g. cylinders of circular and square cross section, etc.) has been the topic of intense research to many researches. The topic finds many applications e.g. in electronics cooling, heat exchanger systems, design of flow dividers, probes and sensors etc. Most of the investigations have been done on circular cylinder that has continuous surface curvature. Sharp edged cylinders (e.g., cylinders of square or triangular cross section) can also produce significant changes in the downstream flow field. The location of separation points are fixed for sharp edged cylinders, whereas for circular cylinder, the location of separation points depends on the state of the boundary layer.Among the sharp edged bluff bodies, square cylinder has also been studied extensively. However, triangular cylinder has gained attention in recent past and literature is scarce. In all bluff body flows, the flow separates from the body with the formation and shedding of circulating flow structures, called vortices in the wake region. The periodic generation of these vortices in downstream flow is referred to as vortex shedding.Researchers havestudied the problem of fluid flow over triangular cylinder with two orientations of the cylinder i.e. vertex of the triangular cylinder facing the flow and base of the cylinder facing the flow.De and Dalal [1], Dhiman and Shyam [2], Chatterjee and Mondal [3] have focused on low Reynolds number flow past an equilateral triangular cylinder with vertex of the cylinder facing the flow direction. Zeitoun*et. al* [4], Jiahuang*et al.* [5], Singh and Rai[6] have studied vertex facing and base facing the flow orientations, both.However, above studies [1-6] were carried out in forced convection regime where buoyancy forces are negligible. For low velocity flow over a highly heated body, both the buoyancy force and forced flow influences the flow field and flow is in mixed convection regime. For mixed convection, flow and thermal field is governed by Richardson number ($Ri = Gr/Re^2$). Where, Gr is the Grashof number. For a horizontally placed heated cylinder, buoyancy forces act in vertical upward direction. If the forced flow is directed in horizontal direction over a horizontal heated cylinder, it is termed as cross buoyancy flow. Chatterjee and Mondal [7], Rasoole*t. al.* [8], Dulhani and Dalal[9]investigated the effect of cross-buoyancy on unsteady mixed convective flow and heat transfer around a triangular cylinder. If the forced flow is directed in vertical upward directionover a horizontal heated cylinder, it is termed as buoyancy-aided flow.Buoyancy aided mixed convection flows past a circular cylinder has been studied by Chang and Sa [10] numerically. Singh et al. [11] studied buoyancy-aided mixed convection flows past circular and square cylinder experimentally. Above literature reveals that no study is available that deals with the effect of aiding buoyancy on the wake characteristics of a triangular cylinder. Therefore, the objective of thepresent paper is to investigate numerically the effect of aiding buoyancy on flow and heat transfer characteristics around a triangular cylinder. The cylinder is placed horizontally in base facing the flow configuration in unconfined boundaries and the flow of air (Pr = 0.7) is in vertical upward direction. Based on the projected width of the cylinder, the Reynolds number (Re) is kept at 100. Richardson number (Ri) is varied in the range of $0 \leq Ri \leq 1.0$. The results are presented by instantaneous streamlines, instantaneous

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DESIGN AND PROCESS INTEGRATION OF MULTIPLE EFFECTS EVAPORATORS

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ABSTRACT

Evaporators are widely used in process industries for concentrating solutions. Heat supplied to evaporator is principally latent heat of vaporization of solvent. Evaporators are large consumers of energy. Multiple effect evaporation is most frequently used to conserve energy. Mathematical modeling serves as a valuable tool for the detailed thermal and hydraulic design of evaporation system as well as for simulation of existing unit. This report covers the detailed thermal and hydraulic design and performance analysis of multiple effect evaporators. The effect of inclusion of thermo vapor recompressor in multiple effect evaporation system is also studied. A mathematical model together with the concept of heat-path diagram is used to determine optimal design of process integrated multiple effect evaporator. The proposed mathematical model includes the effect of pressure drop on heat transfer area requirement for each effect. Available correlations are used to calculate two-phase pressure drop and corrected temperature is introduced into model equations. A case study is chosen from literature to illustrate the effect of pressure drop on area requirement. To demonstrate the application of proposed methodology, a corn glucose process plant is chosen. The capital energy trade-off for different effect systems is studied and it was found that minimum total cost occurs for process integrated triple effect system. A heat exchanger network to achieve minimum utility requirement of optimal design configuration is also proposed.

Keywords: *Evaporator, Energy, Compressor, evaporation.*

I. INTRODUCTION

Process industries require significant amount of energy in converting raw materials into final desired products. One of the energy intensive operations involved in these industries is evaporation. Process evaporators are energy intensive equipments used for concentrating a variety of solutions. The nature of solution decides the selection of evaporator. The heat supplied to evaporator is mainly latent heat of evaporation. Thus there is need to employ energy conservation techniques to reduce utility requirement and associated operating cost. Several techniques have been applied in process industries to improve economy ratio of evaporator. Multiple effect evaporation is most frequently used energy conservation technique. In multiple effect operation, several evaporators are connected in series such that vapor produced in one effect is utilized as heating medium in next effect, operating at lower pressure than the previous one. The net result of this arrangement is the multiple re-use of heat and a marked increase in the steam economy of the system. Other techniques include heat recovery exchange, condensate recovery, thermo-vapor and mechanical recompression. Traditional design of multiple effect evaporator is based on stand-alone approach in which latent heat of vaporization is supplied by steam. Other heat requirements associated with the evaporation process are sensible heat duties for heating inlet feed stream, heating/cooling of outlet product stream and cooling of condensate and vapor streams. Now that process industries are becoming energy conscious due to steeply rising fuel price, the design of evaporation system with minimum utility must be considered. In this context, process integration technique for evaporator is a valuable tool in minimizing total utility consumption and results in improved overall process efficiency.

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A study on parabolic mass distribution

Meena, Amit

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Abstract

Civil Engineering structures have to withstand natural environmental forces like wind, earthquake forces and wave forces, along with loads that they are designed to resist. All this environmental forces are random and dynamic in nature. Therefore the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. Therefore there is always a need for some sort of control of response of structure. This project aims at studying both methods of the Tuned Mass Dampers. It has been well established that Single tuned mass damper (STMD) and Multiple tuned mass damper (MTMD) are effective in reducing the response of the structure. The project aims and study of two devices, the Single Tuned Mass Damper and Multiple Tuned Mass Damper using new control strategy. The tuned mass dampers, consisting of one larger mass block (*i.e.* one larger tuned mass damper) and one smaller mass block (*i.e.* one smaller tuned mass damper), referred in this report as the STMD, have been studied to seek for the mass dampers with high effectiveness and robustness for the reduction of the undesirable vibrations of structures under the ground acceleration. Multiple tuned mass dampers (MTMD) consisting of many active tuned mass dampers (TMDs) with uniform distribution of natural frequencies have been, proposed to attenuate undesirable oscillations of structures under the ground acceleration.

Keywords: MTMD | STMD | DMF | Parabolic mass

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Introduction

Civil Engineering structures have to withstand environmental forces like wind, earthquake forces and wave forces along with loads that they are designed to resist. All this environmental forces are random and dynamic in nature. Therefore the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. Therefore there is always a need for some sort of control of response of structure. The fact is more important in present times due to following factors:

1. **Increased flexibility:** it is now a necessity and trend to use tall, long or in general more flexible structures. There is also a growing

A STUDY ON SKEWED MASS DISTRIBUTION

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Abstract

Civil Engineering structures have to withstand natural environmental forces like wind, carthquake forces and wave forces, along with loads that they are designed to resist. All this environmental forces are random and dynamic in nature. Therefore the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. Therefore there is always a need for some sort of control of response of structure. This project aims at studying both methods of the Tuned Mass Dampers. It has been well established that Single tuned mass damper (STMD) and Multiple tuned mass damper (MTMD) are effective in reducing the response of the structure. The project aims and study of two devices, the Single Tuned Mass Damper and Multiple Tuned Mass Damper using new control strategy.The tuned mass dampers, consisting of one larger mass block (i.e. one larger tuned mass damper) and one smaller mass block (i.e. one smaller tuned mass damper), referred in this report as the STMD, have been studied to seek for the mass dampers with high effectiveness and robustness for the reduction of the undesirable vibrations of structures under the ground acceleration. Multiple tuned mass dampers (MTMD) consisting of many active tuned mass dampers (TMDs) with uniform distribution of natural frequencies have been, proposed to attenuate undesirable oscillations of structures under the ground acceleration

Key word: MTMD, STMD, DMF, Parabolic mass, Skewed, Bell shape

1. Introduction

Civil Engineering structures have to withstand environmental forces like wind, earthquake forces and wave forces along with loads that they are designed to resist. All this environmental forces are random and dynamic in nature. Therefore the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. Therefore there is always a need for some sort of control of response of structure. The fact is more important in present times due to following factors:

1. Increased flexibility: it is now a necessity and trend to use tall, long or in general more flexible structures. There is also a growing tendency to use lighter and more flexible construction materials. These factors promote the idea of control of vibrations of structure.

2. Increased safety levels: As structure becomes more complex, costly and as it serves more critical function, it demands higher safety levels.

3. Stringent performance requirements: Structures are required to respond to the forces acting on them within the safety limits. Hence for environmental loads, which are random and dynamic in nature, more stringent safety limits are generally set, which demand for control of vibrations of the structure. Due to the above listed reasons, the concept of structural perception using control systems is not only becoming increasingly popular but it is becoming almost a necessity in modern days. The Tuned Mass Damper is a classical engineering device that is used for vibration control. It consists of mass, a spring and a damper, which is attached to the main structure Fig 1.

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A compression on parabolic and skewed mass distribution

Meena, Amit

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Abstract

Natural environmental forces like wind, earthquake forces and wave forces, along with loads that they are designed to resist. These forces are random and dynamic in nature. So the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. The aim of study both methods are to compare the effectiveness and the response on the structure. It has been studied to seek for the mass dampers with high effectiveness and robustness for the reduction of the undesirable vibrations of structures under the ground acceleration.

Keywords: DMF | Parabolic mass | Skewed | Bell shape

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Introduction

Engineering structures have to withstand environmental forces like wind, earthquake forces and wave forces along with loads that they are designed to resist. All forces are random and dynamic in nature. So the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. These are the factors due to this engineering structure play an important role.

Stringent performance requirements: Structures are required to respond to the forces acting on them within the safety limits. Hence for environmental loads, which are random and dynamic in nature, more stringent safety limits are generally set, which demand for control of vibrations of the structure.

Increased flexibility: There is also a growing tendency to use lighter and more flexible construction materials. These factors promote the idea of control of vibrations of structure.

3. Increased safety levels: As structure becomes more complex, costly and as it serves more critical function, it demands higher safety levels.

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Vibration control using tuned mass damper

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Abstract: Civil Engineering structures have to withstand natural environmental forces like wind, earthquake forces and wave forces, along with loads that they are designed to resist. All this environmental forces are random and dynamic in nature. Therefore the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. Therefore there is always a need for some sort of control of response of structure. This project aims at studying both methods of the Tuned Mass Dampers. It has been well established that Single tuned mass damper (STMD) and multiple tuned mass damper (MTMD) are effective in reducing the response of the structure. The project aims and study of two devices, the Single Tuned Mass Damper and Multiple Tuned Mass Damper using new control strategy. The tuned mass dampers, consisting of one larger mass block (i.e. one larger tuned mass damper) and one smaller mass block (i.e. one smaller tuned mass damper), referred in this report as the STMD, have been studied to seek for the mass dampers with high effectiveness and robustness for the reduction of the undesirable vibrations of structures under the ground acceleration. Multiple tuned mass dampers (MTMD) consisting of many active tuned mass dampers (TMDs) with uniform distribution of natural frequencies have been, proposed to attenuate undesirable oscillations of structures under the ground acceleration.

Key words: *Vibration; Damper; Tuned mass damper (Single and multiple)*

1. Introduction

Civil Engineering structures have to withstand environmental forces like wind, earthquake forces and wave forces along with loads that they are designed to resist. All this environmental forces are random and dynamic in nature. Therefore the response of the structure is also dynamic and that is what causes the unsafe and uncomfortable conditions. Therefore there is always a need for some sort of control of response of structure. The fact is more important in present times due to following factors:

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The Tuned Mass Damper is a classical engineering device that is used for vibration control. It consists of mass, a spring and a damper, which is attached to the main structure Fig. 1. Single tuned mass

Dampers (STMD) have proved to be very sensitive even to the small offset in tuning ratio when it is optimally designed. This is the greatest disadvantage of STMD. This is due to following reasons. Errors in predicting or identifying the natural frequency of the structure and also the error in fabricating a TMD are inevitable to some degree. Some structures have nonlinear properties even in small amplitude range due to contribution of secondary members.

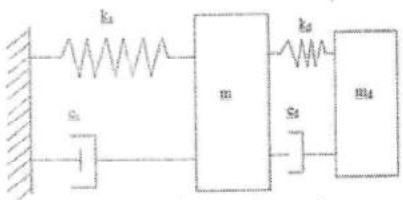

Fig. 1: The Single tuned mass damper

Therefore, in practical design the optimum values of parameters of TMD are not chosen. The damping of the TMD is intentionally made higher than the optimal value such that TMD become less sensitive to tuning errors. This results increase the mass of TMD to meet the design requirement.

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Sincerely,
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A Project on three axis pneumatic modern trailer

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Abstract: *Three axis modern trailer used mainly in construction site as well in industrial site where the place is very less, here we can load material at any side of trailer where as in ordinary unloading done at back side only here we can unload the load on left side, right side and back side also. This system is totally operated with pneumatic component with linkage mechanism. In this project control valve is used to activate deactivate the air input the valve is ON the air goes to cylinder and then pushes cylinder so that lifting is applied at the time of valve is ON.*

Mechanization is broadly defined as the replacement of manual effort by mechanical power pneumatic is attractive medium for low cost mechanization particularly sequential or repetitive operations. Many factories and plants already have a compressed air system which is capable of providing the power or energy requirements and the control system (although equally pneumatic control system may be economic and can be advantageously applied to other forms of power). The main advantage of all pneumatic system is usually economic and simplicity the latter reducing maintenance to a low level. It can be also have outstanding advantages in term of safety.

Key word: Pneumatic, Trailer, Compressed, Cylinder

1 INTRODUCTION

A Trailer is generally an unpowered vehicle pulled by a powered vehicle. Commonly, the term trailer refers to such vehicles used for transport of goods and materials. Sometimes recreational vehicles, travel trailers, or mobile homes with limited living facilities where people can camp or stay have been referred to as trailers. In earlier days, many such vehicles were towable trailers.Mechanization is broadly defined as the replacement of manual effort by mechanical power pneumatic is attractive medium for low cost mechanization particularly sequential or repetitive operations. Many factories and plants already have a compressed air system which is capable of providing the power or energy requirements and the control system (although equally pneumatic control systemmay be economic and can be advantageously applied to other forms of power). The main advantage of all pneumatic system is usuallyeconomic and simplicity the latter reducing maintenanceto a low level. It canbe also having outstanding advantages in term of safety.

2 WORKING PRINCIPLE

In our project, we are doing unloading material in using three axis pneumatic modern trailer. In this working the loading material is unloaded by using pneumatic cylinder. The compressed air passes through the compressor. Compressor is control by the controller for ON the pneumatic. This pneumatic force used for rivet to moves downwards. After a few seconds delay the controller will off the compressor, so that the pneumatic moves upwards. In automatic control movement controller control the pneumatic cylinder positioning with the help of relay and solenoid valve. The controller gives the signal to relay drive. The main function of relay drives to change the direction of air flow movement in solenoid valve. Then the piston movement automatically changes in pneumatic cylinder. Then

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Life Cycle Analysis in Manufacturing Industry - A Case Study

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ABSTRACT

The method used in this project is LCA and the study is performed from gate (beginning of the company) to gate (end of the Company). LCA is a method to assess the potential environmental impacts associated with a specific product or service. All stages in the life cycle are taken into account and use of natural resources, transportation, energy consumption, waste and emissions are considered. LCA can be used for identification of improvement possibilities, decision-making etc. but has also an important application in learning about environmental impacts caused by substances and processes used in the life cycle. This is mainly what is done in this study.

Keywords: Environmental Impacts, NBC, ISO, LCIA, LCA, GWP, LCI

I. INTRODUCTION

The increasing environmental concern in today's society puts lot of pressure on the industry to produce less environmental damaging products. At this point, this is principally experienced by industries producing consumer goods but these industries are in their turn increasing the pressure on their suppliers. So far it is in most cases questions about environmental management systems but the nature of the questions are slowly changing and becoming more product-related. Questions about LCA work and performed LCAs are becoming more frequent. With this as a background I decided that it was time to perform an LCA on one of key products of NBC.

In recent years Life Cycle Assessment (LCA) has become one of many useful tools in assessing the environmental aspects and potential impacts associated with a product. In LCA the product is followed from the cradle to the grave, i.e. from raw material acquisition, through production, use and waste disposal. LCA is multidisciplinary and deals with the social system, the technical system, the natural system and their relationships.

The LCA method provides researchers or companies with quantitative data for their current products. By looking at a product's life from the raw material extraction to its disposal, the environmental impact of each process and material can be analysed. The LCA allows analysts to determine and analyse the technological, economic, environmental, and social aspects of a product or process necessary to manage the complete life cycle. With this quantitative data, desired changes can be justified with respect to the cost and environmental impacts of a product or process.

LCA is an increasingly important tool for environmental policy, and even for industry. Analysts are also interested in forecasting future materials/energy fluxes on regional and global scales, as a function of various economic growth and regulatory scenarios. A fundamental tenet of LCA is that every material product must eventually become a waste. To choose the 'greener' of two products or policies it is necessary to take into account its environmental impacts from 'cradle to grave'. This includes not only indirect inputs to the production process, and associated wastes and emissions, but also the future (downstream) fate of a product. The first stage in the analysis is quantitative

An Overview Study of Solar Cookers

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Abstract - *Cooking is the major necessity for people all over the world. It accounts for a major share of energy consumption in developing countries. Therefore, solar cookers are commonly used in the domestic sector in these countries. The advantages of the use of solar cookers would result in the reduction of the release of CO_2 in the environment. Cooking is the most important energy consuming operation in the domestic sector, as energy for cooking accounts for 50% of the total primary energy consumption. According to Indian government survey, over 77% of rural households in the country were estimated to depend on firewood and chips for cooking. Over 7% used dung cake and only 9% used LPG. In urban areas, LPG was the primary source of energy in nearly 62% of households. Hence, replacing the traditional cooking methods by solar energy can be considered as an alternative for meeting the energy crisis. This paper presents a short review on different types of solar cookers.*

Key Words: Box Solar Cooker, Solar Energy

1. INTRODUCTION

Solar cookers are not a new idea. Designers as far back as the 19th century recognized the potential of the sun's energy to provide heat for cooking and other purposes and designed appropriate tools to harness it. It is indeed likely that solar energy was used for cooking long before then.

Solar cookers have many potential benefits, both to their user and to the environment. A frequently cited advantage of solar cookers is that they reduce users' dependence on fuel sources for cooking. This reduction has economic benefit to the user by reducing their expenditure on fuel and also environmental benefit by reducing deforestation (in regions where wood is used as a cooking fuel) and release of combustion products into the atmosphere. Because a good deal of wood-based cooking is performed indoors with poor ventilation, solar cooking also has the potential to reduce smoke inhalation and related health difficulties

2. LITERRTURE SURVEY

C Z M Kimambo et al (2007) in their paper optimized various parameters and concluded that results obtained from this study show that under various conditions of insolation and wind, different types of solar cookers are superior to others. However, under best respective operating conditions, box solar cookers have lower performance compared to the reflector cookers. The reflector cooker with glass reflector achieved highest temperatures and accordingly shortest cooking times than any other cookers tested under sunny days with no cloud cover. It is recommended as being the most suitable type of cooker in areas with long durations of strong solar radiation with no cloud cover and low wind interference. However, special attention should be paid to protect the users from possible burns or eye damage that may occur due to the reflected radiation of the cooker. The reflector cooker with polished aluminium reflectors has significantly lower performance than that of the reflector cooker glass mirror reflectors, under clear sky conditions. The reflector cooker with unpolished aluminium reflectors has the poorest performance of all the solar cookers even the box solar cookers under clear sky conditions. The ordinary unpolished aluminium should therefore never be used as reflector for solar cookers. Dissemination of such cookers would definitely end up in failure as the cookers would not be able to meet the cooking expectations of the intended users. The 'SunStove' box cooker was able to cook 2 kg of rice, which is sufficient for a moderate family in Tanzania. Both the 'SunStove' and the wooden box cooker can be used for cooking where the global insolation is high and wind effects are not pronounced. This work had shed some light on the status of solar cooking worldwide and provided a detailed account of activities taking place in Tanzania, in relation to solar cooking. Results obtained indicate that many of the cookers could be used to cook food for households in areas with medium and high insolation with appropriate selection of the type and specification of the cookers. The specification should be based on the measured insolation data of the location indicating the direct and diffuse components. This should go hand in hand with proper instruction and training of the users for successful dissemination. As a guiding tool, reflector cookers offer best comparative performance in areas with longest durations of clear sky (greatest direct beam), panel and collector cookers under moderate cloudy conditions and box cookers under very cloudy conditions. It should be noted here that all types of cookers offer best performance under clear sky conditions.

Prof. Viral K Pandya, Prof. Shailesh N Chaudhary, Prof. Bakul T Patel et al. (2011) started their study with the objective to analyze the performance of Box Type Solar Cookers under Gujarat Climate Condition in Mid Summer to

Implementation of Industry 4.0 to achieve Sustainable Manufacturing in Steel industry : A Case Study

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Abstract: **Sustainable manufacturing has been a popular topic of research for quite some time now. There are various concepts and ideas which have claimed to have a significant impact on sustainability of the manufacturing industry like lean, green and agile manufacturing. Industry 4.0 is the latest and by far the one with the maximum potential of changing the manufacturing sector forever. It is rightly called as "the fourth industrial revolution". It is a wide concept which covers many state of the art technologies like the Internet of Things (IoT), Artificial Intelligence, Big Data, Augmented reality etc. But like every big revolution, it is to face many challenges also. In this review, we are looking at this 'yet in infancy' concept and its role in achieving a sustainable manufacturing sector as discussed by researchers. Different scholars have come up with different challenges to implementation of I4.0 which they thought to be of some significance. There is going to review such challenges making a list of 13 such challenges. Then, it also throw some light on the new challenge faced by all of humanity in the form of SARS-CoV-2 pandemic and how it is affecting the manufacturing sector.**

Keywords: **Industry 4.0, Sustainable Manufacturing, Sustainability, Manufacturing.**

1. INTRODUCTION

Manufacturing industries are forced by increasing challenges such as resource depletion, economic stagnation, human beings pursuing higher life quality and stricter laws and environment protection policies. Sustainable manufacturing has intended to empower the companies to cope with such challenges and guide them to stand out in the competitive market today. Therefore, manufacturers are now tending to reset to manufacturing processes and manufactured products that minimise environmental impacts while considering social and economic dimensions. Indian manufacturing units, especially SMEs, have long been avoiding any big transformation. The ongoing pandemic has disrupted the global as well as domestic demand and supply chains [1]. Recent data released by GoI shows that manufacturing is the worst performing sector (at -39.3%) after Construction. At this point of time, the long pending restructuring of the processes and methods has become absolutely necessary. Further continuing with the traditional manufacturing techniques without adapting to the new order might prove to be a recipe for disaster. Now the question arises how a manufacturing industry should approach towards achieving goals offered by sustainable manufacturing?. How to implement these changes in the current system? How to make complete use of industry 4.0 ? its focusing on the implementation of industry 4.0 in order to enhance sustainability in Indian manufacturing industries. It also focuses on the challenges faced by Indian manufacturing industries in implementation of industry 4.0 and the methods that can be used in obtaining maximum output by implementation of Industry 4.0 Industry 4.0 is based on the establishment of smart factories, smart products, and smart services embedded in an internet of things. Sustainable manufacturing or Green manufacturing focuses on energy efficiency, conservation of resources and low waste production and reduces environmental impact. In this process we need to identify, quantify, assess, and manage the flow of environmental waste with the goal of ultimately reducing the environmental impact to that of the self-recovery capability of the Earth could deal with while also trying to maximise resource efficiency . The OECD Sustainable Manufacturing Toolkit illustrates three aspects of sustainability as Environmental, Economic and Social. The 17 well known SDGs (Sustainable Development Goals) of the UN (United Nations) summarizes the need of the hour in a very simple manner and for all three aspects. These SDGs, since their adoption by the UN, have served as the guiding light for policy makers across the globe. Adoption of the SDGs was, according to the UN, "a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030". In this journey to improve sustainability in all aspects of life, many challenges have come our way and many are waiting for us in the journey ahead. We have reviewed such challenges mentioned by earlier researchers. In the end we have reviewed the current situation of COVID-19 pandemic in light of challenges it offers to our agenda of achieving SDGs by 2030.

Selection of the literature to be reviewed by searching on google scholar with keywords, "Sustainability in manufacturing" OR "Industry 4.0 Sustainability" OR "Sustainable manufacturing" OR "Industry 4.0 challenges".

better decisions like product quality, product life, product cost reduction, pollution, faults in process can be made to obtain sustainability in manufacturing.

1.3. Cloud Computing

Cloud Computing is a new technology which helps in easy storage of data over the internet, which provides easier computing and access of data from all over the world via

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Process improvement in an Indian automotive part manufacturing company: a case study

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Abstract: Problem-solving and ongoing procedure enhancements are key elements to obtaining quality improvement in business operations. Many process improvement strategies have been suggested and implemented in organisations, where define, measure, analysis, improve and control (DMAIC) is mostly applied. This study presents a practical application of an improved version of DMAIC, for reducing the defects generated through a process within the auto part manufacturing firm. The paper reviews the most commonly used lean and Six Sigma tools, explicitly, DMAIC, its modifications, and restrictions. Based on this, the study provides define, measure, pre-analysis, experiment, analysis, improve, and control (DMPEAIC) methodology. Finally, DMPEAIC is tested in a case study. The results obtained from the case study shows that DMPEAIC is an efficient approach resulting in the case study company to get a reduction of 76.4% defects in problems related to maintenance methods, and informal issues.

Keywords: automobile part manufacturing; defect; define, measure, analysis, improve and control; DMAIC; process improvement; Six Sigma; waste reduction; India.

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Suppliers Selection Using Fuzzy AHP and Fuzzy TOPSIS Method—A Case Study of a Bearing Manufacturing Company

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Optimal dynamic balancing and shape synthesis of links in planar mechanisms

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ABSTRACT

This paper presents a two stage optimization procedure for dynamic balancing of planar mechanisms and finding optimum link shapes. In the first stage, the shaking force and shaking moment are minimized by optimizing mass distribution of links using the equimomental system of point-masses for each link. Then for the optimum inertial parameters of the balanced mechanism, the optimum links shapes are synthesized systematically using closed parametric curve such as cubic B-spline in the second stage. The control points of cubic B-spline curve are taken as the design variables for link shape formation to minimize the percentage error in the resulting link inertia values. The constraints on design variables are defined for both symmetrical and non-symmetrical shapes in the optimization problem formulation. The proposed method of balancing and shape synthesis can be applied to any planar single and multiloop mechanism with revolute as well as prismatic joints. Its effectiveness is demonstrated by applying it to four-bar, five-bar, six-bar and slider-crank mechanisms.

1. Introduction

The resultant inertial forces and moments of the moving links of a mechanism are termed as shaking force and shaking moment [1]. These forces and moments transmitted to the frame result in vibrations, wear and noise which adversely affect the dynamic performance of the mechanism. Several methods to reduce the shaking force and shaking moment based on various principles are discussed in [2–4]. The complete force balancing can be achieved by making the total mass center of moving links stationary either using mass redistribution [5,6] or by adding counterweights [7]. Force balancing and trajectory tracking are achieved in a five-bar real-time controllable mechanism using adjusting kinematics parameter approach [8]. However, the full force balance generally increases the other dynamic performance characteristics like shaking moment, driving torque and bearing reactions in the joints [9]. Similarly, the complete moment balancing needs elimination of the total angular momentum of the moving links. The complete elimination of the total angular momentum using link mass distribution and/or adding counterweights is not possible [10]. Therefore, normally the shaking moment is reduced by adding inertia or disk counterweights [11–13], duplicate mechanism [14] and moment balancing idler loops [15] along with the full force balancing. Alternatively, shaking force and moment can be minimized by properly designing and making the moving links of bi-material [16]. The effects of dynamic balancing on the elastodynamic properties of the mechanisms are investigated in [17–21]. In all these methods, the overall mass is increased and mechanism becomes more complex.

Instead of complete balance of shaking force and shaking moment, some methods are developed to minimize them simultaneously through optimization. The conventional optimization technique is used to optimally balance the planar four-bar mechanism [22,23] and to analyze the sensitivity of shaking force and shaking moment to the design variables [24]. The shaking moment is minimized in

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Optimal design of planar slider-crank mechanism using teaching-learning-based optimization algorithm †

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(Manuscript Received March 31, 2015; Revised July 29, 2015; Accepted August 16, 2015)

Abstract

In this paper, a two stage optimization technique is presented for optimum design of planar slider-crank mechanism. The slider-crank mechanism needs to be dynamically balanced to reduce vibrations and noise in the engine and to improve the vehicle performance. For dynamic balancing, minimization of the shaking force and the shaking moment is achieved by finding optimum mass distribution of crank and connecting rod using the equimomental system of point-masses in the first stage of the optimization. In the second stage, their shapes are synthesized systematically by closed parametric curve, i.e., cubic B-spline curve corresponding to the optimum inertial parameters found in the first stage. The multi-objective optimization problem to minimize both the shaking force and the shaking moment is solved using Teaching-learning-based optimization algorithm (TLBO) and its computational performance is compared with Genetic algorithm (GA).

Keywords: Dynamic balancing; Equimomental system; Link shape; Optimization; Slider-crank mechanism; Teaching-learning-based optimization algorithm

1. Introduction

The slider-crank mechanism consisting of crankshaft, connecting rod and piston is the fundamental mechanism used for vehicle engines. The shaking force and shaking moment in the mechanism are defined as the resultant inertial forces and moments of the moving links [1] and need to be eliminated to dynamically balance the mechanism. For an unbalanced mechanism, these forces and moments are transmitted to the frame which worsen the dynamic performance of vehicle engine and generate vibrations, wear and noise. It leads to expensive repairs and replacement of crankshaft and connecting rod and their reverse effects on the other parts such as cylinder block and piston. Few review papers discuss the methods to reduce the shaking force and shaking moment based on different approaches [2-4]. To achieve full force balance in the mechanism, the total mass center of moving links is made stationary either by adding counterweights [5] or by mass redistribution [6, 7]. The complete force balancing increases other dynamic quantities like shaking moment and driving torque in the mechanism [8]. For complete balancing of moment in the mechanism, the total angular momentum of the moving links is eliminated by using duplicate mechanism [3], inertia or disk counterweights [9-11] and moment balancing idler loops [12]. However, the complexity and overall mass for mechanism are increased in these methods.

Alternatively, the shaking force and shaking moment are minimized simultaneously by optimizing links inertial properties, i.e., mass, center of mass location and moment of inertia. The conventional optimization technique is used to optimally balance the planar mechanisms [13, 14] and to analyse the sensitivity of shaking force and shaking moment to the design variables [15]. The mechanism balancing problem is formulated as a multi-objective optimization problem and solved using evolutionary optimization techniques like particle swarm optimization [16] and genetic algorithm [17, 18].

Once the optimized inertial properties of mechanism links are obtained, their shapes are to be decided to carry loads. A method to find link shapes is presented in Ref. [19] by discretizing initial assumed shape into small mass elements and locate them systematically along the link length. The link shapes are synthesized on the basis of maximum work done by taking volume of all links as the constraint [20]. Similarly, the link shapes are formed through topology optimization based on parametric curves [21] and non-intersecting closed polygons [22]. The Evolutionary structural optimization (ESO) method is used to optimize the shaft shape for rotating machinery by gradually removing the ineffectively used material from the design domain [23, 24]. Alternatively, by identi-

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Optimal dynamic design of planar mechanisms using teaching–learning-based optimization algorithm

Kailash Chaudhary[1] and Himanshu Chaudhary[2]

Abstract

A two-stage optimization method for optimal dynamic design of planar mechanisms is presented in this paper. For dynamic balancing, minimization of the shaking force and the shaking moment is achieved by finding optimum mass distribution of mechanism links using the equimomental system of point-masses in the first stage of the optimization. In the second stage, their shapes are synthesized systematically by closed parametric curve, i.e. cubic B-spline curve corresponding to the optimum inertial parameters found in the first stage. The multi-objective optimization problem to minimize both the shaking force and the shaking moment is solved using evolutionary optimization algorithm – "Teaching-learning-based optimization (TLBO) algorithm". The computational performance of TLBO algorithm is compared with another evolutionary optimization algorithm, i.e. genetic algorithm.

Keywords

Dynamic balancing, equimomental system, dynamic design, planar mechanism, teaching–learning-based optimization algorithm

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Introduction

High speed machines and mechanisms must be designed such that the unbalance of shaking force and shaking moment should be minimum to avoid undesirable vibrations. Thus, the balancing problems are actually design problems in disguise. The shaking force and shaking moment are defined as the resultant inertial forces and moments of the moving links of mechanisms.[1] These forces and moments need to be eliminated for dynamic design as they create unbalance and are transmitted to the frame. This results in poor dynamic performance of the mechanism and generates vibrations, wear and noise. The methods to reduce the shaking force and shaking moment based on different approaches are discussed in few review papers.[2–4] To achieve full force balance in the mechanism, the total mass center of moving links is made stationary either by adding counterweights[5] or by mass redistribution.[6,7] The complete force balancing increases other dynamic quantities like shaking moment and driving torque in the mechanism.[8] For complete balancing of moment in the mechanism, the total angular momentum of the moving links is eliminated by using a duplicate mechanism,[3] inertia, or disk counterweights[9–11] and moment balancing idler loops.[12] However, the complexity and overall mass for mechanism are increased in these methods.

Alternatively, the shaking force and shaking moment are minimized simultaneously by optimizing links inertial properties, i.e. mass, CG location and moment of inertia. The conventional optimization techniques are used to optimally balance the planar mechanisms[13,14] and to analyse the sensitivity of shaking force and shaking moment to the design variables.[15] The mechanism balancing problem is formulated as a multi-objective optimization problem and solved using evolutionary optimization

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A study on critical order of joints with clearances and its effect on kinematic performance of multiloop planar mechanisms

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Abstract. Simulation and study of joint clearances has usually focused on appropriate simulation strategies and their validation against experiments. The effect of joint clearances on the output of a mechanism has been usually evaluated qualitatively. The relative importance of different joints in a mechanism in producing deviation from the output of an ideal mechanism has not been studied. This work identifies the appropriate statistical measure for quantifying this deviation and uses it to rank the joints of one degree of freedom multi-loop planar mechanisms. The inversions of six-bar mechanism have been studied through ADAMS simulations involving different clearance sizes and speed of crank. A trend in clearance location ranking has been identified which can probably be extended to planar mechanisms of higher complexity.

Keywords. Planar mechanism; joint clearance; simulation; kinematic performance.

1. Introduction

A mechanism is designed to perform a specific task and it may produce errors when used in real working conditions. These errors occur due to unavoidable factors such as flexibility of links, joint clearances, friction, lubrication and wear. Links and joints are the main constituents of any mechanism and a designer needs to carefully consider their function and limitations. The links form the basic structure of the system while the joints are used to define the relative interactions between them. In general analysis of the mechanism, it is assumed that the joints are ideal and there is no clearance in them. However, clearances are unavoidable due to machining tolerances, wear, and local deformations. Joint clearances are necessary to allow motion between the links and hence they are essential for correct functioning of the mechanism. The performance of a mechanism is adversely affected by the wear and tear of the joints as a result of impact forces generated due to joint clearances [1].

Due to clearances, there is a deviation from the expected ideal behavior which is considered as error. These errors are small for small clearance size but they cannot be neglected for high precision operations. However, reduction in these joint clearances increases the overall cost of the manufacturing. In order to reach a compromise between the manufacturing cost and the output error, it is necessary to analyze the errors and their patterns to estimate the effects caused by the clearances for the given set of conditions.

Researchers around the world have reported various methods for studying the effects of joint clearances and predicting their effect on a mechanism's performance as accurately as possible. Research in this area is mainly focused on developing mathematical models for joint clearances to predict the mechanism's dynamic and kinematic behavior in a variety of situations [2–5]. Neural networks have also been used for this purpose [6–10].

Models for taking into account both joint clearance and link flexibility/compliance have also been reported [11–35]. Models to capture system dynamics and mechanism optimization for reducing their effect was the natural progression in this field and have been reported by many [36–43].

Low joint clearance is certainly preferable but it increases the cost of manufacturing. Mechanism designers and manufacturers need to take a decision on how much clearance can be allowed at which location in the mechanism. In order to take this decision, one needs to know whether the location of joint clearance makes a difference to the output of a mechanism. Such a study, which does not appear to be reported, has been undertaken in this work. One degree of freedom planar mechanisms with only revolute and prismatic pairs have been simulated in ADAMS and the effect of clearance location, clearance size and crank speed have been studied. The first step necessary for such a study was quantification of the deviation of the kinematic output of a mechanism with clearance from that of an ideal mechanism. The appropriate statistical tool for

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Dynamic balancing and link shape synthesis of slider-crank mechanism for multi-cylinder engines

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Abstract: A two-stage optimisation method is proposed to dynamically balance a planar slider-crank mechanism to minimise the shaking force and shaking moment and synthesise its link shapes. In the first stage, the dynamic balancing is achieved by optimally distributing masses of crank and connecting rod using the equimomental system of point-masses. Their shapes are synthesised systematically by closed parametric curve, i.e., cubic B-spline curve corresponding to the balanced mechanism's inertial parameters in the second stage. When such optimised mechanism is used in a multi-cylinder inline engine, the loads on main bearings get reduced. The optimisation problem thus formulated to minimise shaking force, shaking moment and bearing loads as well as to find optimum link shapes are solved using the popular evolutionary optimisation algorithm, i.e., genetic algorithm.

Keywords: optimisation; dynamic balancing; link shape synthesis; shaking force and shaking moment; slider-crank mechanism; multi-cylinder inline engine.

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Himanshu Chaudhary is an Associate Professor in the Mechanical Engineering Department at Malaviya National Institute of Technology Jaipur (Rajasthan, India), where he has been teaching computer aided design, theory of machines and mechanisms, optimisation methods for engineering design, and machine design. He received his BE from Rajasthan Technical University Kota (erstwhile Engineering College Kota) and MTech from Indian Institute of Technology (IIT) Kanpur both in Mechanical Engineering. He received his PhD from Indian Institute of Technology (IIT) Delhi in 2007. His research interests include multibody system dynamics, dynamic balancing and optimisation of machines and mechanisms including robotic systems. He has

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Shape optimization of dynamically balanced planar four-bar mechanism

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Abstract

This paper presents an optimization method to find link shapes for a dynamically balanced planar four-bar mechanism. The shaking force and shaking moment developed in the mechanism due to inertia are minimized by optimally distributing the link masses. The link shapes are then found using cubic B-spline curves and an optimization problem is formulated to minimize the percentage error in resulting links inertia values in which the control points of B-spline curve are taken as the design variables. The effectiveness of the proposed method is shown by applying it to a numerical problem available in the literature.

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Keywords: Dynamic balancing; Equimomental system; Four-bar mechanism; Genetic algorithm; Shape optimization

1. Introduction

The four-bar mechanism is the basic mechanism used in the machines. When operated with high-speeds, these mechanisms transmit forces and moments to the ground known as shaking forces and shaking moments. These are defined as the vector sum of inertia forces and moments of all moving links of the mechanism. The dynamic performance of mechanism is adversely affected by vibrations, wear and noise associated with these forces and moments and several methods are presented in the literature [1-3] to reduce them. The complete force balancing in a

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SHAKING FORCE AND MOMENT BALANCING IN MECHANISMS - A REVIEW

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Abstract

This paper reviews the various methods developed for balancing of the planar mechanisms. The methods used for complete force balance as well as complete force and moment balances are reviewed.

Index Terms: Dynamic balancing, Shaking force, Shaking moment

I. COMPLETE SHAKING FORCE BALANCING

The complete shaking force balancing known as static balancing requires the total center of mass of a mechanism to be fixed. The two common approaches used to achieve this are the redistribution of the link masses and use of the counterweights for the mechanism links.

The analytical methods have been developed to trace and keep the total mass center of the mechanism fixed. Shchepetilnikov [1] presented the method of '*Principal Vectors*' in which the position of the mass center is described using the vectors directed along the links of the mechanism. Similarly, Berkof and Lowen [2] introduced the '*Method of Linearly Independent Vectors*' for the complete force balancing of four and six-bar planar mechanisms with arbitrary link mass distribution (Fig. 1). The balancing conditions are presented for the internal mass redistribution and for the counterweight addition. In this method, the links masses are redistributed in such a way that it eliminates the time-dependent terms coefficients in an equation representing the trajectory of the total center of mass of the mechanism.

This results in a fixed center of mass of the mechanism and thus the complete shaking force balancing is achieved.

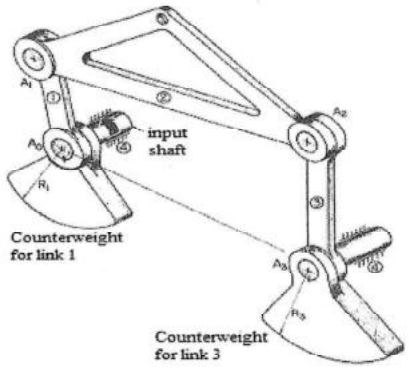

Fig. 1 Complete force balancing of planar four-bar mechanism using counterweights [2]

Tepper and lowen [3] extended this method and proved that the counterweights required for the complete force balance of an *n*-link planar mechanism are half of the total number of the links. They developed the '*Contour Theorem*' to differentiate between the mechanisms which can be fully force balanced and those which cannot. Contour theorem examines the nature of the paths from the individual links to the ground. It was found that the pinned planar mechanisms can always be force balanced as they do not have time-dependent coefficient in the center of mass equation. Based on the same approach, Walker and Oldham [4], [5] presented the complete force balancing conditions for various types of planar mechanisms with multi-degrees of freedom. The counterweights are used to balance

FATIGUE LIFE IMPROVEMENT BY SHOT PEENING

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Abstract: The main advantage of using shot peening process is to increase the fatigue strength of components subjected to high alternating stresses. The fields of application for shot peening include all metallic components, which are subject to fluctuating and fatigue loads. Additional advantages of using shot peening include design of lighter weight and lower cost components, prevention of stress corrosion, formation of lubrication pockets and compensation of manufacturing related surface defects.

1 Shot Peening Process

Shot peening is a process used to produce a compressive residual stress layer and modify mechanical properties of metals. Residual stresses are stresses that remain after the original cause of the stresses (external forces, heat gradient) has been removed. They remain along a cross section of the component, even without the external cause. Machine parts when subjected to fatigue loading will experience maximum tensile stresses, normally over the surface. These tensile stresses initiate and propagate fatigue cracks. In order to counteract the effect of these tensile stresses, residual compressive stresses are induced over the surface of the metal parts by the controlled process known as shot peening [1].

Shot peening is a cold working process in which the surface of the finished part is bombarded with shots under controlled conditions. Each shot acts as a tiny peening hammer; making a small dent in the outer surface of the metal (Fig. 1). This impact causes a plastic flow of the surface fibers to a depth depending on the angle of impact, size of shots and physical properties of the material [2]. The resultant

Effectiveness of Shot Peening Process in Wide Range of Applications

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The main advantage of using shot peening process is to increase the fatigue strength of components subjected to high alternating stresses. The fields of application for shot peening include all metallic components, which are subject to fluctuating and fatigue loads. Some common fields of shot peening application are:

1. Vehicles and agricultural machinery.
2. Power drive and transmission system.
3. Internal combustion engines.
4. Steam and gas turbines.
5. Aviation equipment.
6. Chemical equipment.

The shot peening can improve the performance of the parts through:

1. Usage of the abrasive effect.
2. Removal of stress concentrations.
3. After-machining process.
4. Wear reduction on sliding surfaces.
5. Reduction of the danger of stress corrosion cracking.
6. Straightening or forming of metallic components.
7. Surface stabilization before chromium plating.

Increased fatigue strength due to shot peening has been firmly established by extensive fatigue tests on a wide variety of machine parts. The process is used very extensively on leaf springs, coil springs, torsion bars and other machine parts.

A gain in fatigue strength can be obtained even under poorly chosen peening conditions for a particular application, and even under poorly controlled operating conditions of the peening machine. In spite of this adverse combination, sufficient increase in fatigue strength may be obtained to justify the use of shot peening in that particular application. Shot peening is economical and enviromuental friendly. It leads to significant improvements of the mechanical properties of work pieces. Table 1 gives numerous applications of shot peening [1].

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RESEARCH ARTICLE OPEN ACCESS

Design Optimization of Planar Mechanisms

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Abstract:

This paper presents an optimization technique to dynamically balance the planar five-bar mechanisms in which the shaking force and shaking moment are minimized using the genetic algorithm (GA). A dynamically equivalent system of point-masses that represents each rigid link of a mechanism is developed to represent link's inertial properties. The shaking force and shaking moment are then expressed in terms of the point-mass parameters which are taken as the design variables. These design variables are brought into the optimization scheme to reduce the shaking force and shaking moment. This formulates the objective function which optimizes the mass distribution of each link. The balancing problem is formulated as a multi-objective optimization problem and multiple optimal solutions are created as a Pareto front by using the genetic algorithm. The masses and inertias of the optimized links are computed from the optimized design variables. The effectiveness of the proposed methodology is shown by applying it to a problem of five-bar planar mechanism available in the literature.

Keywords — **Dynamic balancing, Shaking force and shaking moment, Equimomental system, Optimization, Genetic algorithm.**

1. INTRODUCTION

An unbalanced mechanism running at high speed transmits forces and moments to the ground known as shaking forces and shaking moments. These forces and moments are vector sum of the inertia forces and moments of all the moving links. They adversely affect the dynamic performance of the mechanism. Several techniques are presented in the literature for reducing these shaking forces and shaking moments due to inertia. The complete force balancing can be achieved by making the mass center of moving links of a mechanism stationary [1]. This is achieved either by mass redistribution or by adding counterweights to the moving links. This methodology was extended for the mechanisms having prismatic joints under certain conditions [2, 3]. Force balancing and trajectory tracking is achieved in a five-bar real-time controllable mechanism using adjusting kinematics parameter approach [4].

The complete force balancing increases other dynamic performance characteristics such as shaking moment, driving torque and bearing forces in joints [5]. Therefore, along with the full force balancing, several methods proposed in the literature to balance the shaking moment [6, 7]. The complete force and moment balancing is achieved by adding duplicate mechanism, inertia or disk counterweights [8-10]. However, this method is not recommended due to complexity and practical reasons.

Several trade-off methods were developed to minimize different dynamic quantities simultaneously [11, 12]. As the shaking force and shaking moment depend on link masses, their locations of mass centers and moment of inertias, these trade-off methods find the optimal distribution of the link masses [13].

The conventional optimization methods like gradient based search method is used to optimally balance the planar mechanisms [14,15] and to analyse the sensitivity of shaking

A COMPARATIVE STUDY OF ARC WELDING AND RESISTANCE WELDING PROCESSES

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***Abstract:** This paper makes an in-depth comparative study of arc welding and resistance welding processes. The objective is to present the current challenges and future aspects of these welding processes and their usefulness as fabrication technology. The important considerations and application areas of both the techniques are discussed in this paper.*

1INTRODUCTION

The *American Welding Society* (AWS) defines welding as "a materials joining process which produces coalescence of materials by heating them to suitable temperatures with or without the application of pressure or by the application of pressure alone and with or without the use of filler material" [1].

Mechanical parts are often highly complicated in design or large in size. Manufacturing a unit of such a part as a single entity is not always possible. However, it can be produced in the form of different components or structures and could be joined by several joining processes to get the complete unit or assembly. It is here that welding has been found the most useful fabrication technology in joining different components and synthesizing them into a whole system.

2ARC WELDING PROCESSES

One of the most popular and common types of welding in use today is arc welding. It uses an electric arc as the source of heat to melt and join metals. The arc is formed between the metal being worked on and an electrode connected to the arc welder. The electrode is manually or mechanically moved along the joint. The electrode is either a consumable wire or rod, or a nonconsumable carbon or tungsten rod which serves to carry the current and sustain the electric arc between its tip and the workpiece. When a nonconsumable electrode is used, a separate rod or wire can supply filler metal, if needed. The consumable electrode is specially prepared so that it not only conducts the current and sustains arc but also melts and supplies filler metal to the joint and may produce a slag covering as well.

The arc and the weld pool are protected from the ill effects of surrounding atmosphere by some type of an externally supplied inert or semi inert gas, known as a shielding gas, and/or coating electrode or using flux. These processes use either direct (DC) or alternating current (AC) for welding power supply to create and maintain an electric arc between an electrode and the base material to melt metals at the welding point.

The major arc welding processes are described below.

2.1Carbon Arc Welding (CAW)

It is the oldest known arc welding process in which fusion of metal is accomplished by the heat of an electric arc. The arc is established between a nonconsumable carbon (graphite) electrode and the workpiece (Fig.1). The weld can be made by the application of heat with or without the addition of filler material. When filler material is used it is normally of the same composition as the base metal and is added to the arc in the form of additional wire or rod. Though the carbon electrode (4-19 mm diameter and 300-450 mm length) is nonconsumable, but it infact disintegrates slowly and generates CO and CO_2 which replace the air around the arc and thus provide necessary protection. Normally DC power source of constant current type is used with straight polarity to keep the rate of disintegration low. The current carrying capacity of electrode depends upon its diameter and type.

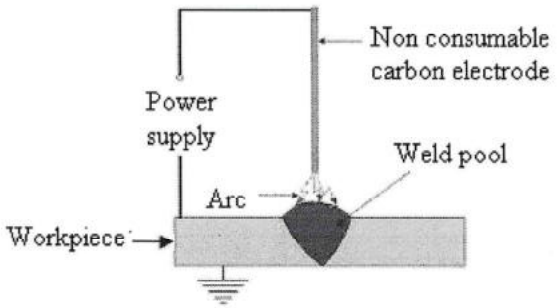

Figure 1: Carbon arc welding [2]

Although this process has been almost completely replaced by the newer processes used in the welding industry, it is still used in certain applications. The process produces adequate welds in thin sheet steel, but should be used with caution in any critical application because it provides only limited shielding from the atmosphere [3, 4].

IMPORTANCE OF CONTROLLING PARAMETERS IN SHOT PEENING PROCESS

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Abstract: The critical peening parameters for fatigue life improvement are: exposure time, shot flow rate, distance between shots throwing station (blast wheel or nozzle) and work surface, shot diameter and shot hardness. The objective of the present work is to investigate the effect of various controlling parameters of shot peening on the material properties of the product to be shot peened.

Keywords: Shot peening, Material properties, Process parameters

INTRODUCTION

The outcome of shot peening is the result of interaction between the following two sets of parameters [1]:

1. Material parameters.
2. Shot peening parameters.

4.1 Material Parameters

These include microstructure, hardness, surface condition and hardening characteristics of the work material. The result of their interaction with the shot peening parameters is:

1. Generation of residual stresses in the work material.
2. Strain hardening of the surface and sub-surface layers of the work material.
3. Changes in microstructure and substructure of work material.
4. Change in surface conditions of the work material.

4.2 Shot Peening Parameters

The shot peening treatment is characterized by the following parameters:

1. Shot material (grade, shape and hardness of shot; fraction of broken shot).
2. Peening parameters (shot velocity, mass-flow rate, peening time and impact angle).
3. Intensity and coverage of components (depending on the peening parameters).

These parameters have to be controlled carefully in order to constantly guarantee top quality shot peened components [2]. The parameters that affect the shot peening process and its efficiency are discussed below.

4.2.1 Shot Material and Its Hardness

The shots used for peening are usually of cast steel with the hardness of 40-50 on the Rockwell C scale. Cast iron can also be used as the material. However, as it is brittle it breaks down quickly and causes difficulty in maintaining the effectiveness of the process of peening [3]. The majority of peening is undertaken using ferrous shots which have high impact energy and good durability. For the use on thin parts, glass beads have been found to be the best option. They can be used when lower peening intensities are permitted. Using them avoids having to decontaminate nonferrous parts after processing, but glass has a higher breakdown rate and higher risk of irregular particles in the blast stream. Ceramic bead is very hard but with much lower density than ferrous shot. It is less prone to breakage than glass bead, but initial purchase costs are higher.

Shot must be at least as hard as the surface being peened. Standard peening shot has a hardness range of 45-55 RC but usually is furnished toward the low end of the hardness range. Consequently, when peening hard parts such as carburized and hardened gears at nominally 60 RC, while there will be some cold work effect on the part, it will not be as great as when a harder shot is used. For these applications, a special hard shot in the range of 55-65 RC should be used to maximize the effect of peening. In residual stress studies performed on steel in the 60 RC range, it was found that the residual compressive stress obtained by using special hard shot was roughly double that produced by using regular hardness shot [4].

4.2.2Shape and Size of Shots

The shots or beads should be free from sharp edges and deformed shapes. For ideal peening application, it is preferable that all shots be of perfectly round shape arid of same size and material properties. The size of the shots chosen depends on the thickness of the work. Small shots give better coverage while large size shots give smoother finish.

It has been demonstrated both in the laboratory and in the field that if the shot striking the work is not uniform in size, the gain in fatigue strength is likely to be less than that obtained with uniformly sized shot, even though the arc height and coverage specifications have been met [5].

Using steel balls, higher deformation energy is obtained at the same impact velocity than with lighter glass or ceramic spheres. 1-lowever, the maximum size of thc balls is limited by technical restrictions. If the ball diameter is increased, the component surface roughness will become greater and there are certain machine operating restrictions. A ball size of 0.05 to 1 mm diameter is commonly used.

Since the shots break down due to the repeated usage, there is the need for the maintenance of the shots. The metallic shots should be checked once in an eight hour operation, glass beads once in two hour operation to ensure that not more than 10 % of the shots or beads are deformed. Shot for fatigue life enhancement is typically 1mm or less in diameter, depending on the smallest radius to he peened and the

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Shape Optimization of Planar Mechanisms

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***Abstract:** This paper presents an optimization method to find link shapes for a dynamically balanced planar four-bar mechanism. The shaking force and shaking moment developed in the mechanism due to inertia are minimized by optimally distributing the link masses. The link shapes are then found using cubic B-spline curves and an optimization problem is formulated to minimize the percentage error in resulting links inertia values in which the control points of the B-spline curve are taken as the design variables. The effectiveness of the proposed method is shown by applying it to a numerical problem available in the literature.*

***Keywords:** Dynamic Balancing; Equimomental System; Four-bar Mechanism; Genetic Algorithm; Shape Optimization.*

1. INTRODUCTION

The four-bar mechanism is the basic mechanism used in the machines. When operated with high-speeds, these mechanisms transmit forces and moments to the ground known as shaking forces and shaking moments. These are defined as the vector sum of inertia forces and moments of all moving links of the mechanism. The dynamic performance of mechanism is adversely affected by vibrations, wear and noise associated with these forces and moments and several methods are presented in the literature [1-3] to reduce them. The complete force balancing in a mechanism is achieved by making the mass center of moving links stationary either by mass redistribution [4] or by adding counterweights [5].

The complete balancing of force increases the shaking moment, driving torque and bearing forces in joints of the mechanism [6]. The shaking moment is reduced along with the full force balancing using inertia or disk counterweights [7] and duplicate mechanism [8]. However, these methods are not preferred as they increase the complexity and mass in the mechanism. Some other methods are developed to minimize shaking force and shaking moment simultaneously through optimization [9-11]. These methods find the optimal distribution of link masses to reduce shaking force and shaking moment as they depend on link masses, their locations of CGs and moment of inertias. The mechanism balancing problem is presented as a multi-objective optimization problem and solved using evolutionary optimization techniques like particle swarm optimization (PSO) and genetic algorithm (GA) considering appropriate design constraints [12, 13].

Very few methods deal with finding the optimum shape of links corresponding to the balanced mechanism. The small element superposing method is used to form link shape considering the link as a combination of several small rectangular elements [14]. A shape optimization problem for mechanism links is formulated using external work done by a given external force as the objective function to maximize and volume of all the links is used as the constraint function [15]. The shape of a compliant mechanism is generated by topology optimization method using Cubic Bezier curves [16]. However, the dynamic balance for mechanisms is not considered in these methods. Also, these methods require an initial shape or design domain to start the procedure.

This paper presents an optimization problem formulation for balancing of the planar four-bar mechanism. The rigid links of the mechanism are presented as a dynamically equivalent system of point-masses, known as an *equimomental system* [11, 17]. This problem is presented as a multi-objective optimization problem to minimize both shaking force and shaking moment and solved using a genetic algorithm. For the resulting optimum inertial properties for the balanced mechanism, shapes of mechanism links are then found using cubic B-spline curves. The inertial properties of resulting link shapes are presented as constraints to keep the same as that of the balanced mechanism. The percentage error in resulting links inertia values is presented as the objective function which is minimized by taking the control points of the B-spline curve as design variables.

Role of Pollution Control Equipment in Shot Peening Machines

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Abstract— **Abrasive blasting can have minimal environmental impact if it is located in an appropriate area and sited, designed and operated properly. If proper care is not taken in addressing environmental issues, however, it has the potential to cause environmental harm. The necessity and importance of effective air and noise pollution equipment is evident in wake of prescribed environment and health or safety norms. The dust collector and air-wash separator are the "lungs" of a shot peening machine. The dust collector provides the necessary ventilation to remove dust from the blast cabinet. It also provides an air stream across the "air-wash" separator to clean the small fines and foreign contaminants from the shot before it is reused. All shot peening machines require good dust collection and air-wash separators for reliable and efficient long term operation. The average shot peening or blast cleaning machine can produce decibel levels between 85 and 125 dBA and experts agree that continued exposure to noise above 85 dBA over time will cause hearing loss. This paper covers the developments and applications of the pollution control equipments in surface finishing industry. It highlights the process characteristics, its operational features and its resulting influence over the control of environmental pollution. The process parameters are explained with a view to control the process in order to achieve the desired results.**

Index Terms — **Shot peening, Environmental assessment, Pollution control**

I. SHOT PEENING PROCESS

Shot peening is a process used to produce a compressive residual stress layer and modify mechanical properties of metals. Residual stresses are stresses that remain after the original cause of the stresses (external forces, heat gradient) has been removed. They remain along a cross section of the component, even without the external cause [1].

Shot peening is a cold working process in which the surface of the finished part is bombarded with shots under controlled conditions. Each shot acts as a tiny peening hammer; making a small dent in the outer surface of the metal (Fig. 1). This impact causes a plastic flow of the surface fibers to a depth depending on the angle of impact, size of shots and physical properties of the material [2]. The resultant residual stressed surface layer, which is in compression, prevents formation of cracks, thus increasing the life of the component (Fig. 2). The maximum residual compressive stress produced on the surface is at least half the ultimate tensile stress of material. Shot Peening serves to increase the fatigue strength of parts subjected to high alternating bending or torsional stresses. The process has very effectively replaced other time consuming and expensive processes of improving fatigue strength. It permits the design of less expensive and light weight components.

Conventionally, when a part is not able to withstand the stresses that it is required to, a lot of trial and error effort is put into design of the part. Its material may be changed, the part may be subjected to heat treatment process, attempt may be made to change its machining techniques, or the designer may even go to the extent of changing the design of the part. If analyzed properly, it may be found out that all the above exercises are totally uncalled for. What may have offered a better solution at a nominal cost could have been the shot peening of the part [3].

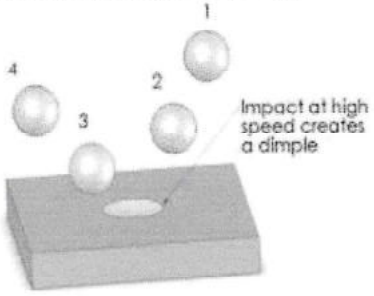

Fig. 1: Shot Peening Process

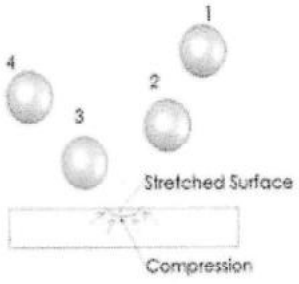

Fig. 2: Shot Peened Surface

II. ENVIRONMENTAL ASSESSMENT FOR SHOT PEENING

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Application of Equimomental System of Point Masses for Dynamic Balancing of Mechanisms

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Abstract: ***This paper presents the concept of equimomental system of point-masses for rigid body to balance the mechanisms dynamically. The links of mechanism are modelled as rigid bodies for kinematic and dynamic analysis. The mass and moment of inertias of the links govern the shaking force and shaking moment transmitted to the frame on which they are mounted. Optimization of mass and moment of inertias methodology is used in minimizing the shaking force and shaking moment. The formulation of optimization problem is greatly simplified using the equimomental system of point-masses. The effectiveness of the method is illustrated with an example.***

Keywords: Equimomental system, Dynamic balancing, Shaking force, Shaking moment, Mechanisms

1. Introduction

A rigid body can be defined as a system of particles where the distances between particles remain essentially unchanged. However, this is an idealization as all solid bodies change shape to some extent when the forces are applied to them. Moreover, if the movements associated with the changes in shape are very small compared with the overall movements of the body as a whole, then the ideal concept of rigidity is quite acceptable. The machine mechanisms, land and air vehicles, rockets and spacecrafts, and many moving structures can be analysed using the concept of the rigid body [1-3].

To balance a mechanism, one has to eliminate the shaking force and shaking moment transmitted to the ground. The links of such mechanism can be modelled as rigid bodies for simplifying the kinematic and dynamic analysis [4]. The mechanisms are to be balanced either statically or dynamically. In some cases, static balancing can be acceptable substitute for dynamic balancing and is generally easier to do.

Like any system of forces acting on a rigid body can be replaced by an equivalent system of forces which produce identical motion, an equivalent mass distribution of a rigid body can be determined. For example, spatial mass distribution of a rigid body can be converted into a system of point-masses keeping the dynamic behavior identical. Such dynamically indistinguishable systems are called equimomental systems. The general requirements for the dynamical equivalence were laid down by Routh [5]. The set of point-masses and the rigid body are equimomental if they have the same total mass, the same center of mass, and the same inertia tensor with respect to the same coordinate frame [6]. However, there is no such limit on the maximum number of point-masses. The number of parameters related to the point-masses increase with increase of point- masses. It is shown that a set of seven point-masses is very effective in reducing shaking force and shaking moment in the mechanism [7]. This set of rigidly connected seven point-mass systems is explained in this paper to balance the mechanism dynamically.

This paper is organized as follows. Section 2 explains the equations of motion for rigid body. Equations of motion for equimomental point-masses are re-written in section 3. Problem of minimizing shaking force and shaking moment for a rotating link is then formulated in Section 4. A numerical example is solved using the proposed method in section 5. Finally, conclusions are given in Section 6.

2. Equations of Motion of Rigid Body

A link of a multibody system is modelled as the rigid body for the dynamic analysis. The Newton-Euler equations of motion for the *i*th rigid body of a multibody system shown in the Figure 1 are expressed as [8]:

$$\mathbf{I}_i^c\dot{\boldsymbol{\omega}}_i+\boldsymbol{\Omega}_i\mathbf{I}_i^c\boldsymbol{\omega}_i=\mathbf{n}_i^c;\ \mathrm{m}_i\dot{\mathbf{v}}_i^c=\mathbf{f}_i^c\ (1)\text{-}(2)$$

Where $\mathbf{n}_i^c$ is resultant of pure moment and moment of external forces about the mass center, C_i , and $\mathbf{f}_i^c$ is resultant force acting on the body at C_i. Moreover, $\mathbf{I}_i^c$ is the centroidal inertia tensor with respect to C_i. In Eqs. (1) and (2), $\mathrm{m}_i, \boldsymbol{\omega}_i$ and $\dot{\boldsymbol{\omega}}_i$ are defined as the mass, angular velocity and angular acceleration of the body. The three-dimensional vector $\dot{\mathbf{v}}_i^c$ defines the linear acceleration of the mass center.

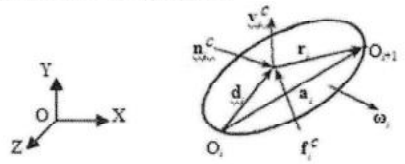

Figure 1 Free-body diagram of the *i*th body

Let the *i*th body is connected to the previous and next bodies at O_i and O_{i+1} through joints. The reference frame OXYZ is the fixed inertial frame. Then $\mathbf{a}_i$ can be defined as the link length. As in linkage balancing problem, we are more interested to know the forces at

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Shape Optimization of Slider-crank Mechanism

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Abstract: **- In this paper, a two stage optimization technique is presented for optimum design of planar slider-crank mechanism. The slider-crank mechanism needs to be dynamically balanced to reduce vibrations and noise in the engine and to improve the vehicle performance. For dynamic balancing, minimization of the shaking force and the shaking moment is achieved by finding optimum mass distribution of crank and connecting rod using the equimomental system of point-masses in the first stage of the optimization. In the second stage, their shapes are synthesized systematically by closed parametric curve, i.e., cubic B-spline curve corresponding to the optimum inertial parameters found in the first stage. The multi-objective optimization problem to minimize both the shaking force and the shaking moment is solved using recently developedevolutionary optimization algorithms–"Teaching-learning-basedoptimization algorithm (TLBO)". The computational performance of TLBO is compared with another evolutionary optimization algorithm (genetic algorithm).**

Keywords: **Dynamic balancing, Equimomental system, Link shape, Optimization, Slider-crank mechanism, Teaching-learning-based optimization algorithm**

I. INTRODUCTION

The slider-crank mechanism consisting of crankshaft, connecting rod and piston is the fundamental mechanism used for vehicle engines. The shaking force and shaking moment in the mechanism are defined as the resultant inertial forces and moments of the moving links [1] and need to be eliminated to dynamically balance the mechanism. For an unbalanced mechanism, these forces and moments are transmitted to the frame whichworsenthe dynamic performance of vehicle engine and generate vibrations, wear and noise. It leads to expensive repairs and replacement of crankshaft and connecting rod and their reverse effects on the other parts such as cylinder block and piston.Few review papers discuss the methods to reduce the shaking force and shaking moment based on different approaches [2-4]. To achieve full force balance in the mechanism, the total mass center of moving links is made stationary either by adding counterweights [5] or by mass redistribution [6, 7]. The complete force balancing increases other dynamic quantities like shaking moment and driving torque in the mechanism [8]. For complete balancing of moment in the mechanism, the total angular momentum of the moving links is eliminated by using duplicate mechanism [3], inertia or disk counterweights [9-11] and moment balancing idler loops [12]. However, the complexity and overall mass for mechanism are increased in these methods.

Alternatively, the shaking force and shaking moment are minimized simultaneously by optimizing links inertial properties, i.e., mass, CG location and moment of inertia. The conventional optimization technique is used to optimally balance the planar mechanisms [13, 14] and to analyse the sensitivity of shaking force and shaking moment to the design variables [15]. The mechanism balancing problem is formulated as a multi-objective optimization problem and solved using evolutionary optimization techniques like particle swarm optimization [16] and genetic algorithm [17-18].

Once the optimized inertial properties of mechanism links are obtained, their shapes are to be decided to carry loads. A method to find link shapes is presented in [19] by discretizing initial assumed shape into small mass elements and locate them systematically along the link length. The link shapes are synthesized on the basis of maximum work done by taking volume of all links as constraints [20]. Similarly, the link shapes are formed through topology optimization based on parametric curves [21] and non-intersecting closed polygons [22]. The Evolutionary Structural Optimization (ESO) method is used to optimize the shaft shape for rotating machinery by gradually removing the ineffectively used material from the design domain [23, 24]. Alternatively, by identifying the feasible material domain associated with the link geometries, the geometric shapes are determined for interference free motion [25]. Some other methods are available in the literature for mechanism dimensional synthesis to generate specified path or motion based on graphical and analytical techniques [26, 27].However, these methods have limitations as they require a pre-defined design domain to start with. Also, they do not consider the dynamic balance for the mechanisms.

In this paper, a two stage optimization method is presented to synthesize link shapes for minimizing the shaking force and shaking moment in the planar slider-crank mechanism. In the first stage, the balancing problem is formulated as an optimization problem by modeling the rigid links of mechanism as dynamically equivalent system of point-masses, known as equimomental system [28, 29]. This problem is presented as a multi-objective optimization problem to minimize both shaking force and shaking moment and is solved using genetic algorithm (GA) and recently developed teaching-learning-based algorithm (TLBO).

For the optimum inertial properties found in the first stage, the link shapes are synthesized in the second stage by

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A Case Study on Data Mining Application in Manufacturing Industries

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Abstract: ***This paper highlights the importance of data mining technique in manufacturing system design. A case study is presented in this paper in which the manufacturing system was re-designed through data mining of data generated corresponding to the traditional method. The performance and properties of the product was analysed virtually using CAD softwares AutoCAD and PTC Creo. The improved design reduced the operating time as well as cost and hence better productivity is achieved through this research work.***
Keywords: Manufacturing System, Computer aided Design, Data Mining, System Design, Automation

1. INTRODUCTION

Data mining is a useful tool to find out the ignored and hidden information of any process. Also, it can process huge amount of data. The data mining from large marketing database can be successfully applied in a number of advanced fields. Applications of data mining include cyber security [1,2], smart cities monitoring[3], forecasting future customer requirements [4], sample identification [5], manufacturing sector [6], medical sector [7 - 9], risk assessment [10]. The data mining also known as data or knowledge discovery is multidisciplinary in nature as it includes statistics, image processing, machine learning, mathematical optimization and information retrieval. The researchers and practitioners all around the world are successfully applying data mining technology on data from different areas such as banking, finance, retail, marketing, insurance, fraud detection, science, engineering, etc., to discover any hidden relationships or patterns.

In this paper we discuss the developments and instructions on improvisation of manufacturing system design based on data mining. Section 2 talks about data mining for manufacturing system design. Section 3 presents a case study demonstrating the data mining approach to improve the productivity of a manufacturing unit. Section 4 gives the conclusion of research work carried out.

2. DATA MINING IN MANUFACTURING SYSTEM DESIGN

The computer design is a high risk and value-added technology as the satisfaction of customer requirements is critical issue for the computer designers and manufacturers. Data mining technique may displace the traditional methods like visualization and statistics that are not preferred for the analysis of any manufacturing system.

Data mining is important stage of Knowledge Database Discovery (KDD) process [11]. KDD process used for manufacturing includes

1. Understanding the manufacturing domain
2. Collecting the targeted data
3. Data cleaning, pre-processing and transformation
4. Data integration
5. Choosing the functions of data mining
6. Choosing the appropriate data mining algorithm
7. Data mining
8. Interpretation and Visualization
9. Implementation of discovered knowledge
10. Knowledge storage, reuse and integration into the manufacturing system. The process of data mining is shown in Figure 1.

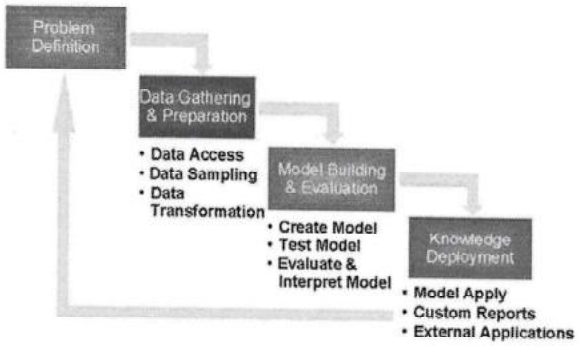

Figure1. Data mining process

Data mining allows users to analyze data from different dimensions or angles, categorize it, and summarize the relationships identified. The integration of data mining with computer aided design and analysis helps in improvising the existing manufacturing system. The drawings of a product contain the useful information.

Data Extraction tool is used to build automated bills of material, drawing title sheets, coordinate tables. Hence the useful data can be easily extracted to Microsoft Excel files using Data Extraction tool. The success factors of data mining are as follow:

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Optimum Design of Mechanism - A Review

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This paper reviews the methods developed for balancing of the planar mechanisms and synthesizing the link shapes. The methods used for partial force and moment balance including the optimization methods as well as the methods used for the link shape synthesis are reviewed. Several review papers such as Kamenskii (1968a), Lowen and Berkof (1968), Lowen et al. (1983), Kochev (2000), Arakelian and Smith (2005), Wijk et al. (2009), and Arakelian and Briot (2015) throw light on the quantum of work carried out on the dynamic balancing of themechanisms.

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I. Partial Shaking Force and Shaking MomentBalancing

Instead of complete balancing of shaking force and shaking moment independently, minimization of them simultaneously is more useful from the design point of view. The optimization methods used to simultaneously minimize the shaking force and shaking moment in planar mechanism can be categorised as:

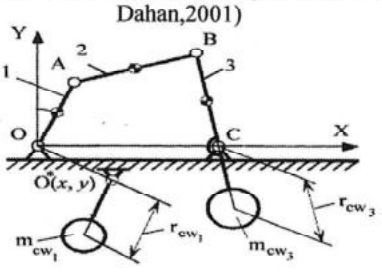
1.1 Method of harmonic balancing

A method based on the harmonic analysis is used to balance the harmonics of the shaking forces and shaking moments in which the forces and moments are formulated using Gaussian least-square formulation and Fourier series (Norton, 2011). Han (1967) presented a least-square approach to balance the complex mechanisms in which a counterweight connected to the input shaft results in first harmonic balancing of the inertia induced forces and moments. Stevensen (1973) presented a method for the complete balancing of a harmonic unbalance of the machine, including inertia forces, moments of the inertia forces, and inertia torques, utilizing six weights on three shafts in the machine parallel to the coordinate axes and rotating at the speed of the harmonic. Similarly, Tsai (1984) used two Oldham couplings to balance second harmonics of the shaking force and shaking moment. This type of balancer runs at the primary speed of the machine whereas the Lanchester balancer runs at double of the primary speed to get the same balancing effect (Hsieh and Tsai, 2009). A method was developed based on the harmonic balancing to find the region boundaries to locate the additional shafts by Davies and Niu (1994). Arakelian and Dahan (2001) presented a method to achieve the first harmonic balancing of the shaking moment by using the counterweight connected to the input shaft in such a way that the counterweight rotation axis remains at an offset to the input shaft axis (Fig. 1).

1.2 Extension of method of linearly independent vectors

Based on the fact that the in a force balanced mechanism, the shaking moment reduces to a pure torque, Berkof and Lowen (1971a, b) developed the theory of shaking moment optimization. In this method, RMS value of the shaking moment is minimized for a force balanced in-line planar four-bar mechanism. The link mass distribution ratios as the functions of the link length ratios are defined as the design variables. This method was the extension of previously developed force balancing method by Berkof and Lowen(1969).

Fig. 1 First harmonic balancing of the shaking moment in planar four-bar mechanism (Arakelian and Dahan,2001)



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Methodology of Optimal Link Shape Synthesis of Planar Mechanisms

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Abstract: ***The optimization problem formulation for link shape synthesis for the optimally balanced simple and multiloop planar mechanisms is presented in this paper. The closed parametric curve is used to represent the link shape and its geometric and inertial properties are calculated using well known Green's theorem. The proposed optimization problem includes the equality constraints to keep the resulting inertial properties same as the inertial properties of the optimally balanced mechanisms.***

I. INTRODUCTION

In this paper, the link shapes are synthesized for optimally balanced mechanism for the given motion. The link shapes satisfying kinematic and dynamic requirements are very crucial for the design of a mechanism and its performance. The shape synthesis using parametric curves like Hermit, Bezier and B-spline curves leads to computer-aided design (CAD) and manufacturing of the mechanism links. Through CAD modeling of the links using these curves; the design, production and functional details can beeasily transmitted between engineering and manufacturing operations. The CAD modeling of the links is also useful in analyzing the static and dynamic response of the designed mechanism. The real-time behavior of the mechanism is evaluated through computer simulation and thus it eliminates the need of the experimental tests for the actual mechanism. Therefore, the cost and time are saved to a great extent and any possible error is realized before manufacturing of the mechanism links.

II. LINK SHAPE

The link shape is represented by the parametric curve, i.e., closed cubic B-spline curve as shown in Fig. 1. If the curve interpolates or approximates a set of n+1 control points, P_0, P_1,…,P_n(Zeid and Sivasubramanian, 2009; Mortenson, 2006) then the position of any point on the curve is defined as:

$$\mathbf{P}(u) = \sum_{i=0}^{n} \mathbf{P}_i N_{i,k}(u), \quad 0 \le u \le u_{\max} \tag{1}$$

For a curve of degree (k-1), the B-spline function $N_{i,k}(u)$ is computed iteratively as:

$$N_{i,k}(u) = (u - u_i)\frac{N_{i,k-1}(u)}{u_{i+k-1} - u_i} + (u_{i+k} - u)\frac{N_{i+1,k-1}(u)}{u_{i+k} - u_{i+1}} \tag{2}$$

where

$$N_{i,1} = \begin{cases} 1, & u_i \le u \le u_{i+1} \\ 0, & \text{otherwise} \end{cases} \tag{3}$$

In Eq. (3), $N_{i,1}$ is a unit step function and u_i are known as parametric knots or knot values. These values form a sequence of nondecreasing integers called the knot vector. The parametric equation of ith curve segment of a cubic B-spline curve having control points P_{i-1}, P_i, P_{i+1} and P_{i+2} for $u \in [u_{i-1}, u_i]$ is given as:

$$P_i(u) = \frac{\alpha_1 P_{i-1} + \alpha_2 P_i + \alpha_3 P_{i+1} + \alpha_4 P_{i+2}}{6} \tag{4}$$

where

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Optimization Techniques for Engineering Design

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***Abstract:** This paper discusses the popular evolutionary optimization technique, Genetic Algorithm (GA)and Teaching-learning-based Optimization (TLBO) algorithm. It also covers the definitions of various parameters used by these algorithms.*

I. INTRODUCTION

Most of the engineering design problems are competing multi-objective problems for which the optimal values of the design variables are searched that optimize several objectivesfor a given set of constraints. The different methods available to formulate a multi-objective problem as a single objective problem are weighted global criterion method, weighted sum method, lexicographic method, weighted min-max method, exponential weighted criterion, weighted product method, goal programming methods, bounded objective function method, and physical programming (Marled and Arora, 2004).The weighted sum approach is more widely used in which a normalized objective function is formulated by assigning proper weighting factors to all the objectives. By selecting different values of the weighting factorsto objectives, the results are obtained as a set of optimum solutions and each solution in this set is a trade-off between the different objectives (Marled and Arora, 2010).

A constrained optimization problem is considered more complex than that of an unconstrained problem. It finds a feasible solution that optimizes one or more mathematical functions in a constrained search space. The constrained optimization problem is transformed into an unconstrained optimization problem by modifying the objective function on the basis of the constraint violations. The constraint violations areused to penalize infeasible solutions to favor the feasible solutions.The constraints are normally treated as penalty functions such as static, dynamic or adaptive penalty to the objective function. The various constraint handling techniques are suggested such as superiority of feasible solutions (SF) (Deb, 2000), stochastic ranking technique (SR) (Runarsson and Yao, 2005), ε-constraint technique (EC) (Takahama and Sakai, 2006), self-adaptive penalty approach (SP) (Tessema and Yen, 2006) and ensemble of constraint handling techniques (Montes and Coello, 2005; Mallipeddi and Suganthan, 2010).

After formulating the optimization problem, it can be solved by using either traditional or evolutionary optimization algorithms. The traditional or classical optimization algorithms are based on deterministic approach, i.e., they use gradient information of objective function with respect to the design variables and move from one solution to other following the specific rules. Depending on the starting solution these algorithmsmay end up with a local optimum solution. Therefore, one has to explore all local solutions; one of them is the global optimum solution. To improve the chances of getting the global optimum solution, a large set of randomly generated initial solutions is required for these algorithms. The global optimum solution is then found as the best of all local optimum solution provided by different instances of the algorithm.The popular methods in this category are quadratic programming, steepest descent method, linear programming, nonlinear programming, dynamic programming and geometric programming, etc. For the complex optimization problem having a large number of design variables and multiple local minimum solutions, these methods converge on the optimum solution near to the initial solution provided and thus produce local optimum solution(Marler and Arora, 2004; Mariappan and Krishnamurty, 1996).These techniques are generally not suitable for the optimization problems with (1) large number of constraints (2) large number of design variables (3) multi-objective function (4) multi-modalityand (5) differentiability.A function is multimodal if it has two or more local optimum solutions in the design space. A function is regular if it is differentiable at each point of its domain. Thetraditional optimization methods require the gradient information and thus not useful in case of the non-differentiable functions.

Evolutionary or advanced optimization techniques are stochastic in nature, and the optimum solution is searched following the probabilistic transition rules.These algorithms mimic the natural evolutionary principles and start with a set of solutions known as the population to search the optimum solution through parallel computing.Thus, it is advantageous to use these techniques to find the global optimum solution with less computational efforts for large and difficult optimization problems. The popular techniques in this category are: Genetic algorithm (GA), Simulated Annealing (SA), Particle Swarm Optimization (PSO), Biogeography-based optimization (BBO), Ant Colony Optimization (ACO), Differential Evolution (DE), Grey Wolf Optimizer (GWO), Fireworks Algorithm (FA), Directed Bee Colony Optimization (DBC), Harmony Elements Algorithm (HEA), Artificial Bee Colony (ABC),

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A Study on Effect of Various Process Variables in Gas Metal Arc Welding

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Abstract: Gas metal arc welding (GMAW) is currently the most widely used arc welding process. It had its beginning in the late 1940s and was developed to make welding a faster, more profitable process. Benefits such as high production rates, high weld quality, ease of automation, and the ability to weld many metals make it attractive to manufacturers. This paper presents a study on effect of various process variables in GMAW.

*****

I. INTRODUCTION

GMAW is a process that joins metals together by heating them with an electric arc that is established between a consumable electrode (wire) and the workpiece. An externally supplied gas or gas mixture acts to shield the arc and molten weld pool.

GMAW is sometimes referred to by its subtypes metal inert gas (MIG) welding or metal active gas (MAG) welding. It was primarily developed as a high current density, small diameter metal electrode process with argon shielding for aluminium, hence the term MIG was appropriate. But when it was extended to the welding of ferrous and nonferrous metals, addition of 1-2 % oxygen to argon was found necessary to get smooth metal transfer. Later it was established that mild steel could be welded using 100 % carbon dioxide or argon-carbon dioxide mixture as a shielding gas. Since these gases are not inert, the process came to be termed as MIG/CO_2 or MIG/MAG welding process. MAG is an abbreviation of metal active gas in which active gas refers to argon-oxygen, carbon dioxide and argon-carbon dioxide mixture, which are chemically reactive and not inert. The *American Welding Society* refers to the process as Gas Metal Arc Welding and has given it the letter designation GMAW. This term appears simpler; it covers inert as well as active shielding gas.

GMAW can be done in three different ways:

1. Semiautomatic welding – equipment controls only the electrode wire feeding. Movement of welding gun is controlled by hand. This may be called hand-held welding.
2. Machine welding – uses a gun that is connected to a manipulator of some kind (not hand-held). An operator has to constantly set and adjust controls that move the manipulator.
3. Automatic welding – uses equipment which welds without the constant adjusting of controls by a welder. On some equipment, automatic sensing devices control the correct gun alignment in a weld joint.

II. PRINCIPLE OF GMAW

This process uses an electric arc as a source of heat to melt and join the metals. An arc is an electrical discharge over a gaseous path between two electrodes which takes place through an electrically conducting hot ionized gas known as plasma (Fig. 1).

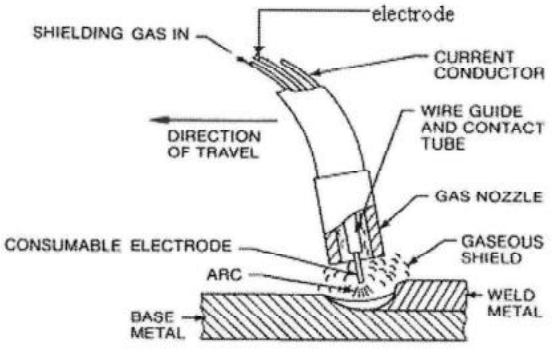

Figure 1: Principle of GMAW [1]

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Life Cycle Analysis in Manufacturing Industry - A Case Study

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ABSTRACT

The method used in this project is LCA and the study is performed from gate (beginning of the company) to gate (end of the Company). LCA is a method to assess the potential environmental impacts associated with a specific product or service. All stages in the life cycle are taken into account and use of natural resources, transportation, energy consumption, waste and emissions are considered. LCA can be used for identification of improvement possibilities, decision-making etc. but has also an important application in learning about environmental impacts caused by substances and processes used in the life cycle. This is mainly what is done in this study.

Keywords: Environmental Impacts, NBC, ISO, LCIA, LCA, GWP, LCI

I. INTRODUCTION

The increasing environmental concern in today's society puts lot of pressure on the industry to produce less environmental damaging products. At this point, this is principally experienced by industries producing consumer goods but these industries are in their turn increasing the pressure on their suppliers. So far it is in most cases questions about environmental management systems but the nature of the questions are slowly changing and becoming more product-related. Questions about LCA work and performed LCAs are becoming more frequent. With this as a background I decided that it was time to perform an LCA on one of key products of NBC.

In recent years Life Cycle Assessment (LCA) has become one of many useful tools in assessing the environmental aspects and potential impacts associated with a product. In LCA the product is followed from the cradle to the grave, i.e. from raw material acquisition, through production, use and waste disposal. LCA is multidisciplinary and deals with the social system, the technical system, the natural system and their relationships.

The LCA method provides researchers or companies with quantitative data for their current products. By looking at a product's life from the raw material extraction to its disposal, the environmental impact of each process and material can be analysed. The LCA allows analysts to determine and analyse the technological, economic, environmental, and social aspects of a product or process necessary to manage the complete life cycle. With this quantitative data, desired changes can be justified with respect to the cost and environmental impacts of a product or process.

LCA is an increasingly important tool for environmental policy, and even for industry. Analysts are also interested in forecasting future materials/energy fluxes on regional and global scales, as a function of various economic growth and regulatory scenarios. A fundamental tenet of LCA is that every material product must eventually become a waste. To choose the 'greener' of two products or policies it is necessary to take into account its environmental impacts from 'cradle to grave'. This includes not only indirect inputs to the production process, and associated wastes and emissions, but also the future (downstream) fate of a product. The first stage in the analysis is quantitative

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A Study on Metal Transfer Mechanism in Gas Metal Arc Welding

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ABSTRACT

Gas metal arc welding is currently the most widely used arc welding process, having overcome the old faithful "stick" welding, SMAW. It was developed to make welding a faster, more profitable process. Benefits such as high production rates, high weld quality, ease of automation, and the ability to weld many metals make it attractive to manufacturers. All commercially important metals, such as carbon steel, high-strength low-alloy steel, stainless steel, aluminium, copper, and nickel alloys can be welded in all positions. A typical application is welding of aluminium bus bars in electrical industry and welding of sheet metal assembly. Gas metal arc welding process has become more popular in weld cladding than other processes due to its numerous advantages.

Keywords: Gas Metal Arc Welding, SMAW, SFBT, PIT, STT, CMT, DCEP, DCEN

I. INTRODUCTION

During gas metal arc welding, the electrode is melted and liquid droplets are formed at the tip of the electrode. The melted metal grows and is detached from the electrode (Fig. 1). This process of metal transfer includes droplet formation, detachment, and transfer in the arc. It plays an important role in determining the process stability, weld quality and productivity of welding. To understand molten metal transfer in arc welding requires understanding of the physics involved, even though the precise physics is not yet completely known. This should not come as a great surprise since arcs are small, their temperatures are high, and the dynamics of molten metal transfer are complicated [1]. The characteristics of the process are best described by the manner in which metal is transferred from the consumable wire to the workpiece.

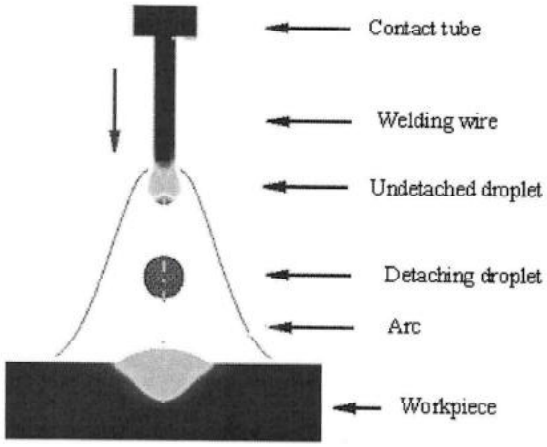

Figure 1: Metal transfer process in GMAW [2]

II. Literature Review

During welding process various forces act on the liquid droplet and also on the weld pool. These forces influence the mode of the metal transfer and the motion of the liquid metal in the droplet and the weld pool, which in turn can have an effect on process stability, weld penetration, and bead shape. The forces controlling this transfer are very complex, and together with the size of droplets, they determine the mechanisms of metal transfer. These forces affecting metal transfer are gravity, surface tension,

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RESEARCH ARTICLE OPEN ACCESS

A Review on Advance Welding Processes

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Abstract:

This paper presents a review on advance welding process in practice. The objective is to present various aspects and relative merits of various welding processes in use in industries. The important considerations and application areas of these techniques are discussed in this paper.

1.Introduction

When compared with other joining methods, such as riveting and bolting, welded structures tend to be stronger, lighter weight and cheaper to produce. A large number of processes comprise the family of welding technologies, and include methods for welding metals, polymers, and ceramics, as well as emerging composite and engineering materials. These process variants of welding allow a great deal of flexibility in the design of components to be welded. They also encourage designing for optimal cost effectiveness in terms of productivity and product performance. Safety is also a major consideration when welding is adopted. This is because it uses electricity and flammable materials, and creates a lot of sparks in some instances.

Most of the welding processes could not get their due importance in the production scenario at the time of their developments, except for repair welding. However, at later stages all of them found their niches in manufacturing environment. Presently, welding is widely being used in fabrication of pressure vessels, bridges, building structures, air and space crafts, railway coaches, shipbuilding, automobiles, electrical, electronic and defense industries and general applications.

2.Solid State Welding Processes

Solid state welding processes produce coalescence by the application of pressure at welding temperature below the melting point of the base materials being joined, without the addition of a filler metal. Joining of two surfaces takes place by atomic bonding; process does not involve melting of the materials. As the surfaces are pressed together, atoms on the two surfaces attract each other to form bonds between the surfaces. The bonds thus formed are responsible for the joining process. Mechanical properties of the weld are similar to those of the parent metals. The process is commonly used for welding dissimilar materials, such as aluminium with steel in ship hulls or compound plates.

2.1.Forge Welding

Forge welding or smith welding is the oldest known welding process in which low carbon steel parts are heated to about 1,000 °C and then forged (hammered) together, either

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Process Capability and Parametric Analysis of Abrasive Jet Machining

(Paper ID: 412ET3011201704)

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Abstract: This paper presents process, working principle, process capabilities, applications, and limitations of Abrasive Jet Machining (AJM). AJM is a mechanical type advanced machining method in which kinetic energy of abrasive particles is utilized to remove material from the workpiece. The material is removed by erosion effect of a high speed stream of abrasive particles carried in a gas medium through a nozzle. It is used chiefly to cut intricate shapes in hard and brittle materials which are sensitive to heat and have a tendency to chip easily. It is especially useful for parts having thin sections; though not suitable for parts with sharp corners.

I. Introduction

Abrasive Jet Machining (AJM) is a mechanical type advanced machining method in which kinetic energy of abrasive particles is utilized to remove material from the workpiece. The material is removed by erosion effect of a high speed stream of abrasive particles carried in a gas medium through a nozzle. The process is suitable for hard and/or brittle metals, alloys, semiconductors and non-metallic materials like glass, ceramics, etc. It is used chiefly to cut intricate shapes in hard and brittle materials which are sensitive to heat and have a tendency to chip easily. It is especially useful for parts having thin sections; though not suitable for parts with sharp corners. It has been effectively employed for cutting, cleaning, etching, polishing and deburring. The process differs from conventional sandblasting in that it uses smaller diameter abrasive particles (10-50 μm) and a more finely controlled delivery system. The AJM process is characterized by relatively low power consumption and small capital cost [1].

II. Literature Review

The erosive effect of sandy winds blowing at high speeds has been felt on this earth for eons, though the controlled and intentional application of the AJM process started some decades ago only. Till date, there has been a quite thorough and detailed experimental and theoretical study on the process. Some of the studies argue over the hydrodynamic characteristics of abrasive jets, hence ascertaining the influence of all operational variables on the process effectiveness including abrasive type, size and concentration, impact speed and angle of impingement. Other researchers found new problems concerning carrier gas typologies, nozzle shape, size and wear, jet velocity and pressure, stand off distance (SOD) or nozzle tip distance (NTD). These research works express the overall process performance in terms of material removal rate, geometrical tolerances and surface finish of workpieces, as well as in terms of nozzle wear rate. Finally, there are several significant and important studies which focus on either leading process mechanisms in machining of both ductile and brittle materials, or on the development of systematic experimental, statistical approaches and artificial neural networks to predict the relationship between the settings of operational variables and the machining rate and accuracy in surface finish [2].

Finnie was the first researcher to analytically model the erosive wear of ductile materials by the impact of solid abrasive particles. However, predictions of his model do not agree well with the experimental results at higher impact angles. Also, the model fails to take into account the effects of abrasive particle size and shape on the erosion [3].

Bitter proposed a model to account for deformation wear (based on the plastic deformation) and predicted erosive wear of both brittle and ductile materials more accurately. Sheldon and Finnie developed an analytical model for erosive cutting of brittle materials by normal impact of abrasives, though the constants involved in this model required complex calculations. Sheldon and Kanhere analyzed the erosion process of relatively soft and ductile materials (aluminium) considering the impact by a relatively large (2500 μm) single abrasive particle and developed a simple analytical material removal model [1].

Verma and Lal have presented a detailed experimental study of parameters affecting erosion rate in AJM. They showed that the material removal rate first increases with increase in abrasive flow rate and stand-off distance and then decreases with further increase in these parameters, giving optimum results at intermediate values [4]. A comprehensive review of work carried out in the area of AJM has been presented by Ramachandran and Ramakrishnan [5]. They proposed a mathematical relationship for edge radius definition when using AJM on a blunt surface. However, this method does not take into account the edge radius created on a predefined sharp edge.

Hutching [6] proposed an easy-to-use model for the erosion of ductile materials by spherical particles at normal impacts. The only model incorporating the effects of statistical distribution

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A Study on Process Capability and Parametric Analysis of Abrasive Flow Machining

(Paper ID: 412ET3011201702)

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Abstract: This paper presents process, working principle, process capabilities, applications, and limitations of Abrasive Flow Machining (AFM). AFM is a finishing process that offers precision, consistency, and flexibility. In this process, an abrasive-laden pliable semisolid compound is forced to and fro across the surface to be machined. The self-deformable tool or the abrasive media changes its shape according to the geometry of the workpiece. Abrasive media is a mixture of abrasives and a semi-viscous carrier that flows through a restrictive passage formed by a work-tooling combination or workpiece. The abrasive media has random cutting edges with indefinite orientation and geometry for effective removal of material to form micro-chips

I. Introduction

High-quality surface finish and dimensional accuracy are essential in any machined product in order to ensure improved product performance and increased product life. Precision and ultra finishing process represents a critical and expensive phase of the overall production scenario. The most labor intensive and often uncontrollable aspect in the manufacturing of precision parts involves final finishing operations, which frequently demand as much as 15% of the total manufacturing cost. The dimensional and alignment accuracy and quality of surface finish are taken care of by finishing processes. The functional properties such as wear resistance and power loss due to friction are influenced by surface roughness of the matching parts [1].

Grinding, lapping, honing, and super finishing are traditional methods of finishing. But their applications are limited to the production of workpieces of the basic forms such as flat (prismatic) or cylindrical (axi-symmetric) surfaces. These conventional finishing processes are being pushed to their limits of performance and productivity in general and complicated-shaped components of hard materials in particular. Hence, there is a need to develop a finishing process with wider bounds of application areas, better quality performance, higher productivity, and automatic operation. Abrasive flow machining (AFM) is one such process [2].

Abrasive Flow Machining was developed by Extrude Hone Corporation, USA in 1960. It is becoming popular due to its ability to give predictable, repeatable and consistent results. The advantage of the AFM process lies in the uniformity of the polished surface, especially when compared to the tedious manual finishing methods. In this process, an abrasive-laden pliable semisolid compound is forced to and fro across the surface to be machined, the self-deformable tool or the abrasive media that changes shape according to the geometry of the workpiece. Abrasive media is a mixture of abrasives and a semi-viscous carrier that flows through a restrictive passage formed by a work-tooling combination or workpiece. The abrasive media has random cutting edges with indefinite orientation and geometry for effective removal of material to form micro-chips [3].

Applications of AFM include finishing of components in aerospace, automotive dies, chemical processing and medical industries. Materials from soft aluminum to tough nickel alloys, ceramics and carbides have been successfully micro-machined by this process. AFM technique is used for deburring, edge contouring and surface finishing. It has produced surface finish as good as 0.05μm and can produce dimensional tolerances as good as ± 0.005mm [4].

II. Literature Review

Considerable number of research studies has been undertaken in the direction of development, applications and capabilities of AFM. A brief review of same has been presented in this section.

Rhoades found that in AFM, depth of cut by abrasive particles depends on size, relative hardness, sharpness of abrasive particles and extrusion pressure. He stated that medium viscosity plays a vital role in finishing action. Experimental study by Przyklenk demonstrated that with workpieces having small bore diameter, more grains come in contact with the workpiece wall, and hence material removal increases [1].

Perry reported that abrasion is high where medium velocity is high. An increase in pressure and medium viscosity increases MRR while surface finish value (Ra) decreases. Slow medium flow rates are good for uniformly removing materials; high flow rates produce large radii. The types of machining processes used to prepare the specimens prior to AFM are found to significantly affect the improvement in surface finish [5].

Williams and Rajurker conducted experiments to study the effect of extrusion pressure and medium viscosity on MRR and surface finish. Loveless *et. al.* concluded through their experiments that initial surface roughness and viscosity significantly influence the percentage surface finish improvements [1].

III. The Process

AFM process involves the flow of an abrasive-laden, semisolid and self-deformable medium through (for internal surfaces) or around (for external surfaces) the workpiece surface(s) to be finished. This semisolid abrasive medium is forced through the workpiece hydraulically or mechanically. Two vertically opposed cylinders extrude the medium back and forth through passages formed by the workpiece and tooling. The workpiece held by fixture is placed between two medium cylinders which are clamped together to form a seal so that medium does not leak during finishing process, as

Book Chapter
Springer

Chapter 11
Design of Reactionless Mechanisms Based on Constrained Optimization Procedure

Himanshu Chaudhary and Kailash Chaudhary

Abstract This chapter presents an optimization technique to dynamically balance planar mechanisms by minimizing the shaking forces and shaking moments due to inertia-induced forces. Dynamically equivalent systems of point masses which represent rigid links and counterweights are useful for developing optimization technique. The point-mass parameters are explicitly identified as the design variables. The balancing problem is formulated as both single-objective and multi-objective optimization problem and solved using genetic algorithm which produces better results as compared to the conventional optimization algorithm. Also, for the multi-objective optimization problem, multiple optimal solutions are created as a *Pareto front* using the genetic algorithm. The reduction of shaking force and shaking moment is obtained by optimizing the link mass distribution and counterweight of their point masses. The inertial properties of balanced mechanism are then computed in reverse by applying dynamical equivalent conditions from the optimized design variables. The effectiveness of the methodology is shown by applying it to problems of planar four-bar, slider-crank, and Stephenson six-bar mechanisms.

Keywords Dynamic balancing • Equimomental system • Genetic algorithm • Optimization • Shaking force and shaking moment

The design of reactionless mechanisms is important in order to (1) reduce the amplitude of vibration of the frame on which the mechanism is mounted due to transmission of shaking forces and (2) smoothen highly fluctuating driving torque/force needed to obtain nearly constant drive speed. Since any vibration leads to noise, wear, fatigue, etc., in the mechanism, its reduction improves several aspects of mechanical design as well. Design a reactionless mechanism means the balancing of shaking force, shaking moment, and input-torque fluctuations together. The shaking force can be eliminated completely by attaching counterweights and/or redistributing masses of the moving links. This will increase overall mass

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A Review on Dynamic Balancing and Link Shape Synthesis of Planar Mechanisms

Sajjan Singh Bajiya, Kailash Chaudhary, and Himanshu Chaudhary

Abstract This paper reviews the various methods developed for balancing of the planar mechanisms and synthesizing the link shapes. The methods discussed in this paper are used for complete force balance, complete force and moment balance, partial force and moment balance as well as for the link shape synthesis of different planar mechanisms. The concepts, applications, and limitations of various methods are discussed and reviewed from the available literature in the area of mechanism balancing. The better understanding of available methods will definitely help the researchers working in this area in analyzing the current practices and in developing the new methods.

Keywords Shaking force and moment · Driving torque · Mass redistribution · Counterweight · Topology · Optimization

1 Introduction

Several review papers throw light on the quantum of work carried out on the balancing of the mechanisms especially dynamic balancing [1–7]. Shaking moment and driving torque get increases due to balancing of shaking force alone. Review of the literature regarding the complete balancing, i.e., shaking force and the shaking moment states that there will be no clear-cut method for static and dynamic balancing.

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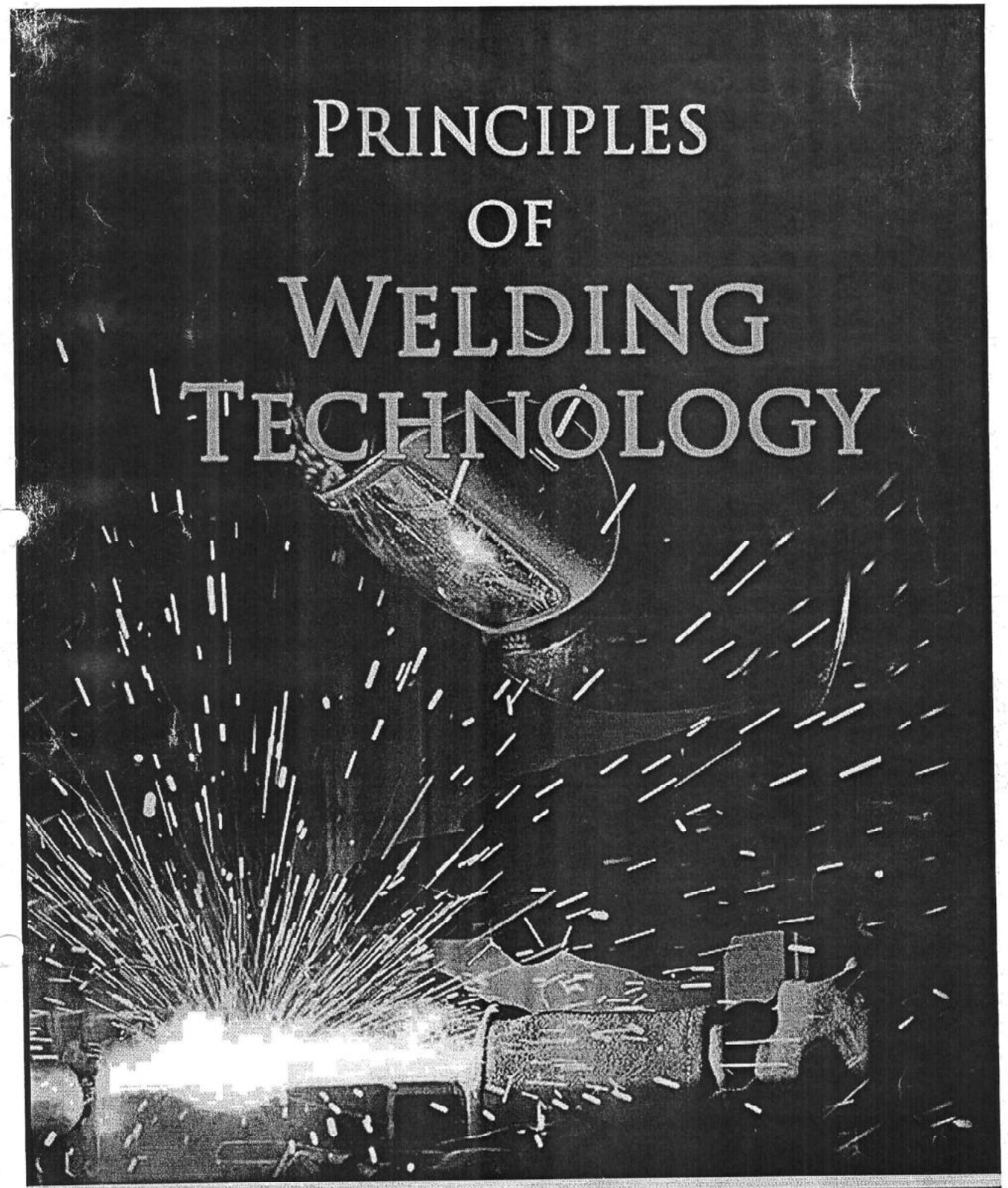

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Paper ID:129

An Insight into the Key Development Areas of Rapid Prototyping

Ajay Dhanopia[1], Pallavi Bohra[2], Kailash Chandhary[2]
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ABSTRACT

In product development, time pressure has been a major factor in determining the direction of the development and success of new methodologies for enhancing its performance. Global competition, product customisation, accelerated product obsolescence and continued demands for cost savings are forcing companies to look for new technologies to improve their business processes and speed up the product development cycle. Amongst the latest technologies to take the industry by storm is Rapid Prototyping also known as Solid Freeform Fabrication, Desktop Manufacturing or Layer Manufacturing Technologies. Various RP methods along with case studies showing effectiveness are presented in this paper. Experimental results show that mechanical properties as well as dimensional accuracy of the manufactured part depends upon the RP process parameter.

Paper ID:130

Mechanical and Microstructural Characterization of D-Gun Sprayed Al_2O_3-TiO_2 Composite Coating deposited on 6063 Alloy

Aayush Soni, Awanish Kumar, Bharat Singh Rathor, Girdhr Dadhich, V N Shukla
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ABSTRACT

In many industrial and power plant applications, the mechanical components are subjected to extreme working conditions. This leads to wear of the material which greatly affects its performance and service life of the component. These degradations cannot be eliminated completely but can be minimized by increasing the hardness of the surface by their surface modification. The aluminium is light, ductile and third most abundant element in the earth crust. It has poor mechanical properties such as yield strength 7 to 11 MPa, ultimate tensile strength 40 to 50 MPa. Hence pure aluminium cannot be used in the automobile and aerospace industry where their strength is examined. Al_2O_3 have high strength and stiffness. Its hardness is extremely high leading to its low wear but its main drawback is its brittleness. The addition of titanium oxide (TiO_2) provides the balanced fusion of properties by maintaining enough hardness and considerably increasing the coating toughness. Al_2O_3-TiO_2 composite coatings have a matrix of Al_2O_3 and a second Al_2O_3-TiO_2 phase which is known as reinforcement. In many applications like ship engine valves, steel piston rings, water pumps, textile and printing industries, plasma sprayed (part of a thermal spray technique) Al_2O_3-TiO_2 is used as a wear resistant coating. Al_2O_3-TiO_2 composite coatings is one of the important engineering ceramic materials due to its high elastic modulus, high wear resistance and chemical corrosion resistance, high temperature stability, retention of strength at high temperatures and low cost of the starting powder. The surface morphology, micro hardness and porosity of the Al_2O_3-40 %TiO_2 coatings was investigated in the present work.

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Paper ID # 21

A study on parametric analysis of Abrasive Jet Machining

Ajay Dhanopia*, Ravi Shekhar Kinja, Dr. Kailash Chaudhary

*SKIT, Jaipur

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ABSTRACT

Abrasive Jet Machining is a mechanical type advanced manufacturing process in which the kinetic energy of propelled abrasive particles is utilized to remove material from the workpiece. The process is applicable on hard and/or brittle materials and is gaining popularity at a very fast rate. The attempts have also been made to develop hybrid methods with it. The performance of this process depends to a large extent upon the hardness, strength, and other physical and mechanical properties of the work material. Also, the selection of machining process parameters is a very crucial factor for the overall performace. To exploit economically the potentials and capabilities of Abrasive Jet Machining to the fullest possible extent, parametric analysis is presented in this paper.

KEYWORDS

Advanced manufacturing processes, physical and mechanical properties, parametric analysis, optimization

****

OP-02: Applications of Shot Peening Process: A Review

Kunal Chaudhary and Kailash Choudhary*
Research Scholar, MBM Engineering College Jodhpur
Assistant Professor, Department of Mechanical Engineering, MBM Engineering College Jodhpur
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Abstract: Various application areas for the shot peening process are explored in this paper. Shot peening process is mainly used to improve the fatigue resistance capacity of the mechanical components. Shot peening makes the surface tougher, and less likely to crack by damaging the material by creating dents. The resulting stronger surface is highly resistant to cracks. The peening takes place as small beads or shots are bounced against the parts surface. Thus, it hammers the surface of a metal part and the hammered portion is covered with small dents which makes the surface tougher. Researchers study the effect of media size, peening intensity and coverage on surface roughness and residual stress magnitude to justify the importance of shot peening process.

OP-03: Synthesis and Investigation Tactic of Biodiesel: A Review

Shyam Sunder Suthar and Farog Nazam Usta
Assistant Professor, Dept. of Mechanical Engg., Govt. Engineering College, Bikaner
Lecturer, Govt. Polytechnic College, Bikaner
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Abstract: There has been great development in the area of biodiesel production during recent time. Biodiesel is becoming popular as an alternative fuel with eco-friendly characteristic. There are a number of mitigating factors to be considered while assessing the sustainability of using biodiesel produced from various methods. Cost verses benefit is most common issue in the production of biodiesel. Problem faced during transportation and storage as biodiesel has inherent tendency of oxidation due to water contents and to maintain and monitor fuel quality as per standardization organizations. This paper aims to review the various synthesis and investigation procedure used during biodiesel production and after production

OP-77: Applications of Shot Blasting Process: A Review

Mahendra Rolan and Kailash Chaudhary*
Research Scholar, MBM Engineering College Jodhpur
Assistant Professor, Dept. of Mechanical Engineering, MBM, Jodhpur
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Abstract: Shot blasting process cleans a surface by removing unwanted rust, scale, paint, etc., in preparation for painting, anodizing, welding, or other processes which require a clean surface. Along with deburring, it removes tooling marks and finishes a crude product. It is also used to change metallurgical properties or to relieve stresses in a part by the multiple impactions. Micro blasting of cutting tips and tools is a very effective and reliable method of advancing the life of tools under the action of turning, milling, drilling, punching and cutting. The importance and applications of shot blasting and other similar processes are explored in this paper.

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This certificate is awarded to Dr. Kailash Chaudhary (CMBM Jodhpur)
for paper titled Application of Data Mining in Manufacturing System Design: A Case Study
towards technical presentation, recognition and appreciation of research contributions to **Data Mining & Machine Learning (NCDMML 2017)** *held at* ***MNIT Jaipur*** *during October 14-15, 2017.*

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[1][भारत का संविधान, अनुच्छेद 51-ए

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51क. मूल कर्तव्य : भारत के प्रत्येक नागरिक का कर्तव्य होगा कि वह –

(क) संविधान का पालन करे और उसके आदर्शों, संस्थाओं, राष्ट्र ध्वज और राष्ट्रगान का आदर करे;

(ख) स्वतंत्रता के लिए हमारे राष्ट्रीय आंदोलन को प्रेरित करने वाले उच्च आदर्शों को हृदय में सँजोए रखे और उनका पालन करे;

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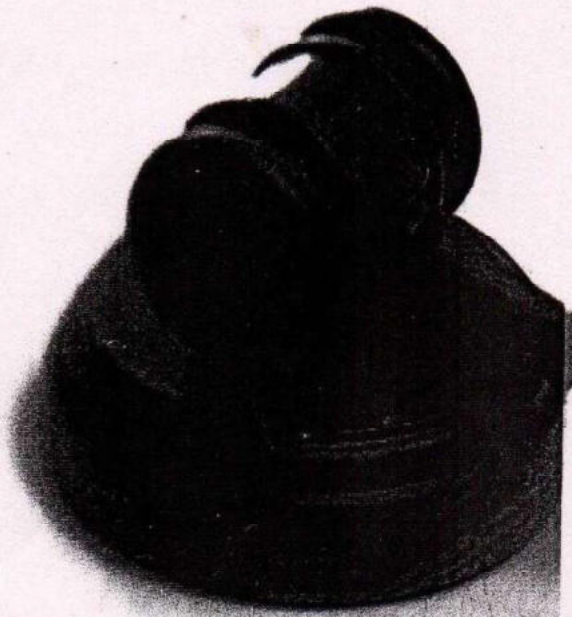

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Case Comment

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Social Security for the Disabled Workers in Industrial Establishments: Legal Issues

Dr. Sheetal Prasad Meena*

Introduction

Human needs social security in the society. Disabled persons are also part of our society. Due to industrial development every person of society affected. Disability is neither a physical problem nor a health problem. It is the result of negative interactions that take place between a person with impairment and her or his social environment. There are many Acts which have been enacted by the government for the benefit of the disabled or the physical and mentally challenged. Still they seems ineffective to disabled persons. Society cannot be changed by merely by making laws there needs a enforcement mechanism. These persons are deprived of Right to employment , Right to work & livelihood, Right to social security , Right to life with dignity etc.

A first step toward a consistent explanation of the prior work requirement is to note its relation to the insurance aspect of Social Security. The requirement ensures that the claimant has paid the Social Security tax for a significant period. Thus benefits can be characterized not as public charity but as a return of insurance proceeds to the disability claimant who has paid tax "premiums" to purchase protection against the risk of disability. The insurance concept is not an entirely satisfactory explanation for the prior work requirement, however, for it could as easily justify coverage for all those now excluded by the requirement.

We could assume that all persons undertake to pay insurance premiums if and when they work, and that the promise to pay these premiums is consideration for an insurance contract by which society agrees to protect against the possibility that an individual will become disabled after working and paying taxes, or be disabled throughout his life and so never achieve a status of taxpaying productivity. That this societal insurance concept has not been adopted indicates that we may be unwilling to regard as insurance a scheme that does not require a connection between an individual's actual contributions and the benefits he will receive.[1]

Definition of Social Security:

The definition of social security includes Social insurance, Social Assistance, Family Benefits, Health Care and other Social services, related social welfare services etc. Right to an adequate standard of living for the health and well being of himself and his family, clothing, including food, and housing and medical care and sickness, disability, widowhood, old age and necessary social security in the event of unemployment or other lack of livelihood in circumstances beyond his control, is provided to every individual. At all times and in every society, at every stage of development, there have been sick people requiring medical aid and care, handicapped and old people are unable to work for a living.[2]

According to a definition given in the ILO publication- Approaches to Social Security (1949), *"Social security is the security that society furnishes through appropriate organization against creation risks to which its members are exposed. These risks are essentially contingencies of life which the individual of small means alone cannot effectively provide by his own ability or foresight or even in private combination with his fellows"*.

United Nations Organizations and Disabled persons :

According to Universal Declaration of Human Rights, 1948, *"All human being are born free and equal in dignity and rights"*. Nevertheless, this is far from being a reality for more than 500 million disabled persons around the world. Disabled persons living conditions are worse than those of other citizens. They are very often isolated and socially marginalized. They face discrimination virtually in all aspects of life. To combat this situation, specific rights have been evolved to protect disabled persons.

According to definition contained in the Declaration of the Rights of Disabled Persons (1975), the term 'Disabled Persons' *"any person unable to ensure by himself or herself, wholly or partly, the necessities of a normal individual and/or social life, as a result of a deficiency, either*

*Associate Professor, Govt. PG. Law College, Pali

1 The definition of disability in social security and supplemental security income: drawing the bounds of social welfare estates, Lance Liebman, Harvard law review, Volume 89, No. 5, Columbia Law School, March 1976.

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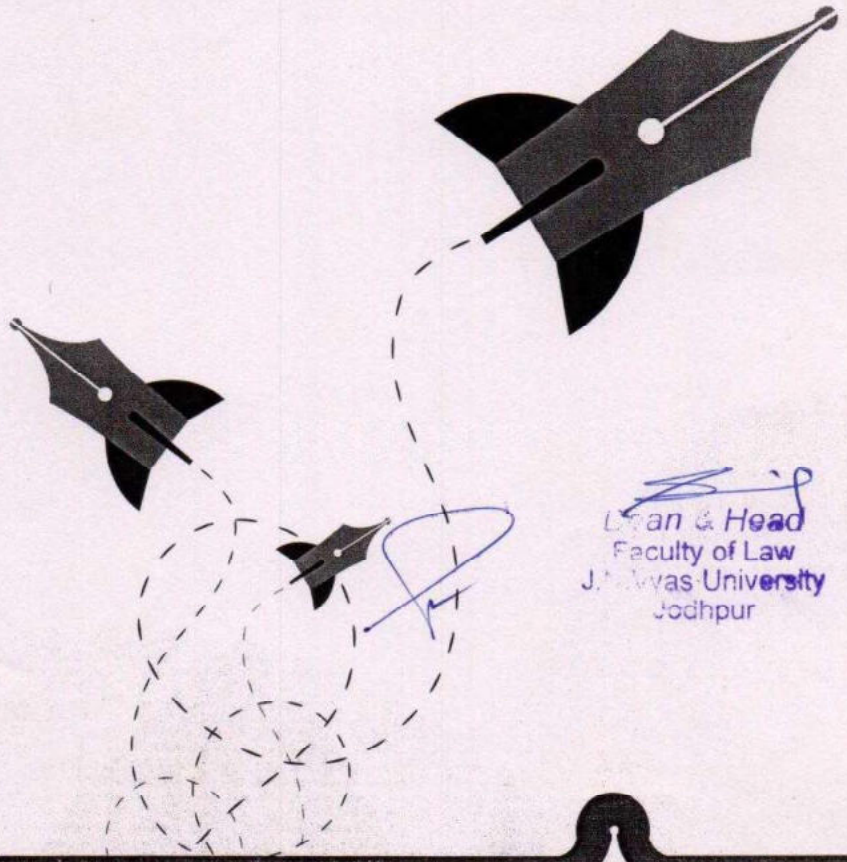

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भारत में ऑनर किलिंग : एक चुनौती

डॉ0 शीतल प्रसाद मीना*

शोध सारांश

वर्तमान समय में भारत सहित विश्व के कई देशों में सम्मान के नाम पर दो वयस्कों द्वारा एक ही गोत्र परिवार, समाज या धर्म में विवाह करने पर हत्या करने की घटनाएँ दिन प्रतिदिन बढ़ती जा रही हैं। इससे व्यक्ति के जीने के अधिकार से वंचित हो जाता है तथा संवैधानिक तथा विधिक अधिकारों का हनन भी होता है। इस संबंध में केन्द्र व राज्य सरकारों के द्वारा बनाए कानूनों का भी खाप पंचायतों ने मखोल उड़ाया। उच्चतम न्यायालय ने महत्वपूर्ण निर्णयों के माध्यम से दिशा निर्देश दिए। हाल में राजस्थान सरकार के द्वारा 2019 में ऑनर किलिंग को रोकने के संबंध में कानून बनाया है।

Keywords : ऑनर किलिंग, खाप पंचायत, मानवाधिकर , स्वतंत्रता

प्रस्तावना

भारत एवं विश्व के कई देशों मे जाति एवं धर्म में ऐसी कई प्रथाएँ विद्यमान हैं जिनके कारण प्रति वर्ष हजारों में नवयुवक विवाहित जोड़ों को अपने जीवन से हाथ धोना पड़ता है। समाज में शिक्षा का बढ़ावा मिलने के बावजूद ऑनर किलिंग आज भी बदस्तूर जारी है। भारत के कुछ राज्यों जिनमें पंजाब, हरियाणा, उत्तर प्रदेश, राजस्थान में ऑनर किलिंग की घटनाएँ सबसे अधिक हुई हैं। उच्चतम न्यायालय ने भी समय समय पर खाप पंचायतों के विरूद्ध कठोर कदम उठाए हैं, लेकिन समाज में सम्मान के नाम पर कई जातियों व धर्मों में लोग अपनी ही बेटे–बेटियों को मार रहे हैं। जो वर्तमान समय में बदस्तूर जारी है। जो समाज में कलंक के साथ चुनौती है।

ऑनर किलिंग यानि सम्मान के लिए मृत्यु या इज्जत के लिए हत्या से है, ऐसे शब्द हैं जिसमें परिवार के सदस्यों द्वारा ही अपने पुत्र या पुत्रियों की हत्या सम्मान या इज्जत के नाम पर कर दी जाती है। यह भारत ही नहीं, बल्कि कई देशों में यह बुराई आज भी विद्यमान है। 'इज्जत के लिए हत्या' ऐसी हत्या है जो परिवार या जाति या धर्म या समुदाय के सदस्यों द्वारा इसलिए की जाती है कि पीडित व्यक्ति (पुरूष या महिला ने) उस परिवार, जाति, धर्म या समुदाय की इज्जत, प्रतिष्ठा या नाम पर बट्टा अपने कृत्यों से लगाया है। सन्1978 में डच स्कालर ऐन ने जब पहली बार 'ऑनर किलिंग' शब्द का प्रयोग किया था तब वह नहीं जानती होगी कि वह मानव सभ्यता को एक ऐसा शब्द दे रही है,जो बरसों रक्त सामंतवादिता का पर्याय बन जाएगा। करो–करी, इज्जत के नाम पर हत्या, या ऑनर किलिंग जिस नाम से पुकारा जाए समाज के माथे पर कालिख का एक रूप ही रहता है। इस प्रकार ऑनर किलिंग में प्रतिशोध पूर्ण हत्या पुरूषों द्वारा परिवार की महिला सदस्य की हत्या कर दी जाती है जिसके कारण समाज या जाति , धर्म में इज्जत पर बट्टा लगाया हो जैसे पारंपरिक विवाह न करना, जाति, धर्म से बाहर विवाह करना, बलात्कार का शिकार होना, तलाक चाहना अथवा जार संबंध कायम करना।

ऑनर किलिंग बनाम खाप पंचायत

हरियाणा, राजस्थान, पश्चिमी उत्तर प्रदेश में खाप पंचायतों का प्रचलन सदियों से रहा है। समाज में इनकी हैसियत बहुत मायने रखती है, लेकिन सरकारी कानून की नजर में इनकी कोई हैसियत नहीं रही है। इनके जरिए किए गए फैसले किसी फतवे से कम नहीं रहे, और जो फतवे के खिलाफ जाता है उसे गाँव से निकाला ,जाति निकाला, या मौत की सजा दी जाती रही है। इन्दर मलहोत्रा का कथन है कि खाप पंचायतें अपने देश में अकेले जाट समाज में 3500 बताई जाती हैं। खाप पंचायतें जब कोई जोड़ा सगोत्र अथवा गाँव के गाँव में ही प्रेम प्रसंग चला है तो उसके विरूद्ध कड़े कदम उठाने के लिए विवश हो जाते हैं क्योंकि उससे सामाजिक प्रतिष्ठा जुड़ी होती है और स्थापित आचार–विचार की अवहेलना होती है।

वैश्विक परिप्रेक्ष्य में ऑनर किलिंग तथ्य– लेबनान में प्रतिवर्ष लगभग 40–50 हत्याएं इज्जत के नाम पर की जाती हैं इसी प्रकार यूरोप में एवं अमेरिका में 90 प्रतिशत इज्जत के लिए हत्याएं मुस्लिम परिवरों से संबंधित होती हैं। पेरू में लगभग 70 प्रतिशत महिलाओं की हत्या उनके पतियों द्वारा या पुरूष मित्रों द्वारा की

*सहायक प्रोफेसर – विधि संकाय, जय नारायण व्यास विश्वविधालय, जोधपुर

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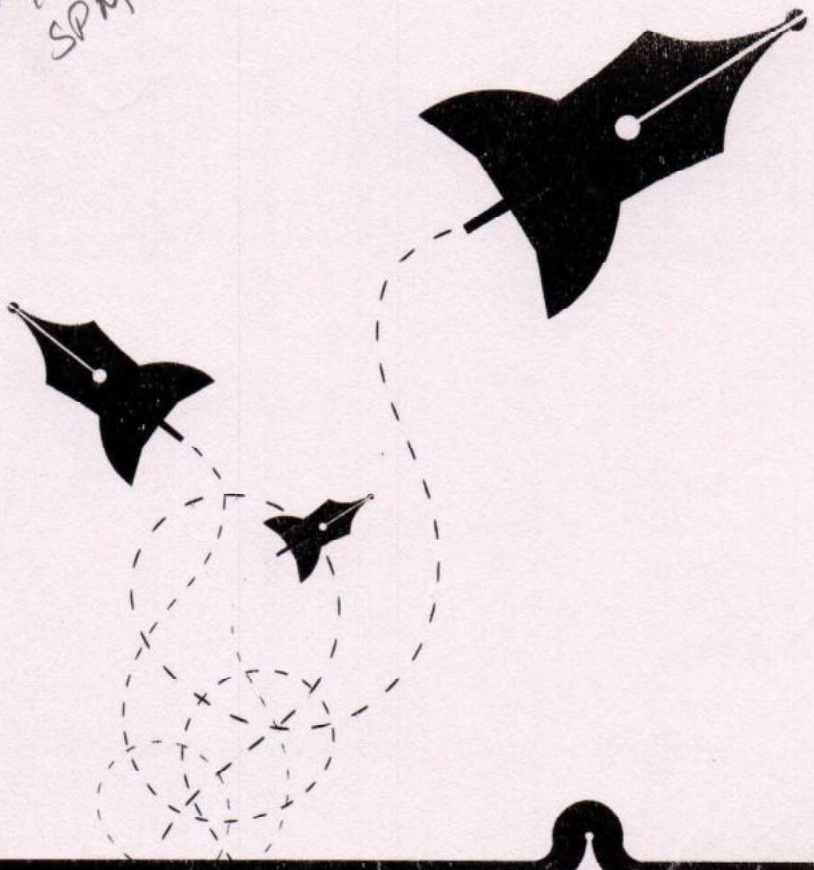

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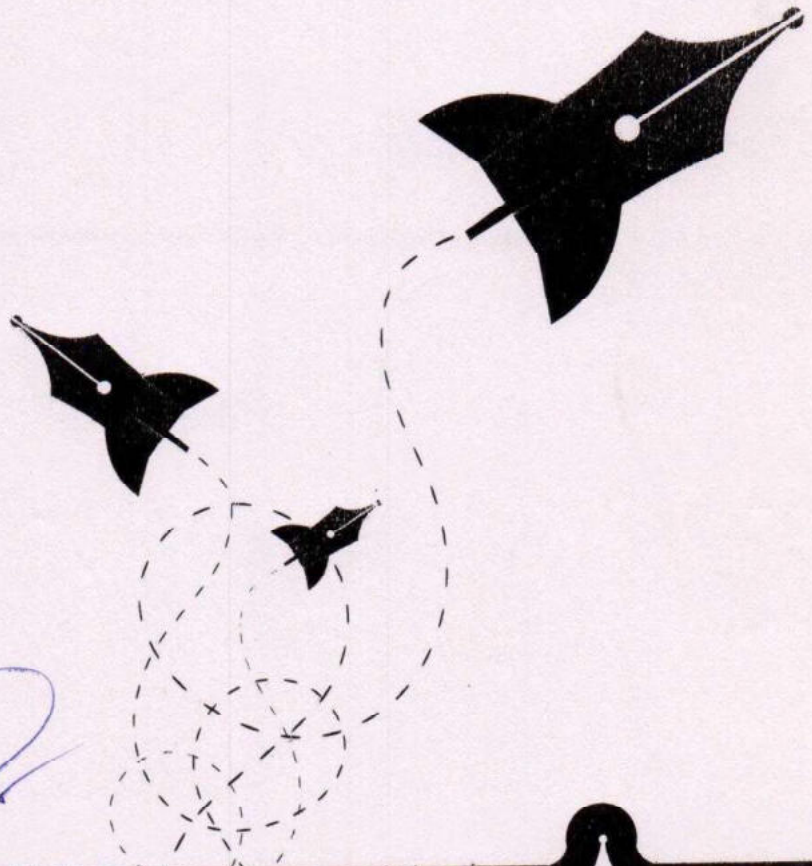

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Democratic Decentralisation in India with Special Reference to Centre-State Relations: An Overview

Paper Submission: 10/03/2020, Date of Acceptance: 27/03/2020, Date of Publication: 28/03/2020

Dalpat Singh
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Abstract

Decentralization is a word that has been used by different people to mean a good many different things. In any case, what do we find by and by? Investigations with nearby government that end in confusion and insolvency; Decentralized structures of organization that serve just as an increasingly viable apparatus for unifying force; Regional and district committees in which government authorities settle on choices while neighborhood delegates stay quiet; Gram Sabhas where the neighborhood individuals partake yet have no assets to dispense. Decentralization helps in recognizing the requirements and inclinations of the individuals through their immediate contribution in plan detailing and usage. It engages the weaker sections and to some extent abolishes elite domination. In India, the Panchayati Raj system is recognized as a major means of decentralization through which democracy becomes truly representative and accountable. The Indian states were acting as federations at only two levels - the Union and the State. The 73rd Amendment reinforces the decentralization procedure in India and enables nearby bodies from states. The current paper considers the procedure of decentralization in India and the significant spotlight is on the 73rd Amendment, which manages district, sub-district and rural level institutions in rural zones.

Keywords: Decentralization, Panchayat, Government, 73rd Amendment, Political, Administrative And Fiscal Decentralization.

Introduction

Decentralization is a procedure of moving capacity to privately choose neighborhood governments. Transferring power means providing greater political authority to local governments (e.g., calling local elections or establishing participatory processes), increasing financial resources (e.g., transfers or through greater tax authority) and provide more administrative responsibilities. With enthusiasm for, and experiments, decentralization has swept the world throughout the most recent four decades. Hypothesis firmly contends that decentralization should expand resident voice and investment in the political procedure, and so the government should be made more sensitive and accountable to governance. These estimates have led to large-scale policy responses around the world, with estimates that 80–100 percent of the world's nations have tried different things with some sort of decentralization reform.[1]

Decentralization is a widely used concept, and is firmly connected with democracy, development and good governance. Several research findings clearly demonstrate that decentralization provides an institutional mechanism through which citizens at various levels can sort out themselves and take an interest in decision-making processes.

Local government is a type of a decentralized framework that is impacted by the exchange of power or duty from more significant levels of government to decision-making, management, or allocation of resources to its subordinate units. The job of nearby government changes starting with one nation then onto the next, but local government has a role in every democratic society. In most South Asian countries, rural authorities are characterized by a weak institutional capacity to deliver public services and promote local development.

Since the early 1980s, decentralization has re-emerged as an important political and financial objective in most developing nations. As indicated by an ongoing World Bank study, everything except 75 of the 75

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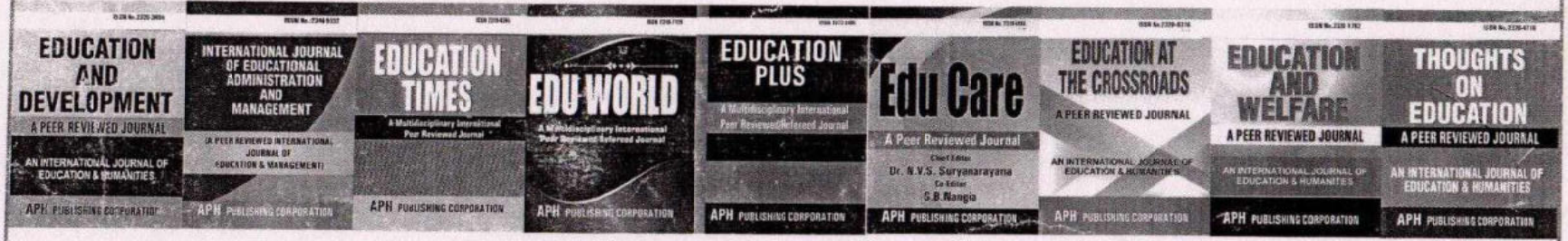

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Dr. Dalpat Singh[1]

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Human Rights of Disadvantaged Groups : Corruption and Good Governance

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Abstract

Global human rights law will offer qualities, standards and rules that modify a standard meaning of majority rule government. This paper inspects the significant segments of minorities, helpless and disadvantaged groups: Values, standards and standards in popular government get from global human rights law.

It regrets that corruption undermines the enjoyment of human rights and, at the same time, employs human rights as a standard framework to condemn and combat corruption. But the human rights-based approach has been criticized as vague and over-reaching. In addressing this controversy, this article attempts to examine more closely the legal quality of the fictitious 'link' between corruption and human rights. Corruption can contribute to closing the implementation gap of international anti-corruption tools not only as human rights issue but also as a potential human rights violation and usefully complement the dominant criminal law-based approach.

Keywords: Human Rights, Disadvantaged Groups, Corruption, Good Governance.

Introduction

As a concept, human rights have been constantly developing all through human history. They have been complicatedly attached to laws, customs and religions for quite a long time. Their standards change over the long haul as per human necessities and interests. Any conversation about human rights should recognize philosophical, political, and legal records. The way of thinking of human rights deciphers the rationale of human rights while governmental issues reveal to us which group of human rights needs quick thought, which group of human rights should we identify and how might we evaluate the conduct of other human rights. Notwithstanding, the law of human rights manages an itemized depiction of globally concurred qualities, standards or decisions that oversee the direction of states towards their residents and non-residents.

But philosophical, political and legal ways to deal with human rights won't be talked about exhaustively for the basic explanation that it is past the extent of work. All things being equal, the most fundamental components of the concept of human rights that give a birds-eye perspective on the above approaches will be made. The reason for doing this is to make an association between human rights and defilement. With this view, the accompanying sections investigate and examine the definition (if any), premise, nature and classifications of human rights.

Objective of the Study

1. To work for ensuring that basic human rights are respected everywhere.
2. To restrict cooperation with governing regimes that violates human right.
3. To actively engage with the Government of India to promote human rights education.
4. To support disadvantaged groups for protection of their rights.
5. To aware about the human rights of disadvantaged groups.
6. To discuss about the causes and impact of corruption on human rights.
7. To presurise to the government to remove corruption on human rights and makes arrangements for good governance.

Definition of Human Rights

In the worldwide field, where assorted societies are included, where positivist bases are unsteady, and where execution components are delicate, the meaning of human rights is significant. Since one understands

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❒ Dr. Sheetal Prasad Meena*

ABSTRACT

The Constitution provides for custodians in the form of legislature, executive and judiciary to protect will of the people. Needless to say, the custodian must be accountable to the public in exercise of their public duty. The Indian Constitution has provided for a complex web of checks and balances to ensure 'accountability' and 'responsibility' of every public institution and public functionary. Legislature and executive are directly made accountable through the system of universal adult suffrage. However, it is often found a challenge to make the judiciary accountable for misconduct. Judges enjoy judicial immunity and are not required to explain their conduct while acting in a judicial capacity. They are unaccountable to the public or to any other branch of government. Considering the fact that judges are responsible to keep a check on the abrogation of fundamental right of the citizens by other custodians, in their role as sentinel of the qui vive, the question that rightly arises is who will judge the judges? The author, through this article analyses this conundrum and tries to arrive at solutions that are the need of the hour to ensure judicial accountability while preserving judicial integrity and independence.

Keywords : judicial accountability, responsibility, judicial integrity, Independence of judiciary, Justice Delayed and justice denied

Introduction

"…however good a Constitution may be, it is sure to turn out bad because those who are called to work it, happen to be a bad lot. However bad a Constitution may be, it may turn out to be good if those who are called to work it, happen to be a good lot.

…The Constitution can provide only the organs of State such as the Legislature, the Executive and the Judiciary. The factors on which the working of those organs of the State depends are the people and the political parties they will set up as their instruments to carry out their wishes and their politics."

Dr. B.R. Ambedkar

These words of Dr. B.R. Ambedkar are crucial to understand the significance of accountability in public life especially as custodians of the Constitution. "Accountability" and "post" both are associated with each other like Sun and Shadow, Life and Death, Body and Soul, and Right and Duty. With this understanding, the framers of Constitution made the concept as a foundation stone of the Constitution's building. When we go through the provisions of Constitution, we get the idea of foresightedness of the framers of the Constitution because even the judiciary has been made accountable for it's functions and duties. In a democracy, every public authority and official should be accountable for their functions and duties. In previous times, accountability was understood only in the realm of its applicability to elected representatives who had to be accountable to their constituents.

The concept of judicial accountability has gained significance in modern times. Hence, the judges should not be treated as exception to this because accountability and duty both co-exist and one cannot survive without

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Research Article Open Access

Shallow Marine Trace Fossils from Mandai Formation of the Barmer Basin, District-Jaisalmer, Western Rajasthan, India

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Abstract

Thirteen well-preserved trace fossil species namely *Thalassinoides horizontalis, Thalassinoides suevicus, Ophiomorpha nodosa, Ophiomorpha borneensis, Palaeophycus heberti, Palaeophycus tubularis, Planolites, Planolites montanus, Planolites beverleyensis, Planolites annularis, Siphonites, Paleomendron, and Phycodes palmatum* have been reported from Mandai Formation of the Barmer Basin at Mandai area, western Rajasthan, India. The present study area is located about 15 km southwest of Fatehgarh town on Fatehgarh–Jhinjinyali tar Road. The Mandai Formation is 27 m thick lithostratigraphic unit deposited in the north-western part of the Barmer Basin and overlies on Early Palaeocene Baniyara -Dharvi-Sajit Member of the Akli Formation and overlain by Giral-Thumbli Member of Akli Formation of Early Eocene. The Mandai Formation has mixed siliciclastic, minor carbonate and phosphorite facies and its starts with bioturbated medium to fine grained ferruginous sandstone at the base. These trace fossils are preserved of full relief in yellowish to dark brown medium to fine grained ferruginous sandstone and greyish yellow coarse and coarse to medium grained calcareous sandstone. The entire ichnogenera shows shallow marine depositional environment of Mandai Formation of Barmer Basin. No age can be assigned on the basis of these trace fossil as they have long range (Cambrian to Recent).

Keywords: Shallow marine; Trace fossils; Mandai formation; Barmer basin; Jaisalmer and Western Rajasthan

Introduction

Barmer Basin is mainly Tertiary basin, opened as narrow, roughly N-S trending linear graben and it has a maximum length 100 km; while the width is about 50 km [1]. Biswas et al. [2] opined that Barmer Basin considered as northern extension of Cambay Basin connected through the Sanchore Basin. The Barmer Basin is floored by Malani igneous suite, Lathi sandstone and Jaisalmer Formation [3]. The sediments of the Barmer Basin are classified into eight formations *viz*; Sarnu Formation, Fatehgarh Formatiom, Mandai Formation, Barmer Hill Formation, Akli Formation, Mataji ka Dungar Formation, Kapurdi Formation and Uttarlai Formation. The Sarnu Formation is represented by red siltstone and sandstone with plant fossils, the Fatehgarh Formation comprises siltstone, ferruginous sandstone, phosphatic sandstone having significant microvertebrates- magnetic spherule bearing bone bed and gastropod bed [4,5], the Mandai Formation is represented by bioturbated ferruginous sandstone and calcareous sandstone, medium to coarse grained sandstone, phosphatic bivalves bed, fine to medium grained sandstone, coarse grained sandstone and pebbly sandstone [6], the Barmer Hill Formation comprises sandy sandstone with chert and poorly preserved plant fossils and well -preserved *Asthenopodichnium* wood bearing trace fossils [7], the Akli Formation is represented by bentonite, clay, lignite and ferruginous sandstone with gastropods, microvertebrates and plant fossils [8], the Mataji ka Dungar Formation is dominantly composed of coarse grained sandstone, ferruginous sandstone and clay and bentonitic clay at the base [6,9], the Kapurdi Formation is represented by fuller's-Earth, gypseous clay, bioclastic limestone and marl with plants fossils, crabs, shrimps, turtles, fishes and gastropods [10] and the Uttarlai Formation comprises salt, gypsum, gypseous clay and sands [1]. Many trace fossils have been already reported from the rocks of the Barmer Basin by various researchers such as Borkar et al. [11], recorded *Thalassinoides, Planolites* and *Planolites Montanus* from Fatehgarh Formation; nearshore – shallow marine trace fossils from Fatehgarh Formation reported by Parihar et al. [7,9] and trace fossils from Mandai Formation reported by Parihar et al. [12]. The present investigation here deals with detailed study of shallow marine trace fossils from Mandai Formation of Barmer Basin at Mandai area *viz; Ophiomorpha nodosa, Ophiomorpha borneensis, Palaeophycus heberti, Palaeophycus tubularis, Planolites annularis* trace fossils found in yellowish to dark brown medium to fine grained ferruginous sandstone and *Thalassinoides horizontalis, Thalassinoides suevicus, Planolites, Planolites montanus, Planolites beverleyensis, Siphonites, Paleomeandron and Phycodes palmatum* trace fossils are occurred in greyish yellow coarse and coarse to medium grained calcareous sandstone in the lower phosphatic – carbonate dominated sequence of Mandai Formation. The objectives of present paper (i) To first reports of 13 trace fossils from Mandai Formation of the Barmer Basin. (ii) To the systematic ichnology of trace fossils and environment of deposition of trace fossils bearing facies of the Mandai Formation of Barmer Basin, Western Rajasthan, India.

Geology of the Study Area

The Mandai Formation is located about 15 km south -west of Fatehgarh on Fatehgarh-Jhinjinyali tar Road (Figure 1). The Mandai Formation is 27 m thick lithostratigraphic unit deposited in the north -western part of the Barmer Basin. The various lithounits of the Mandai Formation forms low to high ridges and hillocks in and around Mandai Village. The Mandai ridge running from south of the Jaton ki Dhani and up to Mandai in the south and the overall strike length of ridges is about 10 kms (Figure 2). The Mandai Formation

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Review Article Open Access

Near Shore - Shallow Marine (*Ophiomorpha* and *Margaritichnus*) Trace Fossils from Fatehgarh Formation of Barmer Basin, Western Rajasthan, India

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Abstract

Two trace fossils namely *Ophiomorpha* and *Margantichnus* have been reported from the Bariyara section of the Fatehgarh Formation of Barmer Basin. Here the *Margaritichnus* trace fossil sp. is the first record from the western Rajasthan. The present study area is located about 6 km south of Fatehgarh town and 70 kms north of Barmer on Bramer–Jaisalmer road. The *Ophiomorpha* trace fossils are found in white fine grained calcareous sandstone from lower siliciclastic sequence while *Margantichnus* trace fossils occurs in dark brown medium to fine grained ferruginous sandstone of middle phosphorite - siliciclastic sequence of the Fatehgarh Formation of Barmer Basin. The *Ophiomorpha* trace fossils were considered as crustaceans and shrimps whereas *Margantichnus* were mainly produced by worm–like deposits feeders such as sipunculids and priapulids or possibly hydrozoa. The ichnological and sedimentological investigations suggests near - coastal shallow marine depositional environment for the Fatehgarh Formation of the Barmer Basin. It is difficult to attribute a more specific age of Bariyara section of Fatehgarh Formation because of the long stratigraphic range of *Margantichnus* (Permian-Cretaceous) and *Ophiomorpha* (Permian-Recent) as attributed the Fatehgarh Formation to the Cretaceous age on the basis of microvertebrate assemblages recorded from the same Bariyara section.

Keywords: Near-shore; Shallow marine; *Ophiomorpha*; *Margaritichnus*; Trace fossils; Fatehgarh formation; Barmer basin; Western Rajasthan

Introduction

Barmer Basin is the Mesozoic–Tertiary basin extends for about 100 kms in north-south direction and 50 kms in east-west as its maximum width [1]. It is tectonically a graben bounded in north by Fatehgarh fault, in east by Sarnu fault and in west by Barmer Faults [2]. The horst is in its eastern flanks is made up of Jodhpur sector of Malani Igneous Suite and its north -western flanks is made up of Devikote High [3]. Datta [4], Biswas [5], Biswas et al. [6] opined that Barmer Basin considered as northern extension of Cambay Basin and southern extension of main Indus Basin. The rocks of the Barmer Basin are grouped into seven namely, Sarnu Formation, Fatehgarh formatiom, Barmer Hill Formation, Akli Formation, Mataji ka Dungar Formation, Kapurdi Formation and Uttarlai Formation. The Sarnu Formation consists of siliciclastic facies with plant fossils of Early Cretaceous age, the Fatehgarh Formation is represented by siliciclastic and phosphorite rocks having significant microvertebrates - magnetic spherule bearing bone bed and gastropod bed of Late Cretaceous age [1,7] the Barmer Hill Formation consists of siliciclastic rocks with poorly preserved plant fossils and well -preserved *Asthenopodichium* wood bearing trace fossils of Palaeocene age [1], the Akli Formation is consists of bentonite, clay, lignite and siliciclastic rocks with gastropods, microvertebrates and plant fossils of Palaeocene to Early Eocene age [8], the Mataji ka Dungar Formation is represented by clay and bentonitic clay at the base and fining upward sequences of siliciclastic rocks of Middle to Late Palaeocene age [9,10]. The Kapurdi Formation is consists of fuller's Earth, gypseous clay, bioclastic limestone and marl with plants fossils, crabs, shrimps, turtles, fishes and gastropods of Early Eocene age [11]. The Uttarlai Formation is represented by salt, gypsum, gypseous clay and sands of Quaternary age [12]. The Barmer Basin is floored by Malani igneous suite, Lathi sandstone and Jaisalmer Formation [3].

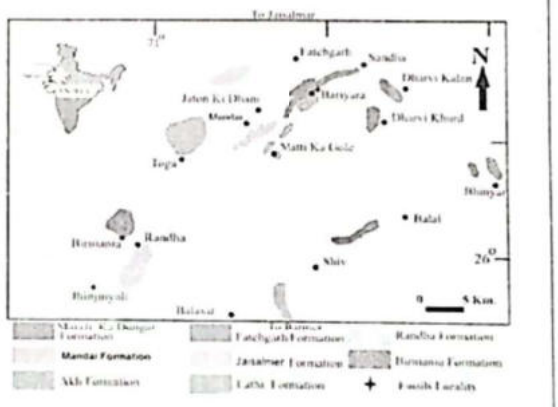

Figure 1: Location map of the Bariyara section of Fatehgarh Formation of Barmer Basin showing trace fossils locality [10].

The rocks of the Barmer Basin studied for ichnological aspects by various workers and many trace fossils are already recorded such as

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Factors Affecting Phytoextraction: A Review

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ABSTRACT

Hyperaccumulators concentrate trace metals and heavy metals in their shoots when grown in metal-contaminated soils and these trace metal-loaded plants may be removed by harvesting the fields. Studies exploring the beneficial role of these hyperaccumulators to clean up the environment have led to the development of phytoextraction. The success of phytoextraction depends upon the high biomass of plant species and bioavailability of metals for plant uptake. The phytoavailability of metals is influenced by soil-associated factors, such as pH, redox potential, cation exchange capacity, soil type, and soil texture, and by plant-associated factors, such as root exudates and root rhizosphere processes (microorganisms). Efficiency of phytoextraction can be improved by advanced agronomic practices including soil and crop management by application of genetic engineering to enhance the metal tolerance, shoot translocation, accumulation, and sequestration and by application of chelate treatments to enhance metal bioavailability. Application of microorganisms including bacteria and mycorrhiza may facilitate the phytoextraction application at commercially large scale.

Key Words: bacteria, bioavailability, chelate treatment, genetic engineering, heavy metals, hyperaccumulator, mycorrhiza

Citation: Sheoran V, Sheoran A S, Poonia P. 2016. Factors affecting phytoextraction: A review. *Pedosphere*. 26(2): 148–166.

INTRODUCTION

Heavy metals in soil represent a significant environmental problem worldwide. This has been attracting considerable public attention over the last decades. Heavy metals also known as potentially toxic elements are introduced in the environment naturally through the weathering of parent materials, as well as the various anthropogenic activities including mining, smelting, ore processing, irrigation with sewage containing heavy metals, agricultural utilization of sewage sludge, application of pesticides and chemical fertilizers, release of automobile exhausts, and pile-up of municipal wastes (Wu *et al.*, 2007; Vamerali *et al.*, 2010; Leitenmaier and Küpper, 2013; Escande *et al.*, 2014). Mining and smelting of metalliferous ores is the principal contributor of heavy metals to soil. The aggregate volume of mine tailings produced in the world has been estimated to be 18×10^9 m^3 year^{-1} (Forstner, 1999). Over recent decades, the annual worldwide release reached 22 000 t for cadmium (Cd), 939 000 t for copper (Cu), 783 000 t for lead (Pb) and, 1 350 000 t for zinc (Zn) (Singh *et al.*, 2003).

Heavy metals pose a critical concern to human health and environmental issues due to their high occurrence as a contaminant, low solubility in biota, and the classification of several heavy metals as being carcinogenic and mutagenic (Sheoran *et al.*, 2008b; Alloway, 2013; Van Oosten and Maggio, 2015). Many remediation techniques have been employed to address the rising number of heavy metal-contaminated sites. Most of the traditional methods such as washing/flushing, vitrification, electrokinetics, incineration, and landfilling are extremely expensive and often harmful to soil characteristics (i.e., texture and organic matter) (Pulford and Watson, 2003; Sheoran *et al.*, 2008a). A promising and relatively new technology for remediation of heavy metal-contaminated sites is phytoextraction. Phytoextraction, making use of the harvestable parts of plants to remove pollutants, represents a green and environmentally friendly tool for cleaning metal-polluted soils and waters (Luo *et al.*, 2005). Several studies concluded that phytoextraction of heavy metals can be a feasible technology for decontamination of metal-contaminated soils (Sheoran *et al.*, 2011; Escande, 2014; Robinson *et al.*, 2015). Furthermore, other than soil cleaning phytoextraction can also prove to be valuable in cropping precious metals such as gold, platinum, thallium, and nickel, which may be recovered by phytomining for commercial gain (Broo-

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Trichobezoar: A possible cause of death in Eurasian Griffon (*Gyps fulvus*) - a case study

Ram Prakash Saran[1] and Ashok Purohit[2]

Introduction

The word bezoar is derived from the Arabic "bad her" or from the Persian "bad air", and it means antidote (De Bakey and Ochsner, 1938). A bezoar is an accumulation of exogenous matter in the stomach or intestine. Trichobezoars also called as "Rapunzel Syndrome" is composed of hair and is rare in species (Balik *et al*, 1993). Although trichotillomania (irresistible will to pull out the own hair) was only described in 1889 by Hallopeau, the first report of a trichobezoar case occurred in 1779, by Baudamant. The first surgical excision was performed by Schonborn in 1883.

Trichobezoar is a hairball having a small collection of hair in the stomach of animals that is occasionally vomited up when it becomes too big. Hairballs are primarily a tight elongated cylinder of packed fur, but may include bits of other elements such as swallowed food. Hairballs are sometimes mistaken for other conditions of the stomach such as lymphosarcoma, tuberculosis, and tumour of the spleen. The rhythmic peristaltic contractions of the stomach in the presence of a trichobezoar could generate abrasive forces, disrupting the normal defensive barriers and allowing for auto digestion of the abomasal wall. The presence of hairballs might cause obstruction in the pyloric opening and interfere the passage of ingestion (Fromsa and Mohammed, 2011; Mohajeri *et al.*, 2012).

The Eurasian Griffon, a bird species characteristic of arid zone, is categorized as Least Concern in the IUCN Red List (BirdLife International, 2015). Eurasian Griffon migrates mostly to western India in winters in for feeding and releasing heat stress. They are consequently threatened by habitat loss, food availability and anthropogenic activity. During on regular field study of Eurasian Griffon roosting sites in Jodhpur district, Rajasthan on 11, January 2014, the authors found three dead individuals of Eurasian griffon at the Arna Jharana hills (26°17'2.36"N 72°53'15.34"E). Our experience with this incident and consultation with veterinary doctor suspects a new cause of vulture death as trichobezoar.

Jodhpur district in Rajasthan has one of the largest reported breeding sites of vultures and is one of the few places in India where four species viz. *Gyps indicus*, *Gyps bengalensis*, *Sarcogyps calvus* and *Neophron percnopterus* breed per year in the dry season (February-May). This occurs because of sufficient food availability in the region. The dumping site for carcass waste in Jodhpur is the best site for vulture study in Jodhpur. In a study, it was determined that diclofenac drug causes a drastic mortality to a vulture. In addition, feral and unmanaged dogs hunting, electrocution and some undefined reasons of vulture death in the early migration event were also noticed (Chhangani and Mohnot, 2004; Saran and Purohit, 2012). In the arid landscape of Rajasthan where water scarcity is a major concern, retention of minimum water levels, and protection and management of this dumping site, is beneficial for them.

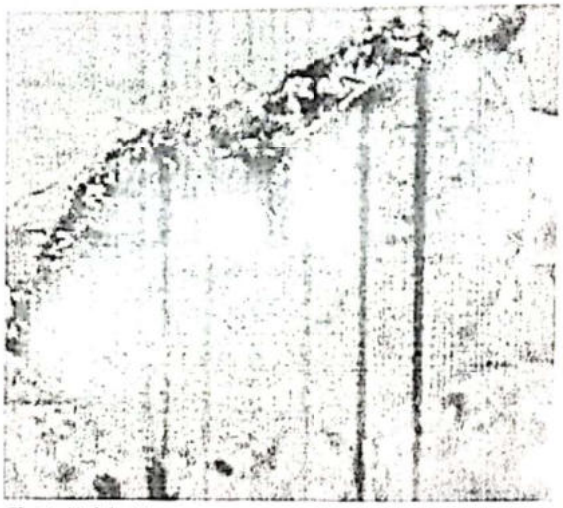

Fig 1. Hairball

Study Area

The study site, Jodhpur (26°17'59" N and 73°02'02" E) is situated in the western part of Rajasthan and is a prominent part of great Indian Thar Desert. Topographically, it is by and large, plain and open interrupted by hillocks. During summer, the temperature ranges between 6° C to 45° C while in May and June it rises up to 49° C. The annual average rainfall is 300 mm, distributed over 20 rainy days. This wide range of climatic condition has led to the formation of different habitat types of vulture in and around the city of Jodhpur.

Methods

On a regular visit to the Arna Jharna hill site to monitor the breeding and roosting sites of vulture, we found three dead specimens of the *Gyps fulvus*. Initially, it seemed as a casual death but we took the specimens to Central Zoo of Jodhpur. In an attempt

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A Comparative Patho-Physiological Study of Diclofenac and Meloxicam Induced Toxicity In *Gallus Domestics*

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ABSTRACT

The present study was conducted to evaluate comparative toxicity of two widely used non-steroidal anti-inflammatory drugs (NSAIDs) i.e. Diclofenac and meloxicam in *Gallus domesticus*. Diclofenac is claimed to be a major responsible cause of vulture population declination and considered as most devastating environmental toxicant. Today, it is replaced by meloxicam which is believed to be a safer drug than diclofenac. The whole experiment was divided in three comparative groups consisting of seven adult healthy broilers in each group. After the completion of experiments, the animals were autopsied as per standard protocols and blood was collected directly from cardiac puncture whereas vital organs were fixed in formalin for histopathological investigations. The results of serum biochemistry, hematology and histopathology revealed significant alterations in comparison to vehicle control. The levels of SGOT and SGPT were significantly ($P \leq 0.001$) increased by diclofenac treatment as compared to meloxicam. The levels of uric acid, creatinine, alkaline phosphatase, bilirubin, albumin, globulin and total proteins were indicated abnormalities in renal and hepatic functions in the diclofenac treated birds. Histopathology of the renal and hepatic tissues showed different degrees of degeneration like pyknosis, apoptosis and necrosis by diclofenac treatment as well as meloxicam when compared with vehicle control. Although the hematology parameters were not altered significantly. Therefore, the results of pathophysiology and biochemistry indicate that meloxicam shows less toxicity in comparison to diclofenac at same dose and duration in the experimental model *Gallus domesticus*.

Keywords: Diclofenac, meloxicam, Pathophysiology, Toxicity, Environmental Pollutant, Vulture.

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Book chapter

Intervention of Fungi in Nano-Particle Technology and Applications

Ramesh Raliya, Vinod Saharan, Ramprakash Saran, Kailash Choudhary, Jagadish C. Tarafdar, and Pratim Biswas

Abstract Biosynthesis of nanomaterial is of particular attention for material scientists due to its environmentally benign perspective and durability in a natural medium. Nanoparticles synthesized by using the whole cell, either inside the biological entity (intracellular) or extract/lysate/peptide-template (extracellular) believed to have a wide range of biological application. The chapter focuses primarily on the mechanistic investigation of metal and metal oxide nanoparticle synthesis and their potential applications in the agricultural and biomedical sector. So far fungus is explored more for silver nanoparticle synthesis among all other nanoparticles and their use as an antimicrobial agent either bare nanoparticles or as a synergetic agent with existing counterparts. In addition, fungus-nanotechnology explored for the synthesis of agriculturally important nutrient for native phosphorus mobilization and enhancement in photosynthetic activity.

1 Introduction

Fungi, belongs to the group of eukaryotic organism, have been extensively used to produce industrial chemical and enzymes for various purposes, notably from food to medicine (Carlile et al. 2001; Prasad et al. 2015). With the advent of modern nanotechnology, researchers have practiced harnessing fungal strains to provide an

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Wildlife Diversity of Desert National Park Jaisalmer (Raj.)

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Abstract

Thar Desert is a unique arid ecosystem and It also called the "The Great Indian Thar Desert" which is situated between 22°30' N to 32°05'N and 68°05' E to 75°45'E. It is a home to many endangered wild species such as Chinkara (*Gazella bennetti*), Great Indian Bustard (*Ardeotis nigriceps*), Spiny tail lizard(*Uromastyx hardwickii*) in Rajasthan. The populations of these fauna have been declining due to an alarming increase of anthropogenic pressure in their habitats over the last few decades.The field survey was conducted December 2008 to September 2012 through road and line transects. During present study,93 plant species of 35 families were observed, out of them 72 plant species were found in Sudasari, 68 species in Khuri and 84 species in Kanoi study site. Likewise,141 animal species were observed, out of which 56 were invertebrates and 85 were vertebrates. Among 56 invertebrates 2 nematodes, 51 arthropods and 3 molluscs and out of 85 vertebrates, 1 amphibian, 16 reptilians, 55 birds and 13 mammals were recorded. But due to loss of habitats, increasing population of human and livestock in their habitats consequently the wild fauna have being declined harshly.

Keywords: Deseart National Park, Fauna, Flora and Wildlife.

Introducation

Wildlife is gift of nature. It fulfills different types of our needs. In past few years, there has been a tremendous increase in human population as well as domestic animal population. Increased population of domestic

Occurrence of Albino *Gazella bennetti* in Viratra mata Oran (Sacred land) of Chohtan, Barmer (Thar Desert of Rajasthan) India

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Abstract— *The study carried out at the Viratra mata oran, Dhok (Chohtan) village of the Barmer district and this study is completely based on the observation and interview of the local people for occurrence of albino Indian Gazelle locally called Chinkara at the study site. The Indian Gazelle is considered an endangered species by the International Union for Conservation of Nature (IUCN). In this Paper we describe the occurrence of Albino Indian Gazelle in this region (Viratra mata oran, Dhok village of the Barmer district). This area is located west site of the Barmer near by the Pakistan border. General eco-behavior of this animal is noted which are similar to the normal Indian Gazelle.*

Keywords*— *Albino, Chinkara, Gazella bennetti, Oran, Threats.

I. INTRODUCTION

The Indian Gazelle or commonly known as Chinkara belongs to family Bovidae, order Cetartiodactyla of Mammalia class. Indian *Gazelles* are characterized by yellowish pale white marking and red colored fur on ventral side. Facial markings of the *Gazelles* are well developed with dark brown and black fore head. They have light face covering by dark stripes at both side of the head and a nose spot. Fur color of *Gazelles* varies seasonally. Indian *Gazelles* are a dark grayish sandy color in the winter. The fur is darker brown in the summer.

Horns of the Indian *Gazelle* are straight with prominent rings and tips that are slightly out-curved. Males and females both have horns although they are relatively shorter in females. Female's horns are usually half of the length of male and thinner in width in comparison to male horns and have less prominent rings.

Generally Indian *Gazelle* reach 0.9 to 1.2 meter in length and 0.6 to 0.8 meter in height. Fully grown Indian *Gazelle* weight 20 to 25 kg. Comparatively Females tend to weigh less than males and it can be as much as 10 cm shorter in height. (Groves, 1997, Jerdon, 1874).

Indian *Gazelles* are polygamous and have polygynandrous system for mating. They feed by grazing mostly in desert plants, grasses, crops, legumes and fruits. Crotolaria berbia (Bui), *Ziziphus nummularia* (Ber), *Prosopis cineraria* (Khejri), *Tecomella undulata* (Rohida) and *Lasiurus scindicus* (Sevan) are common grazing preference plant in desert for chinkara.

Like an other wild animal, Indian *Gazelles* have a close relationship with humans as part of biodiversity, as objects of beauty as past and wonder, as food and good indicator of environmental health. In present scenario due to increase in the human population, human beings change their mode and method of farming for fulfills of food requirements and *Gazelles* enters in their farms for grazing and some time killed by villagers. For increase the productivity of crop farmers use various types of chemical fertilizers, they spread poisonous and dangerous pesticides on crops for save crops from pests. All these chemical substances are affecting the life of wild animals, insects as well as birds in different manner that's why these are the major threats to animals. Anthropogenic pressure, habitat destruction, electrocutions, accidents and natural predators like feral dogs (*Canis lupus*), Jackals (*Canis aureus*), Wolves (*Canis lupus pallipes*) and human are major threats to biodiversity and wild life (*Homo sapiens*) (Rajpurohit and Chena Ram, 2011).

II. MATERIAL AND METHODS

Barmer is the part of the Great Indian Desert and situated in western part of the Rajasthan. The Viratra mata oran, Dhok village has 1839 hectares area and located between altitude 234 m. Latitude 25° 27' to 48.2N and longitude 71° 01' to 34.4E. This area is covered by sand dunes and hills.

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Significant role of Common Property Resources Utilization of Biodiversity Conservation in the Thar Desert Rajasthan

G.R. Parihar ,Khagendra Kumar

Abstract— Thar Desert, Rajasthan is the unique part from rest of the country and this dry area contain various fauna and flora most of them are endemic to this region. Biodiversity of this area Conserved by government as well as local inhabitants and ethics people. This desert has various types of common property resources which are rich source of biodiversity. Sustainable utilization of these common property resources plays a very crucial role in conservation of biodiversity. The native people of Thar Desert have very unique system of conservation is the traditional resources management.

Index Terms— Desert, Fauna and Flora, Endemic, Biodiversity, Ethics and Traditional resources.

I. INTRODUCTION

There are two types of property public and individual but there is in Thar Desert third type property is the common property which is Common Property Resources. These common property resources (Jodhha, 1992) play a crucial role in people's survival, economy and conservation of biodiversity in rural areas of the Thar Desert.

A common property resource is a particular social arrangement regulating the preservation, maintenance, and consumption of a common property resources. The use of the term "common property resource" to designate a type of good has been criticized, because common-pool resources are not necessarily governed by common property resources (Agarwal, 2001). Examples of common property resources include Oran, Gaucher, Wasteland, Aagore, Pachore, ponds, pasture, forests, water or the atmosphere.

Sacred grove known as Oran in Thar Desert of Rajasthan are the natural forest patch, worshipped and conserved by indigenous communities on religious grounds. These forest pockets show optimum growth of vegetation relevant to local terrain and climate (Gadi, 2016).

Orans are not well classified and defined in the revenue records they simply fall under "Culturable Waste Land" category. These account for about 9% of the desert area in Rajasthan while the area under an Oran can vary from a few square meters to several hundred hectares (Mukhopadhyay, 2006).

These sacred groves are under the control of temples and managed by the village communities. Many communities established rules (customs) to ensure their protection, these rules vary from grove to grove. Hunting, felling of trees and agricultural practices are usually strictly prohibited in the holy land of the Orans from ancient period (Gadgil and Vartek, 1994; Robbins, 1998). However, native people collect wild fruits, vegetable, gum and green grass and dry wood without cutting of the green trees and shrubs. The people believe that any kind of disturbance will crucially affect the local deities, causing diseases, natural calamities or failure of crops. Many accounts emphasize the threat of divine retribution, and cautionary tales of divine punishment by blinding and paralysis are common (Gadgil and Vartek, 1994). Orans are the very good source of biodiversity. It contain varieties faunas as well as floras.

Gaucher- Defined as gram panchyat controlled grazing lands for live stocks. Gaucher word derived from Gau which mean "cow". So the land which is for cows grazing (Parihar, G.R. and Mehnot, S.M. 2011). In this area livestock of the native people grazing. Any people can give their land for gaucher according to his devotion and capability. He gives it for one year or lifelong for livestock's grazing it's depending on him and he can use this area back for farming in rainy season. In some village native people leave their land alternately for gaucher area. Most of the time they leave their land permanently for gaucher. This traditional system helps in conservation of biodiversity as well as increase the productivity of that land through dung and urine of the livestock and their natural activities. Track from gaucher, oran, and wasteland to home is called "Goo" from which livestock goes and comes back to home in morning and evening when farms have cultivated. Every village has Goo for livestock's ply. Gaucher land is under control of Gram panchyat.

Wastelands- Defined as areas provided with mixture of characteristics with low productivity (Parihar, 1997). Area where no cultivation can be possible like gravelled stony and rugra ecosystem (Parihar, 2013). That area is the good habitat for some reptiles, wild animals and birds. Livestock graze here during rainy season when small grasses crow here in summer it is dry and barrel no as much vegetation for livestock.

Aagore- It is the ponds catchment area (Parihar, 1997). That is full, protected region of the pond. People clean that area during rainy season to collect pure water in large amount in ponds and traditional Tankas.

Ponds- Natural water conservation unit in village (Parihar, 1997).

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Ziziphus Nummularia As A Boon For The Thar Desert Of Rajasthan

G.R. Parihar , Khagendra Kumar

Abstract— In the Thar Desert of Rajasthan due to drought and famine the situations are not favorable for plants and animals. *Ziziphus nummularia* locally called "Bordi" is a drought resistant plant which can grow in extreme temperatures ranging from 44-52 degree Celsius in the month of June and July and less than 15 degree Celsius in the winter. In drought and famine condition it provides food, fodder and fruit for livestock as well as it is a good source of economy for villagers. It is also useful to stop soil erosion in storm. Necessity of water for Ziziphus nummularia is very low so it could be adapted to grow in drought conditions. Most of the Desert fauna depends on it. Ziziphus nummularia is found in Sacred (Oran) and Pasture (Gaucher) land. It plays a significant role to support village socioeconomic level and it is drought and famine resistant plant useful for animal as well as human so conservation of this plant most needed because most of the biodiversity in these areas depends on this plant. The plant has great significance in the peculiar desert habitat and its harsh water scarcity. Each part of the plant has its socioeconomic value and its uses in human welfare are so diverse.

Index Terms— Thar Desert; Drought; Bordi; Fodder, Oran; Live stock.

I. INTRODUCTION

Thar Desert of India is known as the Great Indian Desert, is the seventh largest desert of the world. Thar Desert spread in about 2 lac square kilometer in the India, out of which more than 60% spread in the Rajasthan. It covers 19.84 million hectares area or 51% of the geographical area of Rajasthan. The Thar Desert resulted in one of a unique diversity and has been maintained and replenished over the centuries by the people themselves (Kaul, 1993; Khoshoo, 1994; Rogers and Panwar, 1988; and Sharma et all 2013). The concomitant decline in pasture land and fallow lands along with good diversity are also expected to take place (Prakash 1994).

Flora of the region include *Acacia senegal* (Kumat), *A. nilotica* (Desi Babul), *Salvadora persica* (Khari Jal), *Salvadora oleoides* (Mithi Jal), *Prosopis cineraria* (Khejri), *Tecomella undulata* (Rohida), *Capparis decidua* (Ker), *Calotropis procera* (Aak) and *Ziziphus* (Ber) species.

The entire vegetation are important in this region but *Ziziphus nummularia* (locally called "Bordi") stand greater than other species because of its economic benefits and uses in the fluctuating Thar Desert ecosystem.

Ziziphus nummularia has numerous benefit it provide fodder, food and fruits. The plant has economic and household values as dry woods uses for kitchen fuel and various medicinal uses. Most of the avian and mammalian fauna depends on it. Product of this plants are very good source of economy. So the necessary action conservation plan has to be taken in the Thar desert.

Study area: The study area included three villages namely Bajwa, Rohila and Juna patrasar, District Barmer, Rajasthan, India with an area of 2692 Square kilometers. The life support systems in this region are compelled by bioclimatic and environmental limitations.

Average annual rainfall of the area is 120- 350 mm, extreme pre monsoon temperature ranges between 44 and 52 degree Celsius, high wind speed average annual 10-40 km hour in summers, high evaporation transpiration annual 1600-1200 mm. Soils of the Thar generally sandy to loam and rocky with Magra ecosystem (Parihar, 2013) and have a very poor nutrient status.

Livestock-

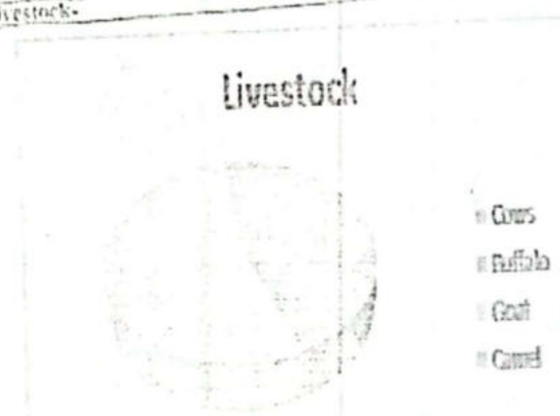

Figure-1 Livestock Population

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Histoenzymological Observations on Acid Phosphatase Activity in the Posterior Intestine of $HGCL_2$–Treated Fish, *Channa striatus*

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ABSTRACT

Present studies incorporate enterotoxic effects of $HgCl_2$ on the relative distribution of acid phosphatase (ACP) activity in the posterior intestine of fish, *Channa striatus*. It was observed that there appears to be slightly increased ACP activity accompanied by histolytic changes in the columnar epithelial cells lining of villi and intestinal glands of the posterior intestine of treated carnivorous fish. However, in control, these changes were invisible.

Key words: ACP, *Channa striatus*, $HgCl_2$

INTRODUCTION

Many workers notably Goel (1975), Chakravorty and Sinha (1982), Imtiyaz and Ashok (2010), Kozaric et al (2011), Kuzir et al (2012) and Tlak et al (2013) have studied the Qualitative distribution of ACP activity in the intestine of fishes and birds. Sastry and Gupta (1978), Sastry and Malik (1979), Gupta and Sastry (1981) and Dalela et al (1982) discussed various effects of heavy metals, toxins and drugs on the distribution of phosphatase in the intestine of fishes. Pollution of aquatic environment is a serious problem that should be taken for higher concern. Aquatic pollution undoubtedly affects fish health and survival. Heavy metals are common pollutants of the aquatic environment. These metals are slow poisoning and slow degradable substances which could have toxic effect for prolonged period. Mercury is one of the heavy metals found in nature. Some amount of mercury present in water enters into the digestive tract of fish through ingestion and food chain and can produce structural and functional disturbances. Interestingly, Mercury and its compounds accumulate in different tissues of aquatic organisms including fish (Dhanekar et al 1987). Mercurial compounds are well known for causing toxic effects in fish.

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Discovery of Trace Fossils from Lower Odania Member of Lathi Formation of Jaisalmer Basin, Akal area, District- Jaisalmer, Western Rajasthan, India

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Abstract: The Lathi Formation is the oldest lithostratigraphic unit unconformably overlying rocks of Malani Igneous suites, Birmania Formation, Marwar Supergroup and Bhadhura Formation and overlain by lower Hamira Member of Jaisalmer Formation of the Jaisalmer Basin. It is well developed mainly in the vicinity of Lathi, Odania, Thaiat and Akal area and divided into two members *viz.* Lower Odania Member and Upper Thaiat Member. The present investigations here documented eight trace fossils namely *Thalassinoides suevicus, Thalassinoides paradoxica, Ophiomorpha nodosa, Ophiomorpha borneensis, Palaeophycus heberti, Palaeophycus tubularis, Gyrocrote* and *Phycodes palmatum* from grayish yellow coarse to medium grained calcareous sandstone of Lower Odania Member of Lathi Formation of Jaisalmer Basin in Akal area. The trace fossils bearing Akal section is located about 18km south of Jaisalmer city on NH-15. The complete section is about 22m thick comprises glauconitic sandstone at the base, calcareous sandstone, petrified wood bed and ferruginous sandstone with box works and concretionary structures. These trace fossils are well -preserved and abundant in nature in Akal area and ethologically they represents domichnia and fodinichnia. The ichnological and sedimentological investigations suggest near-shore to shallow marine depositional environment of trace fossils bearing calcareous sandstone of Akal area. No age can be assigned on the basis of these trace fossils as they have long range (Precambrian to Recent).

Key words: Trace fossils, Odania Member, Lathi Formation, Jaisalmer Basin and Western Rajasthan

1. Introduction

Jaisalmer Basin is the mainly Mesozoic -Tertiary basin which is floored by Malani igneous suite, Marwar Supergroup, Bhadhura Formation on surface (Pareeek, 1984 and Roy & Jakhar, 2002) and Permo-Triassic Bhuana Formation in sub-surface (Bhandari, 1999 and Roy & Jakhar, 2002). The sediments of the Jaisalmer

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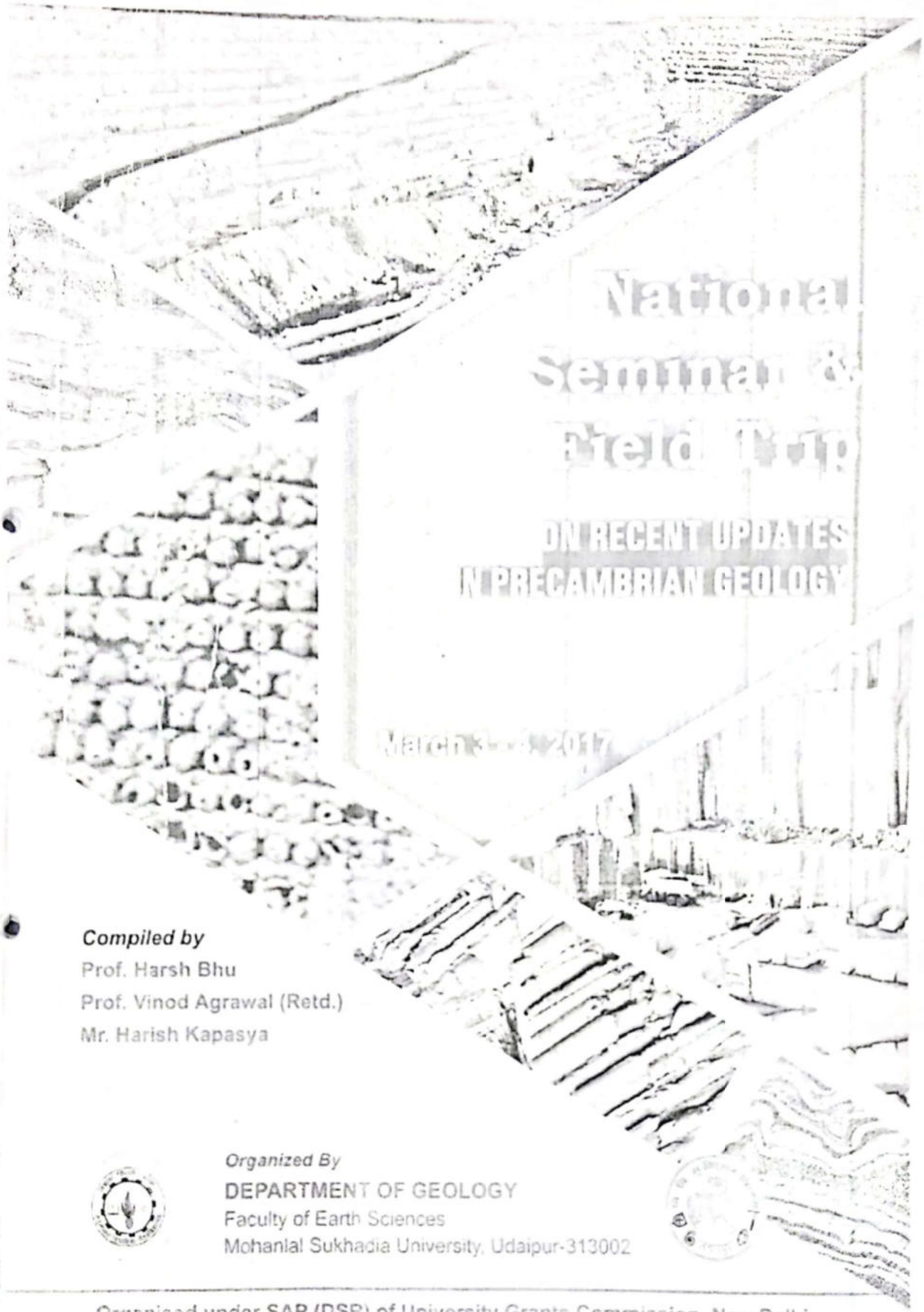

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divergent views have been expressed by different workers. The carbonates of the south Delhi terrane have been differentiated on the basis of the heavy carbon isotope character and represent gap between the deposition because different in palaeoenvironmental conditions. The rocks of Delhi Supergroup from southern terranes of Gogunda-Sirohi section (outcrops in about 80 km width) requires detailed structural, petrologic, metamorphic and isotope studies before assigning alternate tectono-stratigraphic status to the South Delhi rocks.

Key – Paper

THE GLOBAL EDIACARAN EVENT IN THE GEOLOGICAL RECORD OF JODHPUR GROUP OF THE MARWAR SUPERGROUP: ENIGMAS IN GEOLOGY'S PRELUDE TO THE CAMBRIAN EXPLOSION.

Mathur, S. C; Parihar, V.S; Nama, S.L; Soni, A., Hukma Ram; and Mathur Saurabh*
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Up to 2005, the Jodhpur Group of the Marwar Supergroup (MSG) was regarded as unrewardingly unfossiliferous. Till year 2010, the fossils record being isolated, few in number and were dubious (Peters, 1995; Raghav *et al.*, 2005; Sarkar *et al.*, 2005, 2008; Paliwal, 2007; Sarkar, 2008, Kumar and Pandey, 2008, 2009; 2010). The change came with the significant discoveries of Ediacara fauna made by number of researchers from Jodhpur Group (Parihar, et.al., 2011; 2012 and 2015; sharma, 2011; Mathur, 2011; Mathur et al., 2013; Samanta et al., 2011; Kumar et al., 2012; Kumar and Ahmed, 2012; Sarma and Mathur, 2013; Srivastava, 2013; Hughes et al., 2015) along with a field trip to MSG geoscientists of IGCP project 587 in 2014 and their publication (Petricia et al., 2016). These diversified fossil assemblages from Jodhpur Group endorsed that they belongs to the period between 600–543 Ma, known formerly as the Vendian and now officially as the Ediacaran period. This period is characterized by global geochemical, palaeontological, climatic and unique depositional events which set the stage for all subsequent geological history of western Rajasthan specially, Precambrian-Cambrian boundary, infracambrian petroliferous event and global Early Cambrian Radiation event (McCall 2006; Soni, 2014 and Hukma Ram, 2015). Hence, the rocks of MSG in which signature of these significant global events have been preserved which will be very helpful in understanding the Precambrian-Cambrian geological histrory and its economic aspects for the development of western Rajasthan.

The Precambrian-Cambrian rocks belonging to MSG has been subdivided into five groups; in stratigraphic order, these are the Jodhpur Group, Bilara Group, Hanseran Evaporite Group, Nagaur Group and unidentified Upper Carbonate Group (Pareek, 1984; Peters, 1995 and Chauhan et al., 1999). Previously, the Jodhpur Group has been subdivided into the Pokaran Boulder Bed, Sonia Sandstone and Girbhakar Sandstone. Recently, Mathur

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Research Article

DIURNAL AND SEASONAL ACTIVITY PATTERN OF THE BLACKBUCK (*ANTELOPE CERVICAPRA*) IN THE SORSAN GRASSLAND, RAJASTHAN

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Antelope, ecology, foraging, resting, scanning

ABSTRACT

The present paper investigates the diurnal and seasonal activity of blackbuck (*Antelope cervicapra*) in Sorsan grassland, Baran, Rajasthan. Data were gathered for eight days per month starting from early in the morning to late evening. Activity pattern of the selected blackbuck of particular age/sex was recorded by using focal animal sampling method. Observations were conducted on selected adult males, adult females, sub-adult males, sub-adult female and fawn. This study suggests that blackbuck dedicated significantly more time to foraging than to other diurnal activities. Blackbuck of all age classes devoted the least time to standing and spent the similar amount of time moving. Present investigation proposes that there is a definite pattern of activities in the fixed hours of the day which shows variation with the seasons

INTRODUCTION

The blackbuck (*Antelope cervicapra*) is a medium-sized antelope native to the Indian subcontinent. It is considered to be most handsome member of the 'Bovidae' family (Jhala and Isvaran, 2016). Over last hundred years the range and numbers of blackbucks have declined (Jhala, 1992, Meena *et al*, 2017a). The more recent report suggest that numbers are marginally increasing and the population can be reasonably described as secure due to increase in protected areas and better conservation policies in some places(Bashistha *et al*., 2012). Blackbuck is listed in Red Data Book of International Union for Conservation of Nature and Natural Resources as least concern (IUCN, 2017) and in Convention of International Trade for Endangered Species (CITES) of Wild Flora and Fauna is categorized in Appendix III. In India, hunting and poaching of blackbuck are prohibited under Schedule I of the Wildlife Protection Act of 1972 (Meena and Chourasia, 2017a).

Blackbucks are found in wide range of habitat but it attains greatest densities in semi-arid grasslands (Jarman, 1974). Blackbuck requires water regularly, which restricts its distribution, to only those areas where surface water is available almost throughout the year. It is easily adaptable to wastelands, marginal agricultural fields and cultivated areas (Meena *et al*, 2017b). Blackbucks are principally grazers and mainly forage in the small area, but in summer may migrate to long distances for the search of water and food (Jhala *et al*, 1992). Blackbucks have evolved mechanisms for water conservation and when deprived of water, they can increase the concentration of urea in their urine and reabsorb water from their faeces. Strong eyesight and speed are the primary defense features of blackbuck against predators. Blackbucks are mainly active during the day, and for most of the times,they live in small herds (Meena and Chourasia, 2017b). It has imperative ecological roles in the grassland ecosystem. Blackbuck performs various activities during the daytime. The present investigation deals with diurnal,seasonal and annual activity pattern in selected individuals of blackbuck of different age/sex class.

MATERIAL AND METHODS

Study area

Present investigation of a diurnal, seasonal and annual pattern of activities in blackbuck was performed in Sorsan grassland. Sorsan grassland is known for the conservation of blackbuck and chinkara. It is located in Anta tehsil of Baran district of Rajasthan (Figure 1). The protected area spreads between Amalsara and Sorsan village. It stretches over 35 square kilometres between right main canal of the Chambal and the

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First Report on Ecotourism Potential in Sorsan Region of Rajasthan

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ABSTRACT

Ecotourism an emerging concept deals with the conservation of natural resources through socio-economic development of the local communities. The protected areas and reserve forests are located mainly in remote areas where the locals depend on the natural resources for their survival. Development of the ecotourism sites not only leads to economic development, but also social and cultural development. Sorsan is hunting prohibited and protected area located in Anta tehsil of Baran district of Rajasthan and have high potential to be developed as ecotourism site. Ecotourism in Sorsan region will able to create employment opportunities for the local peoples and will improve the quality of living of the participants. Successful ecotourism planning and implementation will bring social empowerment through community involvement, community cohesion, infrastructure improvement and cultural awareness. There is need to devise better and rigorous policies aiming profitable ecotourism in Sorsan which is socio-economically operative, culturally unconventional and environmentally sustainable.

Key words: Community; Conservation; Local; Protected area; Sustainable; Wildlife.

INTRODUCTION

Tourism is one of the world's largest industries. As awareness is increasing, economy is developing, transport facilities is breaking barriers of unreachability and reducing distance, communication is becoming ever more active and as countries of the world are coming close to each other through the rapidly changing to liberalization, privatization and globalization, the tourism industry is growing exponentially (Kunjuraman and Hussin 2016.). Tourism sectors are often regarded as an industry without chimneys as this industry one the least polluting industry. However, tourism has often been opposed by those who are very sensitive to cultural and environmental values. Tourism has been suspected to be an enemy of wild life and environment (Wight 1993). Nevertheless, despite its negative ecological, social, and cultural implications, it is almost impossible to wish away tourism. Tourism is so close to human psyche that we cannot imagine human life without tourism. Of course, its negative implications must be properly addressed and it must be turned into an industry of social, cultural and ecological values. Eco-tourism is perceived as an alternative to the conventional tourism (Bagul and Din 2016).

Ecotourism is a somewhat new concept, and it is still often misunderstood or misused. While the term was first used in the 1980s, the first broadly recognized definition, The (International) Ecolourism Society (TIES) in 1990 which states

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Assessment of threats to blackbuck *Antilope cervicapra* (Linn) in sorsan grassland, Rajasthan, India

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Abstract
The decreasing natural resources lead to conflicts and threats to the wild population. The cause of threat to the population of blackbuck (*Antilope cervicapra*) at Sorsan is due to developmental work and human encroachment of grassland area. Human population pressure and change in the land use pattern has further restricted the habitat of blackbuck. There is competition between blackbuck and cattle stock for grazing and territory. Blackbuck cause heavy damage to the crops and thus come in direct conflict with the inhabitants. Sorsan is very close to the National Highway, many animals meet accident while crossing the road. Illegal hunting and poaching is another threat to the blackbuck population of Sorsan.

Keywords: anthropocentricity, habitat loss, human-wildlife conflict, land use, wildlife collision

1. Introduction
The Blackbuck (*Antilope cervicapra)* is native to India and Nepal and earlier occurred across almost the whole of the Indian subcontinent grasslands. Their distribution decreased during the 20th century and they are now nonexistent in Pakistan and Bangladesh [1]. The blackbuck has been introduced to grasslands of the United States of America (Texas) and Argentina [2].

Although blackbuck have disappeared from numerous areas due to habitat destruction for anthropocentric development, they are increasing in many protected areas and areas specially dominated by Vishnoi communities in Rajasthan, Gujarat and Haryana [3]. Blackbuck is listed in Red Data Book of IUCN (International Union for Conservation of Nature and Natural Resources) as least concern and in CITES (Convention of International Trade for Endangered Species of Wild Flora and Fauna) is categorized in Appendix III. In India, hunting and poaching of blackbuck is prohibited under Schedule I of the Wildlife Protection Act of 1972.

The blackbucks prefer open grassland, dry thorn scrubland and agricultural margins as their habitat. The daily water requirement restricts its distribution, to the areas where water is available throughout a year [4, 5]. Blackbucks are principally grazers, but browse when lack of grasses in summer season forces a greater dependency on dry leaf litter, flowers and fruits. Blackbuck is a prominent animal of Sorsan grasslands of Baran district, Rajasthan [6]. The villages adjacent to this grassland are Amalsara, Manpura, Sorsan, Niyana and Kuradia. The main occupations of the inhabitants are agriculture and cattle rearing. Being in the command area of Right Main Canal (RMC) of Chambal the region is fertile and well irrigated. The present study has been accomplished to evaluate the effect of various threats which have potential to limit the survival of blackbuck in Sorsan grassland of Baran district of Rajasthan, India.

2. Study Area
Sorsan is known for conservation of blackbuck and other wild life. It is located in Anta tehsil of Baran district of Rajasthan. The protected area spreads between Amalsara and Sorsan village. It stretches over 35 square kilometers between right main canal of the Chambal and the Parvan River. State government in 1984 has banned poaching or hunting of animals in Sorsan region under wild life act 1972. It is 50 km east of Kota (25.00 -25.8^0 N, 76.12- 76.18^0 E) having scrubby, vegetation and numerous small water bodies, which harbor amazing varieties of birds as well as animals.

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Original article

Population monitoring and annual population fluctuation of migratory and resident species of vultures in and around Jodhpur, Rajasthan

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vulture population

ABSTRACT

Vultures are important scavengers that play a vital role in clearing animal carcasses and municipal dumps. In the past decade, a sharp decline has been observed in vulture population. For the present work, Jodhpur district of Thar Desert, India, the natural habitat of resident and migratory species of vultures, was investigated. Intensive surveys of the study area were undertaken from 2007 to 2015 to determine the annual population fluctuations in various vulture species in and around Jodhpur (26°19′N and 73°08′E). The data obtained regarding the population fluctuation of different vultures species in the study area are of great significance. Comparative analysis of data obtained with regard to the population dynamics of the various species of vultures in this region has suggested that there has been a drastic decline in the population of migratory as well as resident vulture species in this region. A comparative study suggests that the population of migratory species has reached very low relative abundance in 2015 as compared to 2007. *Neophron percnopterus* has the highest and *Gyps bengalensis* has the lowest population during the entire 9-year study. The finding suggests that the reason for this population fluctuation is climate change as well as change in temperature fluctuation over a period of time, particularly during the breeding season.

Introduction

Vultures are one of the most important scavengers as they provide an important ecosystem service by disposing of waste carrion from dead cattle. Owing to a lot of variation in geographical and environmental gradient, India has nine species of vultures in the wild (Ali and Repley 1987), of which four species—*Gyps bengalensis*, *Gyps indicus*, *Sercogyps calvus*, and *Gyps tenuirostris*—are listed as critically endangered in the International Union for Conservation of Nature Red Data Book (IUCN 2016). There has been a drastic decline in vulture population in the Indian subcontinent over the past two decades (Rahmani 1998; Prakash 1999; Prakash and Rahmani 1999; Virani et al 2001; Prakash et al 2003; Chhangani 2005; Gilbert et al 2006). Thar Desert, one of the smallest deserts in the world, lies between 25° and 30°N (latitude) and 69.5° to 76°E (longitude) (Rahmani 1997). Jodhpur, the part of Thar Desert situated at 26°19′N latitude and 73°8′S longitude, has the dry and hot climate conditions of the desert, exhibiting xerophytes vegetation, which is favorable for nest building among resident species such as Egyptian vulture, long billed vulture, and white backed vulture (Chhangani 2002).

Eurasian griffon, Himalayan griffon, and cinereous vultures migrate here at Jodhpur to avoid adverse conditions at their native places. The population explosion in Jodhpur has generated several new challenges in terms of habitats and food availability, affecting the eco-status of vulture species in Jodhpur (i.e., Keru, Badli, and Arna Jharna). A dramatic fall in their population has created serious challenges, in particular, carcass disposal and the consequent rapid increase in the canine population. Compounding the issue, vulture populations on the Indian subcontinent have undergone dramatic (>95%) declines and carcasses that would normally be consumed by vultures now supplement dog diets (Markandya et al 2008; Prakash et al 2003).

Monitoring vulture population size is often a strenuous task as most species are territorial and widely distributed over a sizable area (Fuller and Mosher 1981). Different species of vultures show local seasonal fluctuations, and their number and activity may vary throughout the day or within a season (Newton 1979). Vultures are large gregarious species that breed colonially in cliffs, forming large

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Population Characteristics, Habitat Availability, Forage Preferences and Threats to the Blackbuck *Antilope cervicapra* (Linn) in the Sorsan Region of Baran, Rajasthan

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Abstract: Sorsan is hunting prohibited and protected area located in Anta tehsil of Baran district of Rajasthan. It is ideal habitat for blackbuck. The presence of blackbuck in region indicates the good health of an ecosystem. Due to increased urbanization, rising human population and eco-transformations had enhanced great pressure on the population of black buck. The land use pattern variations over past few decades have alarmingly altered the environment for all the inhabitants. Human-wildlife conflict is one of the major threats to the survival of many wildlife species. The present study deals with the population characteristics, habitat, forage preference and major risk factor limiting the population of Blackbuck (*Antelope cervicapra*) in study area. The research suggest that conservation plans should include local people with an ample flow of benefits to them united with active management initiatives from the forest departments including management of habitats outside protected areas and allowing animal movement across regions by maintaining functional corridors.

Key words: Antelope · Behavior · Blackbuck · Conservation · Habitat Fragmentation · Sorsan

INTRODUCTION

Blackbuck (*Antelope cervicapra*) is a graceful, gazelle-like animal, considered as the most handsome member of the 'Bovidae' family. It is endemic to the South Asian sub-continent where it is the only representative of the genus 'Antelope' and was once the most abundant wild animals of this region. Previously blackbuck population distributed through the whole of the Indian subcontinent but during 20th century its population declined abruptly and they are now almost extinct in Bangladesh, Nepal and Pakistan. Attempts of their restoration have been taken in Pakistan and Nepal [1].

Over last hundred years the range and numbers of blackbucks have declined. More recent report suggest that, numbers is marginally increasing and the population can be reasonably described as secure due to increase in protected areas and better conservation policies in some places. However, Blackbuck habitat is continuously decreasing due to increase in human population, increasing numbers of domestic livestock and agro-economic development. The habitat available is decreasing and the species is projected to be close to meeting the 30% decline figure over ten years that would be suitable for Vulnerable under criterion A3c. The IUCN Red list has listed this animal in "Near threatened" category [2, 3].

The systematic position of blackbuck is:

Kingdom: Animalia
Phylum: Chordata
Sub-phylum: Vertebrata
Class: Mammalia
Subclass: Theria
Infraclass: Eutheria
Order: Artiodactyla
Family: Bovidae
Subfamily: Antelopinae
Genus: Antelope
Species: *Antelope cervicapra*

Sub species or geographic races include [4]:

- *Antilope cervicapra cervicapra*
- *Antilope cervicapra rajputanae*
- *Antilope cervicapra centralis*
- *Antilope cervicapra rupicapra*

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Agriculture crop damage by antelope (*Boselaphus tragocamelus*) and management strategies: Challenges in India

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Abstract
In India, problems associated with locally overabundant wildlife species have emerged as important management issues for reason of some species losing their natural habitat and adapting themselves to the man-altered situation. Crop-raiding by locally overabundant populations of nilgai antelopes (*Boselaphus tragocamelus*) has been widely reported in many parts of the country. Due to prolonged breeding activity and lacks of potential predators, numbers of nilgai have increased considerably and become locally overabundant in the states of Gujarat, Uttar Pradesh, Haryana, Punjab, Rajasthan, Madhya Pradesh and Delhi. The extent of human-nilgai conflict varied from place to place within these states. Nilgai were found to be capable of causing extensive damage to most agricultural crops. Damage to wheat (*Triticum aestivum*), gram (*Cicer arietinum*) and mustard (*Brassica campestris*) crops was caused not only by foraging but also through trampling, resting in field and daily movement of the animals. In low density nilgai areas, losses to wheat, gram and moong (*Phaseolus mungo*) crops were 20-30%, 40-55% and 40- 45%, respectively. Damage to guar (*Cyamopsis tetragonoloba*) and cotton (*Gossypium arboretum*) was 20-35% and 25-40%, respectively. Whereas in high density nilgai areas, damage to wheat, gram and moong was 35-60%, 50-70% and 45-60%, respectively. Mustard was seldom eaten by nilgai but it was damaged by trampling. There were also increased incidences of road mishaps (7-12 cases/state/year) due to vehicular collisions. Though people considered nilgai as a sacred animal, conflict between nilgai and farmers is on the increase, and which is adversely affecting the conservation ideals. Options for damage control and managing nilgai populations are available but each of them has their advantages and limitations. Possible management strategies to reduce crop damage are suggested.

Keywords: *boselaphus tragocamelus*, agricultural crops, damage, road mishaps, mitigation strategies

Introduction

Agricultural lands close to protected areas (PAs) often face crop raiding by wild herbivores, which can be a serious problem for farmers whose livelihoods depend on agricultural produce [1-4]. In order to avoid economic loss, farmers apply a range of protective measures. They include manual guarding, various types of fences, trenches and other devices [5-13]. However, these measures often come with high associated costs [14] and risks [11, 15-19]. The traditional fences are made using wooden poles and thorny branches lopped from nearby forests causing substantial damage to the forest. Destructive measures such as traps can kill or injure animals. Highly sophisticated means such as electric fences are expensive and need continued maintenance [14, 20]. Although a number of measures have been developed and shown to be effective on an experimental scale, there are reasons why they achieve limited success when employed on a wider spatial scale.

In India, problems associated with locally overabundant wildlife species have emerged as important management issues for reason of some species losing their natural habitat and adapting themselves to the man-altered situation. Crop-raiding by locally overabundant populations of nilgai (*Boselaphus tragocamelus*) has been widely reported in many parts of the country. Although people considered nilgai as a sacred animal, conflict between nilgai and farmers is on the increase, which is adversely affecting the conservation ideals.

In India, after the introduction of the Wildlife Protection Act (1972) and through associated management actions, the populations of many wildlife species have increased considerably, and a few of them have decidedly become locally overabundant. Due to disparate and often incompatible land use practices, these species have become ecological dislocates. Those that have been successful in adjusting to the man-altered habitats have thrived, and in many places such species have become serious pests of agricultural crops and are competing for resource utilization with domestic stock [21, 22, 23]. Nilgai, an antelope, is afforded holy and sacred rites by Hindus, and has rapidly grown in numbers outside protected areas. Agricultural crop damage by nilgai has been widely reported from almost all corners of India [25, 26, 27, 28]. Rural societies existing on subsistence agriculture can ill afford to have their crops raided by nilgai. Realizing the seriousness of the problem, poor farmers are now becoming increasingly intolerant to damage to their crops. Some have developed outright hostile attitudes toward the animals. It has now become important that administrators and wildlife managers take the initiative to actively control the wildlife damage to mitigate this problem, which is also in the larger conservation interest. During 2006-2010, extensive survey work was conducted in different states, and information was collected on the occurrence and abundance of nilgai, and on their habitat and crop depredation patterns in the affected areas.

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Sambhar lake: Some physical - chemical features and composition of biological communities

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Abstract
The present paper deals with biological studies of natural salt lakes located in the Rajasthan. There were investigated for first time the halophilic microorganisms (bacteria and archaea) and also phyto- and zooplankton species in relation with physical-chemical parameters as control factors. The chemical composition of all tested stations is marked by the abundant presence of chlorides (sodium, magnesium, potassium) and also some relatively important concentrations of aluminum. The biological diversity was represented by several types of archaea and halophilic bacterial species and some species of cyanobacteria and diatoms. There were also identified ciliates, rotifers and copepods mainly in the samples taken from Sambhar Lake. The results revealed the presence of magnesium and calcium ions and a chloride content that influences the phytoplankton and zooplankton diversity in these saline environments.

Keywords: salt lakes, halophilic archaea, plankton communities, saline ecosystems

1. Introduction

Hypersaline ecosystems are widely distributed habitats including a variety of terrestrial lakes and deep-sea basins with salt concentrations exceeding three times seawater up to saturation [15]. In addition to being hypersaline, these ecosystems are often characterized by other extremes in environmental conditions such as high alkalinity, low oxygen concentration and high UV irradiation [12, 6, 7, 25].

Salt lakes attracted researchers in the last period as a spring of novel microorganisms capable to grow and develop in extreme conditions, namely high ionic strength due to high salt content of water body of such environments. Following this approach, more than 150 species of halophilic archaea distributed in 40 valid published genera were found to populate saline and hypersaline environments [16, 19]. Regarded initially as low diversity areas, saline lakes appear to harbour a rich endemic biological diversity represented by brine shrimp *Artemia salina*, brine fly *Ephydra*, photosynthetic flagellates belonging to the genera *Dunaliella, Asteromonas, Synechococcus* and a lot of prokaryotes either Bacteria or Archaea, which represent the predominant organisms [28]. The biodiversity of saline habitats, typical examples of extreme environments, is determined by several physical-chemical parameters like the chloride content, salinity and iron content, temperature and oxygen solubility, pH value [10, 13, 29]. These parameters act as factors that can control the diversity towards physiological mechanisms [27, 29, 18].

It is difficult to attribute a spectral characteristic of salinity for a salt lake in the absence of generally agreed classification. On the base of their taste, the lakes are divided in fresh water lakes and salt lakes. The salinity of salt lakes may be different. The species richness in salt lakes decreases with the increasing of salinity [29]. Thus, in the range of salinity bellow 50 g L^{-1} there could be found vertebrates, invertebrates, angiosperms, macrophytes, phytoplankton and prokaryotes. Over the salinity of 50 g/l, the vertebrates and angiosperms are not generally able to survive. On the other hand, at a salt content over 120 g L^{-1}, saline waters harbour only some invertebrates like *Dunaliella* sp., sulphate reducing bacteria, cyanobacteria and archaea. At a salinity level between 170-220 g L^{-1}, sulphate reducing bacteria and cyanobacteria cannot not be found, and over 220 g L^{-1} the biodiversity is limited only to *Dunaliella* sp. and archaea [3]. In order to cope with high ionic strength from hypersaline and saline environments, prokaryotes developed two strategies, namely "salt-in" and "compatible solutes" [8, 19, 21]

In the first strategy the salts are accumulated in high concentrations inside cells to equivalate the osmolarity with external environment. The enzymes and proteins present special adaptations i.e. the increasing of acidic amino-acid residues to their surface [14, 9, 10, 11]. The second strategy is based on the synthesis or accumulation in the cell of some organic molecules named compatible solutes in order to face external osmolarity [19].

The present paper presents the biological studies of lakes with natural genesis located in the sambhar, being investigated for the first time the presence of halophilic microorganisms both bacteria and archaea, phytoplankton and zooplankton species in relation with physical-chemical parameters as control factors.

2. Materials and Methods

A. Study Area

Sambhar Lake is situated at an altitude of 360 m AMSL in a relatively obscure habitat some 60 Km west of Jaipur at 26° 52' N – 27° 02' N and 74° 54' E – 75° 14' E just outside prosaically named Salt Lake City – Sambhar. This vast body of glacial saline is somewhat elliptical in shape having its long axis towards east-northeast to west-southwest. The lake basin

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Review

Synthetic and phytocompounds based dipeptidyl peptidase-IV (DPP-IV) inhibitors for therapeutics of diabetes

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INSULIN MIMETIC AND PANCREAS-PROTECTIVE EFFECT OF *TECOMELLA UNDULATA* LEAVES EXTRACT IN DIABETIC RATS

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ABSTRACT

The Great Indian Thar Desert having peculiar kind of flora which are using by local people in amelioration of various ailments and health prospective based on conventional wisdom. This study was assigned to evaluate Insulin mimetic and pancreas-protective efficacy of *Tecomella undulata* leaves extract in diabetic rats. The assigned objectives were evaluated by four experimental groups including treatments of 250mg/kg and 500mg/kg body weight for 28days. The adult albino rats were used for diabetic animal model having weight of 150 to 250gm. The diabetes was induced in overnight fasted animals by a single intraperitoneal injection of 60 mg/kg streptozotocin (STZ). The dose of leave extract of *Ticomella undulata* was administered orally at 250mg/kg and 500 mg/kg body weight of animal model for 28 days. The treatments of leaves extracts were significantly reduced sugar levels in gradual manners by different degrees at 7days, 14 days, 21days and 28 days. Supportive reductions were also shown through treatments in lipid profiles (Total cholesterol, LDL-cholesterol, VLDL – cholesterol and triglyceride). Correspondingly, body and organs weights were significantly altered after completion of experiment. Subsequently, histopathology of pancreas was shown improvements in histo-architectures of diabetic animal models. The pancreatic islet cells were shown normalcy in cellular status by treatments of leave extracts of *Ticomella undulata* as well as nuclear shape and morphology. Whereas, toxicity profile i.e. renal and hepatic function parameters were remained under and around normal ranges. Therefore, it is concluded that leave extract of *Ticomella undulata* possessing potential phytocompounds having insulin mimic and pancreas-protective efficacy.

Ecological Observations of Avian Fauna on Different Trees in the Thar Desert of Rajasthan, India

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The vegetation of the Thar Desert has great economic importance and many of them contribute to varieties of product for human use and also meet out the domestic requirement of birds. Among these, the Khejari (Prosopis cineraria), Ker (Caparis decidua), Jal (Salvadora persica) and Bordi (Zyzipus nummularia) have the vital role for biodiversity and supporting biocological activities of many birds for their survival in this region. The observations reveal that the Khejari has major important role and support a varieties of birds on the tree and in the understory of it. These trees are used for night rest as well as for short rest during the day by birds. Caparis decedua is found to support about five species of birds. This shrub provides shelter to birds as night abode. Salvadora percica support four species of birds. Interestingly its holes of old tree trunk provide nesting to nocturnal bird i.e., spotted owlet (Althene brama). Similarly, Zyzipus nummularia support birds primarily for food and subsidiary for nesting purposes. This also provides shelter to birds from predator attack. In present work, bio-ecological observations related to food, feeding and resting behavior of various birds are discussed and are and presented in tables.

Key words: Birds, Thar Desert, Biodiversity, Predator.

1. INTRODUCTION

The biological activities of almost all the birds species either lower to higher group of birds are closely associated with different plant species or on same in the Thar desert of Rajasthan is an ecological niche had has the important role in ecosystem. These all may not have the symbiotic relationship but have the mutualistic relationship with them. The Thar Desert is fortunate to have attracted the attention of a great deal of naturalist, mammologist, taxonomist, ornithologist, herpetologist and entomologist to work together and constitute a fairly good treatise on desert texa and biodiversity. Wroughton [1] was perhaps the first mammologist who carried out mammal survey of the Kutch and Thar Desert. Whistler [2] undertook comprehensive ornithological survey of the desert zone the then the Jodhpur state. This was followed by more systematic survey by Pecock [3]. Roonwal [4] reported on zoogeography, ecology, biology, physiology and conservation highlighting the fauna of the Great Indian Desert. Rama Rao [5] and Ghosh [6] dealt with the status of Rajasthan fauna. Barnes [7] work our on the nesting behaviour in Rajputana especially covering the desert. Sharma & Vazirani [8] and Prakash [9] reported on food and feeding of reptiles of the Thar Desert. Ahuja [10] reported on grass production under Khejari (*Prosopis cineraria*) in the Indian desert and its role in agro forestry. Singh & Lal [11] documented about Khejari (*P. cineraria*) and Babool (*Acasia arabica*) trees on soil

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HISTOENZYMOLOGICAL OBSERVATIONS ON ACID PHOSPHATASE ACTIVITY IN THE OESOPHAGUS OF $HGCL_2$-TREATED FISH, *LABEO ROHITA*

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ABSTRACT

Present studies incorporate gullet-toxic effects of $HgCl_2$ on the relative distribution of acid phosphatase activity in the oesophagus of fish, *Labeo rohita*. It was observed that there appears to be slightly decreased ACP activity accompanied by histolytic changes in the columnar epithelial cells lining of mucosal villi and glands of the oesophagus of treated herbivorous fish. However, in control, these changes were invisible.

Key words- *Labeo rohita*, ACP, $HGCl_2$

INTRODUCTION

Many workers notably Sastry (1975), Chakravorty and Sinha (1982), Hunt (1983), Arellano and Storch (2001), Song et al (2012) and Magall et al (2013) have studied the qualitative distribution of ACP activity in the oesophagus of fishes. Sastry and Gupta (1978a), Sastry and Gupta (1978b), Sastry and Gupta (1978c), Verma et al (1986), Gill et al (1990) and Zeynab et al (2013) reported various effects of heavy metals such as Cd, Pb, Hg, Cr and chemical compounds on the distributions of phosphatases in the oesophagus of fishes. Oesophagus of *Labeo rohita* is a short narrow tube-like structure. Its numerous lining forms seven prominent longitudinal folds and several smaller folds in between them. Mercuric chloride ($HgCl_2$) a known potent Cirrhosis agent that is commonly found as traces in the polluted water and industrial wastes is known to cause various histo-physiological effects on various biological organs specially gills, kidneys, livers and digestive tracts of fishes. However, Histochemistry of oesophagus of bony fishes and effects of heavy metals and toxins on them have received insufficient attention during the past decades. Present study deals with the

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HISTOENZYMOLOGICAL DEMONSTRATION OF ACID PHOSPHATASE IN THE STOMACH OF $HGCl_2$ - TREATED CARNIVOROUS FISH, *CHANNA STRIATUS*

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ABSTRACT : Present studies incorporate gastro-toxic effects of $HgCl_2$ on the relative distribution of acid phosphatase (ACP) activity in the stomach of carnivorous fish, *Channa striatus*. It was observed that there appears to be highly increased ACP activity accompanied by histolytic changes in the columnar epithelial cells lining of villi and gastric glands of the stomach of $HgCl_2$-treated fish. However, in control, these changes were invisible.

Key words : ACP, $HGCL_2$, *Channa striatus*.

INTRODUCTION

Many workers notably Goel (1975), Sastry (1975), Chakravorty and Sinha (1982), Arellano *et al* (2001) and Kozaric *et al* (2004) have studied the qualitative localization of acid phosphatase activity in the gastro-intestine of fishes. Sastry and Gupta (1978), Sastry and Gupta (1979), Verma *et al* (1980), Pugazhyendan (2009) and Sunita *et al* (2015) reported various effects of toxins, heavy metals and drugs on the distribution of non- specific phosphatases in the gastro- intestine of fishes.

Mercuric chloride ($HgCl_2$) a known potent cirrhosis agent that is commonly found as traces in the polluted water and industrial wastes is known to cause various histo- physiological effects on various vital organs especially gills, liver, kidney and alimentary canal of fishes. Heavy metals are common pollutants of aquatic environment. These metals are slow poisoning and slow degradable substances which could have toxic effect for prolonged period. Mercuric is one of the heavy metals found in nature. Some amount of mercury present in water enters into the digestive tract of fish through ingestion and food chain and can produce structural and functional disturbances.

MATERIALS AND METHODS

The living carnivorous fish, *Channa striatus* (weighing 180 gm approx.) were collected from Balsamand lake, Jodhpur. They were kept in aquarium for about 24 hours before subjecting them to experimental treatment. For determining the effects of $HgCl_2$ on the distribution of acid phosphatase in the stomach of *Channa striatus*, 1 ml of 0.0001% approx. solution of mercuric chloride was injected into the thorax cavity of the fish. After 10 hours the fish was dissected out and the small pieces of stomach were fixed in 10% neutral chilled formalin for 24 hours at 4æ%c. Frozen sections of the stomach were cut 5-10 micron with the help of freezing microtome and were processed for the demonstration of acid phosphatase activity using Gomori's method (1952).

RESULTS AND DISCUSSION

It was observed that ACP activity in the stomach of $HgCl_2$ treated *C. striatus* exibited relatively highly increased as compared to control. In the stomach, $HgCl_2$-induced toxicity resulted in the surface epithelial layer of mucosal villi seemed to erode followed by cytoplasmic extrusion of the contents. Besides, scattered lysosomal acitvity was also noticeable in the submucusa and musculais mucusa. Lumen of the gastric villi showed strong ACP activity as indicated by distribution of large numbers of lysosomsal granules (Figs. 1, 2 and 3). On the other hand, in control experiment, ACP rich lysosomal granules were less concentrated in the brush border epithelial cells of mucosal gastric villi where comparitively mild deposition was found. Goblet glands exhibited mild ACP activity as represented by less concentration of lysosomal granules along their inner borders. Whereas, lumen of the stomach(gastric), villi, submucosa and muscular layers displayed scattered lysosomal activity (Figs. 1a, 2a and 3a). The fuctional signification of acid phosphatase in different parts of the stomach of fishes have been stated by many workers notably Goel (1975), Sastry (1975), Arellano *et al* (2001) and Kozaric *et al*

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LIPID LOWERING AND ANTIOXIDANT EFFECT OF WHEAT WHOLEGRAIN EXTRACT IN HYPERCHOLESTEROLEMIC RABBITS

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ABSTRACT

Objective: The present study was designed to examine the hypocholesterolemic and antioxidant activity of *Triticum aestivum* (Wheat) wholegrain extract in cholesterol fed rabbits. **Methods:** Ethanolic extract of wheat wholegrain was administered to induced hypercholesterolemic rabbits at a dose of 500 mg/kg.b.wt/day. The animals were divided into control, hypercholesterolemic, wheat wholegrain extract- regular and parallel treatment groups for 60 days experimentation. The serum lipid profile, Lipid peroxidation (LPO), antioxidant parameters like Catalase (CAT) and Superoxide dismutase (SOD) were estimated and histopathological study of thoracic aorta was carried out. **Results:** Cholesterol feeding caused a significant increase ($P \leq 0.001$) in serum total cholesterol, low density lipoprotein-cholesterol and triglycerides, when compared with the control group. The changes in the antioxidant parameters were observed as an increase in serum LPO and reduction in CAT and SOD activity in the cholesterol fed rabbits. The serum lipid profile parameters and level of lipid peroxidation was reduced significantly whereas CAT and SOD activity were elevated after the treatment with 70% ethanolic extract of wheat wholegrain. Histopathology of aorta exhibited significant increase in lumen size by reduced cholesterol deposition and regressed atherosclerotic lesions as compared to the hypercholesterolemic group. **Conclusion:** These outcomes recommend that wheat wholegrain extract reduces elevated cholesterol levels thereby controlling atherosclerosis. It has a potent antioxidant activity which may be responsible for its hypolipidemic effect.

KEYWORDS: Wheat wholegrain, atherosclerosis, antioxidant, hypercholesterolemia.

INTRODUCTION

Alterations in the concentration of major lipids like serum total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and triglycerides (TG) give useful information on the lipid metabolism and predisposition of the heart to atherosclerosis and its associated coronary heart diseases.[1] Atherosclerosis is recognized as a multisystemic, diffuse, and chronic inflammatory disorder which involves the vascular, metabolic and immune systems of the body, with various local and systemic manifestations.[2] Lipoprotein oxidation appears to contribute significantly to the pathogenesis of atherosclerotic cardiovascular disease.[3]

Wheat (*Triticum aestivum),* is the world's most consumed cereal grain. Whole wheat grain consists of the pericarp, the seed coat, the endosperm and germ or embryo. Wheat and wheat products contribute substantially towards proteins, vitamins and minerals when consumed as a major component of diet.[4] Phytochemicals are compounds found in plants that have a beneficial effect on health and play active role in the amelioration of disease. Whole wheat provides a rich source of bioactive phytochemicals namely phenolic acids, carotenoids, tocopherols, alkylresorcinols, benzoxazinoids, phytosterols, and lignans.[5] Epidemiological evidences indicate that whole-grain consumption substantially lowers the risk of chronic diseases such as cardiovascular diseases, diabetes and cancer, and plays a role in body weight management and digestive health.[6] It is recommended by various dietary guidelines worldwide to increase wholegrain consumption by replacing refined grains. High fat diet brings about enormous modifications in the antioxidant defence mechanism against the process of lipid peroxidation.[7]

It is well documented that flavonoids and polyphenols are plant derived antioxidants which are known to significantly increase Superoxide dismutase and Catalase activities.[8] The total antioxidant activity of wheat grain extracts and their phenolic acid contents is highly correlated.[9] Owing to the side effects of synthetic medications to treat hyperlipidemia, patients are increasingly using herbal alternatives for preventive and therapeutic purposes. The present investigation was carried out to evaluate the hypocholesterolemic,

EFFECT ON BIOCHEMICAL PARAMETERS AFTER ADMINISTRATION OF DIFFERENT DOSES OF ESTRADIOL IN MALE RATS

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Abstract: In the animal models prepared by us in whom the animals are hypophysectomised and treated with gonadotropin to maintain the spermatogenesis, the estradiol is delivered through sialistic capsules in hypophysectomised animals maintained on exogenous supply of gonadotropin. The present study has been designed to determine the dose specific effects of estradiol on the overall activity of the animal. In order to find out this, different doses of estradiol in sialistic capsules viz 1cm.2cm.4 cm were implanted in the animals. A comparison of biochemical parameters of proteins, cholesterol and sialic acid was done with the controls. Serum as well as tissues such as liver, reproductive organs and accessory organs was used. The results show that 1cm sialistic capsule though had some effect on these parameters but were not significant to have an effect on the overall metabolism of the animal.

Index Terms: Spermatogenesis, Estrogen, Sialistic Capsule.

I. INTRODUCTION

The role played by estrogens in the spermatogenic regulation yet remains unclear, but it has been depicted to suppress the male reproductive functions to a severe extent. [18]Estrogen hormone serves to play a dual role by acting as survival factor as well inhibitory agent by suppressing the gonadotropin production when given in excess.[17] It is widely known that estradiol inhibits spermatogenesis[19] and testosterone production[8]The present study has been designed to determine the dose specific effects of estradiol on the overall activity of the animal. In order to find out this, different doses of estradiol in sialistic capsules viz 1cm.2cm.4 cm were implanted in the intact animals. A comparison of biochemical parameters of proteins, cholesterol and sialic acid was done with the controls. Serum as well as tissues such as liver, reproductive organs and accessory organs were used. In the animal models prepared by us in which the animals are hypophysectomised and treated with gonadotropin to maintain the spermatogenesis, the estradiol is delivered through sialistic capsules in hypophysectomised animals maintained on exogenous supply of gonadotropin.

II. MATERIAL AND METHODS

Male rats in the body weight range of 200-250 gm were procured from the Central Animal House, Rajasthan University, Jaipur and were maintained at the animal house, Zoology department, JNVU. Animals were kept in a well ventilated room, exposing them to 12 hrs light and 12 hrs darkness and were given food pellets at lib. In another experiment, testicular tissue was obtained from hypophysectomised animals. Hypophysectomised animals were treated with 400IUhCG and IIUFSH. In these animals sialistic capsules filled with estrogen were implanted subcutaneously in the abdominal skin.

III. EXPERIMENT DESIGN

3.1The animals were divided into two groups. Each group consisted of 5 animals.

Group I : This group consisted of 5 animals. Intact, male rats in the body weight range of 200-250 gm were treated as controls, whereas the experimental animals were implanted with 1cm,2 cm,& 4 cm long sialistic capsules filled with estradiol. The controls received empty sialistic capsules.

GroupII: Animals in this group were hypophysectomised and were maintained on 400 IU hCG and IU FSH. These animals were then implanted with 1 cm sialistic capsule filled with estrogen. The controls received empty capsules.

CHEMICALS: Estradiol were purchased from Sigma and Pharmacia respectively. Solvents of reagent grades were used. Chemicals for in situ labeling and vital staining were purchased from Organon and Oncor.

3.2SIALISTIC CAPSULES: They were prepared by methods described earlier and implanted.[20]

3.3SERUM BIOCHEMISTRY: Serum protein,cholesterol was estimated by routine methods

Assessment of Success Criteria Index of Restored Drastically Disturb Terrestrial Ecosystem at (Study Site 1) Sanu Mines, Jaisalmer

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Abstract

The study was conducted on restored backfill areas of RSMML (Rajasthan state mines and minerals Ltd) Lignite Mining Department at Sanu, located Jaisalmer district, Rajasthan state. Soil's samples were collected from revegetated backfill areas of Sanu mines. Analysing the parameters of residues from restored both, soil fauna as well as earlier plantation on backfilled areas. Assessing the success, soil sampling and data collection from restored backfilled areas and blending different residues for optimization of quantifiable attributes. These were significantly characterized by basically parameters like the physical and chemical qualities of the restored soil, succession rate of visible floral and faunal diversity. The physical and chemical analysis of backfilled soil are done. Soil fertility was increased by the plantation and due to soil microbial activity. Organic carbon increased greatly. Both old plantation and recent faunal diversity is growing after rehabilitation on backfilled areas, are indication of success. Some micro-macro fauna like ants, beetles, deer, desert fox, nilgai or blue bull were present. After successful restoration, local people were migrated with their cattle's like camel, goat, cows, buffalos and sheep's.

Keywords: restored, parameters, attributes, backfill, rehabilitation.

INTRODUCTION:

RSMML (Rajasthan State Mines and Minerals Limited) in Sanu, is falling under the part of Great Thar desert & located in Jaisalmer district, western part of Rajasthan. It is one of the important and advanced Enterprise of the Government of Rajasthan Sanu mines are tasked with the large and sustainable supply of raw materials (Lignite). Fewer valuable minerals have to be leased back in the mine and the mine outcome is increasing. In Sanu, mining process is totally dry, no liquid waste or sewage will be generated hence no adverse impact on surface water is expected. The low-grade fine is concurrently backfilled in the mined-out pit and levelled. This backfilled area will have plantation activities using woody plants.

Opencast mining destroys natural soil strata and productivity of soil, fauna and flora, contaminated soil, and air in surrounding area (Safaya 1979, Dhar and Thakur 1995). Mining activities increases the waste dumps. These waste dumps and disturbance in soil strata pose adverse condition for soil, microbial activity and plant growth due to their low nutrient condition in soil, low water level, contamination in soil, low organic matter. One method to find out the success criteria of restored disturb mine land are to restore the soil fauna by backfilling and plantation. In the open cast mining, the backfilled material is meant to restore both, the top soil surface and excavated soil of mining operations. The application of backfill in order to change the outline of the mine is vital for viable success. In result of using backfill, it is possible to change the layout of the excavated areas with plantation and seedling methods. Most of the mines restore the land through plantation and seedlings on backfilled.

Thus, it is possible to assess the success of the productivity and regain the soil fauna of a mine by process of backfill and plantation. Setting the criteria for the selection of the best possible methods and materials for future improvement, it is useful to know about their qualities and improvements to evaluate succession rate.

Restoration endpoints:

The restoration endpoints described in terms of community structure of plants and animals as well as secondary growth factors; soil properties (chemical, biological, physical) and soil-plant regulation processes (National Research Council, 1992). This type of restoration is rare in desert mining areas. In Sanu mines, earlier restored area has led to practice of having reference restoration provide the basis for both developing revegetation on backfilled areas methodology and evaluating the progress of success criteria (Society for Ecological Restoration, 2004). In

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भारत और विदेशों में कोविड–19 के बाद समाज का भविष्य

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कोविड–19 कोरोना वायरस के कारण होने वाली संक्रामक बीमारी है। WHO ने कोराना वायरस से फैलने वाली कोविड–19 बीमारी को वैश्विक महामारी घोषित किया है। वायरस को आगे प्रसारित होने से रोकने के लिए वैश्विक स्तर पर सामूहिक प्रयास की आवश्यकता है। पहले विश्व में, 2009 मे H1N1 फ्लू नाम की महामारी थी। 31 दिसंबर 2019 को चीन के वुहान शहर में फैले अज्ञात कारण से निमोनिया के बारे में चीन ने WHO को सूचना दी। इस वायरस को SARS-COVI-2 के रूप मे भी जाना जाता है। मुख्य रूप से इसका संचरण संक्रमित व्यक्ति के श्वसन के समय खांसी या जुखाम के समय श्वसन बूंदों के माध्यम से संक्रमित सतह को छूकर व्यक्ति स्वयं के मुँह, आँख या नाक के हाथ लगाता है तो ये वायरस श्लेष्म झिल्ली में प्रवेश कर जाता है। केन्द्र सरकार ने सार्वजनिक रूप से सामाजिक दूरी बनाए रखने के लिए सख्त दिशा निर्देशों की घोषणा की। हम सभी विश्व को कोराना वायरस संक्रमण से मुक्त होने के बाद वापस पूरे विश्व को स्वस्थ देखना चाह रहे हैं। इसके लिए हम सब लोगों को जागरूक होने की जरूरत है। इस वायरस के बाद लोगो की जिन्दगी में नए समायोजनों द्वारा बदलाव होंगे। इन परिवर्तनों से लोग जल्दी से स्वस्थ होंगे। आशा है कि जल्दी से इस संकट से उभरेंगे तथा अब लोगों के बीच भौतिक दूरी और मुँह व नाक ढकने के लिए मास्क जरूरी हो गया है, जिससे कोरोना वायरस का संक्रमण स्टेज–3 में जाने से रोका जा सके।

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SOME OBSERVATIONS ON THE ACID PHOSPHATASE ACTIVITY IN THE JUXTAGLOMERULAR CELLS AND GLOMERULUS OF THE KIDNEY OF FRESHWATER TELEOST, *CHANNA PUNCTATUS* IN RESPONSE TO LEAD NITRATE

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ABSTRACT : The present studies incorporate nephrotoxic effects of lead nitrate on the distribution of acid phosphatase (ACP) activity in the juxtaglomerular cells (JGC) and glomerulus (GL) of the kidney of a fish, *Channa punctatus* (Bloch). Exposure of lead nitrate to fish showed decreased ACP activity in juxtaglomerular cells and glomerulus in comparison to control.

Key words : *Channa punctatus*, lead nitrate, acid phosphatase (ACP).

INTRODUCTION

The present scenario of aquatic ecosystem is very well known by everyone. The water is contaminated by various effluents released by the industries and due to which the whole ecosystem get disturbed. Heavy metal accumulated into the body of fish and creates metabolic changes and also affects the synthesis of enzymes (Fernandes *et al*, 2016). A LC_{50} test had been conducted on fish *Catla catla* and it is concluded that increasing concentration with decrease the exposure time of lead nitrate increases the toxicity. Findings also indicate that the mortality of fishes was dose and time dependent and the accumulation and magnification lead to death (Mohanambal and Puvaneswari, 2013).

A study had been done on *Labeo rohita* in which it is clearly distinguishable that after the exposure of heavy metal the level of acid phosphatase got decreased in the kidney and this may be due to the covering of active sites of enzyme by the metal ions or may be the toxic effect produced by metals ions to the cell producing enzyme (Mir *et al*, 2016). An increase in the level of acid phosphatase in the kidney and liver had been seen in the study carried out on *Gambusia affinis* and it is suggested that it may be due to the chlorpyrifos interrupt the chemical composition of cell in the fishes, which damages the lysosomal membrane due to which all acid content comes out of the lysosome into the cytosol which increased the level of acid phosphatase (Khan and Sharma, 2012; Sharma *et al*, 2016).

In an another study on *Channa punctatus*, it was observed that exposing the fishes to the sub-lethal dose of the lead nitrate the toxicant affects on higher level at kidney and at lower level to the liver (Manikandan *et al*, 2016). The activity of acid phosphatase was decreased in the kidney in the fishes like *Cirrhinus mrigala* and *Oreochromis mossambicus* due to the heavy metal exposures and it is due to the damages occurred in the cell membranes due to these heavy metals (Sepperumal and Saminathan, 2014 and Vasanthraja *et al*, 2014). A significant alteration had been found in the haematological parameters of fish *Channa punctatus*. The lead nitrate concentration affects the total count of erythrocytes and it is also time dependent (Dutta *et al*, 2015).

A study on *Clarias batrachus* treated with lead nitrate shows the histopathological changes like Hypertrophy, degeneration of lamellar epithelium (Khan *et al*, 2011). According to the Mary *et al* (2014), it is observed that after the exposure of lead nitrate the level of acid phosphatase and other enzymes got increased in the gill, muscle and liver and this may be due to the liver damage or arrested bone growth. After exposing the fish *Channa punctatus* to the butachlor it is observed that it accumulates majorly into the liver and then in kidney. It is also concluded that the residues deposited into the tissues results in bioaccumulation through the food chain (Tilak *et al*, 2007). A study on *Mystus cavasius* shows the effect of lead nitrate on kidney that there is slight increase in kidney glycogen after exposure in all concentration dose and this is due the disruption of

Sustainable rural development and biodiversity conservation through ecotourism in Thar region, India

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Abstract

Ecotourism is the most dynamic forms of tourism now-a-days because it offers a plenty of advantages to both tourists and host communities. Rural areas of Thar region are rich in ecological and rural diversity. For a long time in the survival, rural communities have their faith on the abundance of natural resources present in their area. But in recent years, there is a drastically change in the technology which have brought an intense revolution in the field of agriculture that is leading a better lifestyle for rural communities. Thar region basically comes under arid region where rainfall is less. Rural communities cannot depend upon only agriculture for their daily basic needs. Ecotourism is now a basic need for rural communities to earn money for living besides agriculture. This process includes a set of particularities of nature followed from tourist action, specify in its complication and interacting with the environment and other divisions of the economy, the scale and variety of social affairs which they generate, on the one hand, and the features of sustainable development, in common, on the other hand. The purpose is to examine the existing relationship between rural tourism and ecotourism, among the need for sustainable development and the need to preserve the local ethnicities, and to witness if such equilibrium is possible between these two terms.

Keywords: Ecotourism, Rural Development, Communities, Conservation

Introduction

Ecotourism is an important economic activity in the Thar region of Rajasthan. Ecotourism has a great potential and it full tills several major objectives, such as sustainable rural development, economic growth, employment and economic and social unity. The strategic method is to create the surroundings and provide the basis for sustainable and high-quality ecotourism. (Vaishnav V, 2018)

Sustainable ecotourism development meets the needs of tourists and host regions, defending and expanding the possibilities for the future. Ecotourism can bring both advantages and disadvantages in the rural area. It can encourage the development of other economic activities such as farming, local production of food and crafts, and help increase revenue. Ecotourism has a significant role in the economic growth of those areas or regions as touristic attractions. Ecotourism and Rural tourism have a lot of things in common. Both of them deals with the sustainable development of rural areas. Ecotourism is a prospective of tourism where the main motive of the tourists is to observe and appreciate the nature and local traditions related to the nature and must meet the following conditions:

- preserving and protecting nature;
- use local human resources;
- educational character, respect for nature - awareness of tourists and local communities;
- minimum negative impact on the natural environment and socio-cultural (established definition of World Tourism Organisation)

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Aspidella: the Ediacaran body fossil from the Jodhpur Sandstone of the Marwar Supergroup, Sursagar area, Jodhpur, western Rajasthan, India

Aspidella: *un fósil del cuerpo blando ediacárico de la Arenisca de Jodhpur (Supergrupo de Marwar), área de Sursagar, Jodhpur, Rajasthan occidental, India*

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ABSTRACT

This paper describes well-preserved *Aspidella* remains, the Ediacaran body fossils from the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India. They show distinct morphological features previously described in other famous Ediacaran fossil sites, such as the Fermuse Formation of Newfoundland, South Australia and White Sea of Russia

Keywords: Aspidella; Jodhpur Sandstone; Ediacaran; Rajasthan; India.

RESUMEN

Se describen en este trabajo los restos bien conservados de *Aspidella*, fósiles de cuerpo blando ediacáricos de la Arenisca de Jodhpur (Supergrupo de Marwar) el área de Sursagar, Jodhpur, al oeste de Rajasthan, India. Éstos muestran características morfológicas características descritas anteriormente en otros famosos yacimientos fósiles ediacáricos, como los de la Formación de Fermuse (Terranova), Australia meridional y el Mar Blanco de Rusia.

Palabras clave: *Aspidella*; Arenisca de Jodhpur; Ediacárico; Rajasthan; India.

Introduction

The present paper describes well-preserved *Aspidella* remains, the Ediacaran body fossils from the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India. The Jodhpur Sandstone is the basal and significant group of the Marwar Supergroup (MSG).

Results

The Marwar Supergroup was earlier described as Trans-Aravalli Vindhyans as it is occurring on the western side of the NE-SW trending Aravalli Mountains, and occupies a large area in the north-western Rajasthan (Pareek, 1984; Chauhan *et al.*, 2004). It is up to 1000 m thick, unmetamorphosed

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Demography, Nesting and Breeding Success of Red Headed Vulture (*Sarcogyps Calvus*) In Thar Desert of Rajasthan, India

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ABSTRACT:

Great Indian Thar desert have favorites habitat for vultures. Red headed Vulture is a solitary vulture mainly feeding on the carcasses of a variety of animal. Repetitive surveys were taken in to accomplish the objective to know the population and breeding habits of the vulture species in Thar Desert of Rajasthan. With its striking, simple, red head and jet-black body, the red-headed vulture is distinctive among vulture species. Present study suggests marked increase in population of red headed vulture in study area. During the present investigation, nests were seen mostly on the canopy of *Prosopis cineraria* (Khejri) trees. The breeding success is evaluated 75%, thus there is positive hope for increase in the population of this critically endangered species, although continuous conservation efforts are demanded.

KEYWORDS: Red headed Vulture, Thar Desert, Nesting.

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Science, Technology and Development

Study on physico – chemical properties and its impact on aquatic bodies in Sambhar Lake.

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Abstract

The present paper deals with the study of water quality of Sambhar Wetland (Ramsar site no. 464, and IBA site no. IN-RJ-1), Rajasthan. The study was carried out for water quality of samples collected from different sites in the lake periphery as well as in the catchment areas. Samples were collected from different locations of Sambhar Lake for their physico - chemical studies. The standard methods of APHA were used for analysing five samples. The analytical result shows that pH varies from 10.4 - 11 ,Chloride 312 mg/l - 646 mg/l, Sodium 225 mg / l - 530 mg /l, TDS (total dissolved solids) 1201 mg/l-1824 mg/l , Magnesium 2.4 mg/l - 125.4 mg/l, COD (Chemical Oxygen Demand) 42 mg/l -509 mg/l, Nitrate 23 mg/l - 45.38 mg /l, Phosphate 7.1mg/l-16mg/l. The study revealed that the water quality is rich in TDS, Phosphate and Nitrate content which indicates that the Sambhar wetland is eutrophicated and the physico - chemical parameters act as control factors.

Key words: - Wetland, Sambhar lake, Water quality

Introduction

Wetlands are defined as 'lands transitional between terrestrial and aquatic ecosystems where the water table is usually at or near the surface or the land is covered by shallow water. Conservation of wetlands has gained momentum in recent years due to their significant role in ecological and hydrological processes. India with its large geographic spread, diverse climate and terrain harbours diverse types of wetlands. Inventory of wetlands at 1:50,000

Interaction of Desert fox with wild animals and local people

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Abstract

Desert fox is carnivores which is adaptable to hot desertic climate. It is nocturnal and very shy animal. The present study was conducted in Jajiwal Dhora at Jodhpur in Rajasthan on *Interaction of Desert fox with wild animals and local people* from February 2017 to February 2019. The area is surrounded by Vishnoi community and they protect the wild animals, so the population of the wild animals is healthy. Interactions among animals were frequently observed here. Desert fox felt fear from the dog so it ran away from the area immediately. Desert fox didn't feel any type of threat from the Chinkara and Nilgai. It continued daily activities without fear near the Chinkara and Nilgai. The fox took more time in attacking position to find the rodents. Desert fox easily killed the hare. The Porcupine protected itself from the Desert fox by the help of their spines. We saw many times the peacock chased the Desert fox and protected their eggs and chicks. Desert fox and cat both used the same habitat in same time but they didn't share the food. Desert fox ran away after watching the men; however when it was with its pups and chased by the people, at that time it felt insecure and threat to pups so it became aggressive.

Keywords- Desert fox, Interaction, wild animals, Local people

Introduction

Mammalian carnivores belonging to the Canidae family which include foxes, wolves, jackals, coyotes, wild dogs as well as domestic dogs. The carnivorous requires multi use landscape for existence in which human are dominant feature. In this landscape the man and carnivorous co-exist, but competition occurs when they share resources such as prey species or livestock which often results in conflict. (Thirgood et al., 2000; Sillero-Zubiri and Laurenson, 2001). Red fox is an extremely shy species. It is adaptable and opportunistic animal. In many habitats the red fox found closely associated with human settlement in intensive agriculture area (Macdonald and Reynolds 2004a and 2004b).The red fox can run fast up to the speed of 48 km/hr and can jump up to two meters high on fencing or other obstacle. It has good senses of hearing, sight, smell and can swim well (Nowak, 1999). During interaction between fox and coyote, the displacement occrued when one or group of coyote chased fox causing the fox to run away immediately from the area (Eric et al., 2019). Desert Fox (*Vulpes vulpes pusilla*) is a sub species of red fox which is found in Baluchistan, Rawalpindi, Rajputana, Kutch, southern Iran and Iraq (Pocock, 1941). It is the smallest and lightest of all three red foxes in India (Menon, 2003). The populations of Desert fox are decaling due to habitat destruction and sarcoptic

THE MINING ACTIVITIES AND ITS IMPACT ON DIVERSITY AND POPULATION OF VERTEBRATES, AROUND KHEJARLA VILLAGE OF WESTERN RAJASTHAN

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ABSTRACT

The mining is a dangerous anthropogenic action. It is harmfull for biodiversity and destroys its natural habitat. Over the most recent couple of years, the mining rate has expanded a few times. Its result is loss of biodiversity and physiographic deformation in the disturbed areas. This investigation was carried out at mining site close to Khejarla village with the principle point of surveying the effect of the mining activity on vertebrate fauna around the quarrying zone. The techniques utilized for fauna overview are both direct and indirect strategies. Questionnaire were managed to get satisfactory data of the species found in the surrounding territory. The index method was used to represent the quantity of individual species. The outcomes uncovered that species most plentiful at the study area are the Aves. An aggregate number of thirty-six species from twenty families of avian fauna were reported at the site. Fifteen species from ten families of mammals were recorded at the site. The observed reptile fauna comprises of eight families having ten species at the study site. The examination of fauna in mined and non-mined sites showed that the faunal diversity near the mining site was scanty while the non-mined zone had higher faunal diversity. This can be concluded that the exploited zone of mining site at Khejarla is a troubled site because of mining exercises and transportation due to it biodiversity is decreasing around mined region.

INTRODUCTION

Mining is basically a harmful development activity where nature endures the economical benefits to mankind. Mining activities fundamentally includes deforestation, decimation of natural resources and biodiversity. The mining industry gives a good resource of income. In any case, regardless of these identify monetary advantages, mining exercises had opposed impact on biodiversity. Quarrying is a type of land utilizes and part of the nearby legacy where nonmetallic rocks excavated from land (Ukpong, 2012). Dimensions and squashed stones are the last yield of such industry in which these items are utilized for various purposes for humans (Nartey et al., 2012).

Generally, mining troubles the biodiversity by way of deforestation, degradation of territory and aquatic ecosystems, isolation, soil erosion etc, (Odum, 1971, Gupta and Chauhan, 1994 and Gupta, 2012). Unchecked populace expansion and human-centric causes deprive the living space and annihilation of numerous types of plants and animals (Sharma, 1997). Biodiversity basically alludes to the scope of living species, including invertebrates, vertebrates, plants and even micro-organisms. Mining exercises are considered to make a genuine harm to greenery and fauna by method for demolition of their normal environment. Studies also recommend a less steady dynamics of fauna due to mining because of expanding patchiness (Kareiva, 1987). Generally, both positive and antagonistic communal effects of modern producing technologies have extraordinary results on financial matters, health, security and environment (Anand, 2006). Air contamination by and large and particularly dust from quarry sites are known to be liable of vegetation damage and crop yield lost and therefore turn into a risk to the survival of plants in industrial zones (Iqbal and Shafiq, 2001). The extraction of crude materials from their normal living spaces by mining, boring, significantly influences the regular habitat (Fedra et al., 2005). Quarrying carries the capability of annihilating environments and the species they sustain (Mabogunje, 2008). In the same way as

Changes in herd size and composition of Chinkara (*Gazella bennetti*) population in Desert National Park, Rajasthan, India

B. R. JAIPAL

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Abstract

Chinkara (*Gazella bennetti*) is a gregarious and very shy animal. Indian Gazelle (Chinkara) are distributed throughout the Thar region but healthy populations are seen in Bishnoi and Jat dominated areas. Chinkara populations are lives in group or herd. Two types of herds were observed in Chinkara population. Mixed herd were comprised of adult males, adult females, subadult males, sub-adult females and fawns while all male herd was comprised of all males of different age groups. During the study period, a total 160 herds and 19 solitary animals were observed. A largest size mixed herd was noted in the Sudasari study site during the Monsoon season while smaller size herd was seen in the Kanoi and Khuri study site during the summer season. The size of herd was influenced by seasons, availability of food materials and predators. The study was done at Sudasari, Khuri and Kanoi study sites in Desert National Park. Interviews, questionnaires, direct observation and line transect methods were applied during the study.

Keywords:- Chinkara, Herd size, Season, Desert National park.

Introduction

The Indian gazelle (*Gazelle bennetti*) are distributed in desert, plain, plateau and hilly region up to1500 m from the Arabian peninsula to Iran, the salt range of Pakistan and Indian sub continent (Ellerman and Morrison Scott, 1951; Prater, 1971; Robert, 1977). It is also distributed throughout the Thar Desert but the highest concentration is found in Bishnoi dominated areas. Gazelle exhibits sexual dimorphisms through the size and shape of horns. The male has S-shaped horns with rings while the female has straight and thin spike like horns and almost without rings (Prater, 1980). Chinkara is not only a grazer but also a browser and feeding habits depend on the quantity and quality of food (Jaipal, 2015). During winter Chinkara spend maximum time on feeding activity while in summer it spends maximum time on resting. Feeding activity depends on the availability of food and it varied time to time and season to season. Members of chinkara herd were seen scattered during feeding and more scattered in the summer season. In winter they take rest at the southern side of bushes or in an open place in front of Sunlight while in summer under the bushes (Jaipal, 2010). The group size and group composition are the major element of social organization in the ungulate population (Barrette, 1991). Environment factors, predation risk and reproductive strategies affect the herd

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POPULATION STRUCTURE OF NILGAI (BOSELAPHUS TRAGOCAMELUS) IN THE SEMI ARID REGION OF THE THAR DESERT

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ABSTRACT

The Thar Desert is spread over twelve districts of Rajasthan. It has divided into arid and semi arid region. Study of population structure of Nilgai (*Boselaphus tragocamelus*) was conducted in semi arid region near Jodhpur city by using the line transects and direct count methods. The nilgai adapt in dry and hot environmental condition of desert. Population of nilgai lives in small herd (group). The grouping behaviour minimize the threats and provides the safe environment for survive. Two types herd such as bisexual herd and all male herds were observed in the nilgai population. Bisexual herds were comprised of adult dominant male, recessive males, adult females, calves, sub adult males and sub adult females while all male herds were composed of males of different age groups. Mixed (bisexual) herd size generally varied from 2 to 7 individual in the study area. The sub adult males of mixed groups were discarded by the dominant male of mixed herd. The herd size was influenced by different factors such as human activities, availability of water and food sources. The largest herd size was observed in monsoon while smallest herd size in summer season. Density of nilgai population in study area was 0.54 individuals /sq km. The adult male to adult female sex ratio (1: 1.24) tilted towards the adult female while adult female to sub adult sex ratio (1: 1.16) bent in favour of sub adult. The nilgai is yearlong breeder but maximum calves were observed in monsoon season and natality rate was recorded 0.51 calves / female.

Key words: Nilgai, Herd, Density, Sex ratio, Season

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RESEARCH ARTICLE

Dual Inhibition of DPP-4 and Cholinesterase Enzymes by the Phytoc stituents of the Ethanolic Extract of *Prosopis cineraria* Pods: Therape Implications for the Treatment of Diabetes-associated Neurological pairments

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Abstract: ***Background:*** Insulin resistance causes decreased uptake of glucose which promotes the susceptibility of type 2 associated neurological impairments.

Methods: The study was aimed to evaluate the inhibition potential of the ethanolic extract of *Prosopis cineraria (EPC)* pods against DPP-4 and cholinesterase enzymes by *in-vitro*, *in-vivo* and *in-silico* assessments. The present study consists of *in vivo* studies on a diabetes-induced rat model by HOMA (Homeostasis model assessment) and related parameters, *in vitro* studies through the DPP-4 enzyme assay and cholinesterase assays using Ellman's reaction. The *in-silico* studies were conducted by the molecular docking of Cinerin C with targeted enzymes. The phytochemical characterization of the extrac was demonstrated through LCMS studies. The antioxidant studies on the extract were performed by FRAP and TEAC assays.

Results: The extract showed 64.8% maximum inhibition of DPP-4, 34.91% inhibition of AChE and 74.35% inhibition of BuChE. The antioxidant capacity of the extract was observed to be 847.81±16.25μM Fe^{2+} equivalent in the FRAP assay and 0.40 ± 0.08 mmol/l of Trolox equivalent in the TEAC assay. The *in vivo* study showed competent glycaemic control against significant HOMA IF (1.5), HOMA % β (26.5) and HOMA % S (68.8) as well as pancreatic cell mass proliferation. The *in silico* analysis also revealed positive pharmacophores interactions of Cinerin C with targeted enzyme (DPP4 and cholinesterase).

Conclusion: It can be concluded that the phytoconstituents of *Prosopis cineraria* pod extract can be significantly considered in neuropharmacology to resolve insulin resistance-induced neurological complications as it showed inhibition against DPP-4, AChE and BuChE target enzymes.

Keywords: *Prosopis cineraria*, diabetes mellitus, Alzheimer's disease, DPP-4, acetylcholinesterase (AChE), butyrylcholinesterase (BuChE).

1. INTRODUCTION

The occurrence of diabetes mellitus (DM) and Alzheimer's disease (AD) is increasing worldwide [1]. Insulin resistance is considered as the main cause of type 2 diabetes mellitus (T2DM) which causes fluctuations in blood sugar levels and potential complications, such as neurodegeneration and cognitive impairments [2]. The rise in blood levels in diabetic patients can be controlled through commercially available medications, however, complications can persist even after abnormal glucose levels are controlled which makes effective treatment more challenging. A recent study suggested that insulin desensitization in the brain may be one of the causes of neurodegeneration. Numerous reports have identified T2DM as a potential risk factor for the neurodegeneration associated with AD. Previous studies demonstrated that there was a strong

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Anti-Aggregation Property of Allicin by *In Vitro* and Molecular Docking Studies

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ABSTRACT: Amyloidogenesis is the process in which amyloid beta (Aβ) peptide aggregation results in plaque formation in central nervous system (CNS) are associated with many neurological diseases such as Alzheimer's disease. The peptide aggregation initiated from peptide monomers results in formation of dimers, tetramers, fibrils, and protofibrils. The ability of allicin, a lipid-soluble volatile organosulfur biological compound, present in freshly crushed garlic (*Allium sativum* L.) to inhibit fibril formation by the Aβ peptide in vitro was investigated in the present study. Inhibition of fibrillogenesis was measured by a Thioflavin T (ThT) fluorescence assay and visualized by transmission electron microscopy (TEM). The molecular interaction between allicin and Aβ peptide was also demonstrated by in silico studies. The results show that allicin strongly inhibited Aβ fibrils by 97% at 300 μM, compared with control (Aβ only) ($P < .001$). These results were further validated by visual of fibril formation by transmission microscopy and molecular interaction of amyloid peptide with allicin by molecular docking. Aβ forms favourable hydrophobic interaction with Ile32, Met35, Val36, and Val39, and oxygen of allicin forms hydrogen bond with the amino acid residue Lys28. Allicin anti-amyloidogenic property suggests that this naturally occurring compound may have potential to ameliorate and prevent Alzheimer's disease.

KEYWORDS: Alzheimer's disease, allicin, amyloid β, fibrillogenesis, transmission electron microscope, Thioflavin T fluorescence assay, molecular docking

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Introduction

The amyloid plaques deposited extracellularly in central nervous system (CNS) have been identified as one of the major pathological characteristics of Alzheimer's disease (AD).[1] The fundamental element of amyloid plaque revealed the presence of 1-40 and 1-42 amino acid sequences, termed the amyloid beta (Aβ) peptide. In brain, the disturbance between production and clearance of Aβ peptides formed by proteolytic cleavage of amyloid precursor protein (APP) directly correlated with the development of AD.[2,3] The Aβ monomer is an unfolded, unstructured ~4 kD peptide, rich in hydrophobic residues. It has been proposed that the smallest stable form of the Aβ peptide exists as a dimer, trimer, or a tetramer. Furthermore, Aβ fibrillogenesis is a process where Aβ monomers are more susceptible to self-aggregate and form oligomers and fibrils. Amyloid fibrils contain characteristic crossed β sheets which specifically bind to dyes such as Congo red and Thioflavin T (ThT) used in light microscopical staining and spectrophotometric/fluorescence techniques that are often used to analyse these fibrils.

The formation of well-ordered fibrillar aggregates consisting of Aβ plays a significant role in neurodegeneration and is considered one of the main pathogenic factors related to AD. Currently, there is no approved drug to target Aβ fibrillar assemblies. One possible strategy is the use of small molecules that efficiently and specifically inhibit the fibrillogenesis process. Previous studies have reported that some of the natural compounds such as polyphenols, curcumin, rosmarinic acid, tannic acid, catechin, and quercetin inhibit the formation of fibrillar assembly in vitro.[4] Present study evaluated the anti-amyloidogenic potential of allicin measured by ThT assay validated by transmission electron microscopy (TEM) and molecular docking studies.

Materials and Methods

Chemicals/reagents

Allicin ((R, S)-diallyl disulfide-S-oxide) was purchased from Caymen chemical, India. Aβ peptide ($A\beta_{1-42}$) was purchased from Abcam , India. Other chemicals such as cholesterol, uranyl acetate, glycine, sodium hydroxide, ThT were purchased from Sigma-Aldrich (India). All reagents were prepared in Milli-Q water (Millipore, India).

Thioflavin T fluorescence assay

ThT assay was used to quantify amyloid formation, in which the fluorescence intensity remarkably increases with the degree of β-sheet formation.[5] ThT binds specifically to Aβ fibrils and this produces a shift in emission spectrum, the amount of β sheet formed being proportional to the fluorescent signal. Aβ was dissolved in Milli-Q water at a concentration of 11 μM. A mixture of Aβ with or without allicin solution (37.5-300 μM) was then incubated overnight at 37°C with constant rotation. After 24 h, 80 μL of ThT (10 μM) in glycine-NaOH buffer (pH 9.0) was added to each well with 20 μL of the Aβ with or without different concentrations of allicin in 96-well micro titration black

AMELIORATION IN INSULIN RESISTANCE AND β-CELL FUNCTION BY DPP-4 INHIBITION POTENTIAL OF *TRIGONELLA FOENUM* SEED EXTRACT IN TYPE-2 DIABETIC RATS

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ABSTRACT

The current study was aimed to evaluate amelioration in insulin resistance, β-cell function and pancreas protection by DPP-4 inhibition potential of *Trigonella foenum* (TF) seed extract in corticosteroid induced type-2 diabetic rats by *in silico*, *in vitro* and *in vivo* assays. The corticosteroid induced diabetic status of animal model was considered at the HOMA indices, insulin and glucose levels. The *in vitro* assay of DPP-4 inhibition showed up to 60.4±2.8% and activity of DPP-4 in serum was observed to be 39.12±1.3% in *TF* seed extract treated groups. Furthermore, the FTIR spectra interpreted availability of potent functional groups in possessing bioactive compounds. Additionally, HPLC studies confirmed that gallic acid is the leading compound present in *TF* seed extract and shows significant binding energy obtained from -3.6 to -3.7 with DPP-4 residues LYS-71, ASN-74, GLU-91, THR-94, PHE-95, ILE-102, ASN-103, and ASP-104 via hydrophobic bonds. Significant changes were observed in HOMA indices, histopathology and others supportive parameters in treated groups. The study revealed promising results against insulin resistance, β-cell function and protective alterations in pancreas.

Keywords: β-cell function, pancreas protection, HOMA, HbA1C, Insulin resistance, *TF*(TF).

INTRODUCTION

Dietary combinations are formulated from ancient times for therapeutics of various ailments in the Ayurveda, Unani, Chinese and other medical systems of old civilizations[1]. Moreover, some potent drugs such as aspirin, metformin, anti-cancers drugs, digitalis and other leading drugs have been invented from herbal resources[2]. All together less than 1% of higher plants have been pharmacologically evaluated and some of them are having antidiabetic potential[3]. The reported several plants have been used individually or in formulations for treatment of diabetes and its complications. But the major glitches with herbal formulations are the active constituents: not being well defined with their interactive interpretations[4]. Thus, it is absolutely necessary to recognize the active constituents and their molecular interactions which lead to therapeutic effectiveness of the product and correspondingly to standardize the product and explore to mode of action of plants using model systems[1]. Plants have a peculiar plethora of potent bioactive phytocompounds, with a capacity to resolve different metabolic disorders by following free radical scavenging activities and targeting key enzymes inhibitions[5]. In similar context, several studies concluded that most of the antidiabetic bioactive phytocompounds target in individual or multiple manner to key enzymes i.e. dipeptidyl-peptidase-4 (DPP-4), α-glucosidase, α-amylase, lipase, aldose reductase and protein tyrosine phosphatase 1B (PTP1B) and other key catabolic carbohydrate metabolism enzymes for therapeutics of diabetes[6,7]. Recently, several studies have focussed on the inhibition of DPP-4 enzyme for therapeutics of diabetes, which is one of the serine based proteolytic enzyme cleave to GLP-1 and reduced internal insulin secretion[8]. Therefore, the DPP-4 inhibition considered as the main therapeutic target by synthetic and herbal DPP-4 inhibitors. *Trigonella foenum* (TF) seeds are one of oldest Indian food ingredients used in numerous food recipes used in folklore medicines for therapeutics of various ailments[9]. It is also reported that seed of *TF* possesses potent bioactive compounds such as alkaloids, polyphenols, saponins, flavonoids, steroids and others[10]. The current study was made to evaluate effect of DPP-4 inhibition potential of *TF* seed extract on insulin resistance, β-cell function and pancreas protection in corticosteroid induced type-2 diabetic rats.

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Research Article

ANTIATHEROSCLEROTIC AND ANTIOXIDANT POTENTIAL OF PETROLEUM ETHER EXTRACT OF *PROSOPIS CINERARIA* POD IN HYPERCHOLESTEROLEMIC RABBITS

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ABSTRACT

Objective: The present study is done to investigate the anti-atherosclerotic efficacy of petroleum ether extract of *Prosopis cineraria* pod in hypercholesterolemic diet-induced atherosclerosis in rabbits.

Methods: Atherosclerosis was induced in rabbits by feeding normal diet supplemented with oral administration of cholesterol (500 mg/kg body weight/day) which was mixed in coconut oil for 15 days. Rabbits were then administered with petroleum ether extract of *P. cineraria* pod for 45 days (Group III), and another set of the group was treated with standard drug Atorvastatin for 45 days. After the completion of the experimental period, the serum biochemistry and histological analysis of thoracic aorta was done. Along with it lipid peroxidation(LPO) and antioxidant parameters such as catalase (CAT), superoxide dismutase (SOD), and ferric reducing ability of plasma (FRAP) were estimated.

Results: There was a significant increase ($p \leq 0.001$) in serum total cholesterol (TC), low density lipoprtein (LDL) and triglycerides after cholesterol feeding when compared with the control group (Group I). Antioxidant parameters were altered too with an increased serum LPO while the reduction in CAT, SOD, and FRAP was observed. After the administration of the petroleum ether extract, significant reduction in TC, LDL-C, very low-density lipoprotein -C, and triglyceride was observed as compared to high-fat diet control rabbits. Slightly significant reduction in ($p \leq 0.05$) atherosclerotic plaque in the aorta was observed while cardiac LPO was lowered alternatively CAT, SOD, and FRAP levels increased in petroleum ether extract administered rabbits.

Conclusion: The outcomes from this study recommend that *P. cineraria* pod extract has hypocholesterolemic effect thereby controlling atherosclerosis and has potent antioxidant activity which may be responsible for improving the lipid profile.

Keywords: *Prosopis cineraria*, Atherosclerosis, Antioxidant, Hypercholesterolemia.

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INTRODUCTION

Dietary changes have been the basis of numerous metabolic syndromes which plays a pivotal role in the development and progression of atherosclerosis, one of the progressing cardiovascular diseases. Atherosclerosis is characterized by lipid deposition and inflammation in the arterial wall resulting in a narrowing of arteries causing a situation like heart attacks [1]. Atherosclerosis is mainly influenced by hypercholesterolemia and dyslipidemia [2] that are developed through various risk factors, that is, hereditary, lifestyle, diabetes, and high-fat diet consumption accumulation of cholesterol and forming of plaque which ultimately bursts resulting in myocardial infarction [3]. A number of pharmacological agents are available in the market to manage dyslipidemia and atherosclerosis; one such advancement in combating atherosclerosis is the use of HMG-CoA inhibitors which lowers the serum cholesterol. The mostly used HMG-CoA inhibitor is statin available in the market and is widely used [4]. However, its been seen that long-term usage of statins showed adverse effects which majorly includes myalgia, diabetes mellitus, Alzheimer, dementia, and many more [5]. These issues diverted the interest to look for alternatives which are not only reliable effective but also have no adverse effects. These requirements direct focus toward herbal formulations. Studies have demonstrated that some plants and their products exhibit hypolipidemic potential [6].

Plant has been a reservoir of secondary metabolites such as flavonoids, terpenoids, alkaloids, carotenoids, and many more which are considered exceptional antioxidants, therefore, have played a cheif role in therapeutic [7]. *Prosopis cineraria* L. (Fabaceae) has been reported to have pharmacological potential. It is one of the key ingredients of "Panchkutta," one of the important Rajasthani dish. *P. cineraria* commonly called as khejari is a state tree of Rajasthan. Studies have concluded that it is not only a good source of food and fodder but also persist great medicinal value too. Its pod is locally known as Sangri, considered as a dry fruit of desert and a rich source of nutrients. *P. cineraria* plant and its various parts found to be rich in polyphenols, alkaloids, tannins, saponins, and flavonoids. Its bark is used in treating bronchitis, asthma, dysentery, etc., while the smoke of leaves is considered for treating ailments of eye and leaf paste cures boils blisters, and many more [8,9] but its pod have not been explored much on its bioactivities and phytochemical level.

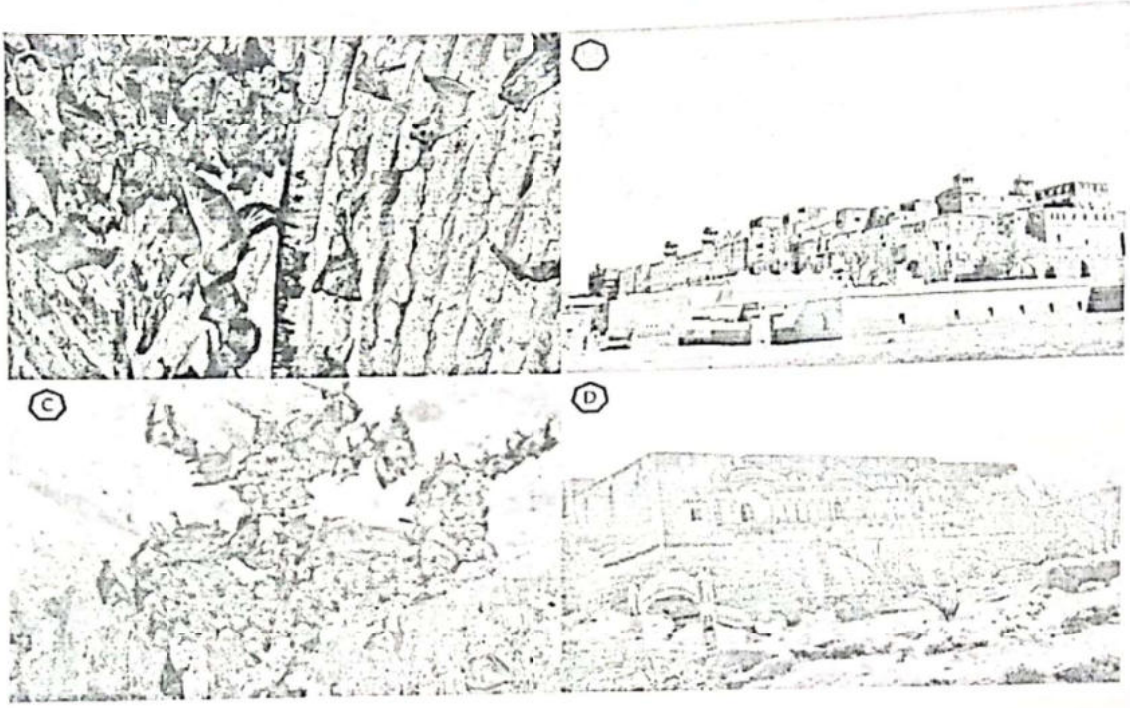
This study aims at investigation its antiatherosclerotic activity and at the same times exploring its antioxidant activities in the petroleum ether extract of *P. cineraria* pod, using high-fat diet-induced atherosclerotic rabbits as a working model. Atherosclerotic plaques in aorta; lumen volume; cardiac lipid peroxidation (LPO); circulating total cholesterol (TC), high-density lipoprotein -cholesterol (HDL-C), low-density lipoprotein -cholesterol (LDL-C), triglycerides (TG), and very low-density lipoprotein -cholesterol (VLDL-C) levels; atherogenic index (AI); and organ (heart, aorta, kidney, and liver) weight were considered as key parameters. Planimetric studies of the aortal wall and histopathological studies of heart, aorta, kidney, and liver were studied as supporting parameters to correlate with altered conditions.

MATERIALS AND METHODS

Preparation of plant extract

The selected plant *P. cineraria* was identified by the experts of Botany Department Jai Narain Vyas University, Jodhpur. The required part of this plant, i.e. pod of *P. cineraria* was procured from the local registered vendor. Pod of *P. cineraria* was dried and ground to powder and later its

Additional records of Greater Short-nosed Fruit Bat *Cynopterus sphinx* from the Thar Desert, India



Short-nosed Fruit Bat roosts: A—Roost at Junagarh | B—Junagarh fort of Bikaner | C—Roost at Mansingh fort | D—Jalore fort. © Rakesh Kumawat.

The Greater Short-nosed Fruit Bat *Cynopterus sphinx* (Vahl, 1797) (Mammalia: Chiroptera: Pteropodidae) is one among the 14 species of old world fruit bats in the Indian subcontinent. It is found in a variety of roosts, tents, under leaves, lumped leaves, stems, cavities of barks, aerial roots and humanmade abandoned structures (Brosset 1962) feeding on more than 30 species of plants. It is listed as Least Concern on the IUCN Red List (Bates et al. 2008). This Fruit Bat has typical taxonomic features as the second finger with a claw, small wingspread (below 600mm), visible tail and four teeth in upper molar series and five in lower (Sinha 1980).

Earlier, the western part of the subcontinent was represented by a few localities as a single record from Malir, Karachi and "Kashmir Smasta" in Pakistan; Danta, Vedtial in Anand and Silvassa in Surat District of Gujarat State; Bundi, Banswara and Jhalawar of Rajasthan State.

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SNAKE DIVERSITY IN GOLDEN TRIANGLE OF THAR DESERT OF RAJASTHAN, INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author RK performed the filed study and wrote the first draft of the manuscript, and Author AP managed the analyses and supervised the study. Both authors read and approved the final manuscript.

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ABSTRACT

The pattern of ecological assemblage in the arid and semi-arid region of the Thar Desert in Rajasthan altering at a high pace after the Indira Gandhi Nahar Pariyojna canal expansion for three decades. About this, this study revises the most favoured, secretive, and environment-sensitive underprivileged taxa (serpents) in the framework of diversity and occurrence in the golden triangle of the Thar Desert of Rajasthan state (Jodhpur, Jaisalmer, and Bikaner). Overall, 22 species and one subspecies were identified in four years of extensive field study based on the active search, night drives, scale counting, and topographical database. This study's finding pointed out the apparent abolition of previously most common snake such as Russell's viper and Indian rock python, Contrast to this, potential colonies of lesser-known Sindh Awl-headed snake, Afro-Asian sand snake, and Red-spotted royal snake has exposed.

Keywords: Occurrence; Snake diversity; Thar desert.

1. INTRODUCTION

Diversity studies in ecology provide better potential for eco-sensitive species like snakes. However, snakes have a significant concern about a global decline in some current research [1, 2]. The snake extinction risk calculation misjudged, other than long-period studies on snake's diversity, richness, density, and demography, involves comprehending this risk [3]. Thus, essential data on life history aspects for understanding the species ecology and comprehensive distribution data for biogeographic studies and conservation assessments are still missing for a considerable proportion of important diverse areas such as the Thar Desert of Rajasthan. Concise, disruptive, and scanty records are available about the occurrence, distribution pattern, and population abundance of snakes from the Thar Desert [4 –9]. Studies suggest district-wise distributions of snakes in this part were not uniformly distributed.

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Impact and assessment of wildlife mortalities on road due to vehicular movements in Desert National Park, Rajasthan, India

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ABSTRACT

To begin to quantify the effects of roadways on wildlife at Desert National Park, Jaisalmer, regular road kills surveys were conducted with the help of forest officials from January 2016 to December 2016. During these surveys, we have documented overall 289 wildlife road mortalities during an average of one-year period. Nevertheless, the number of individual animals observed is only a small fraction of the number killed on roads in and adjacent to the Park. A total of 289 instances of road kill of faunal diversity belonging to 43 species and 27 families were recorded. Among them one species is endangered and 20 are least concern. There was higher mortality among reptiles. It is feared that such a kind of persistence loss can be detrimental to the local reptilian population of DNP.

Key words: Desert National Park, Road kill, Vertebrate.

INTRODUCTION

Road kill is undoubtedly one of the most significant human-caused factors of direct mortality to vertebrate animals in and around significant biodiversity-rich areas, including many protected areas, yet its overall impact remains poorly documented. In the new parts, there is tremendous development in urbanization with vast networks of national and state highways. This has caused de-fragmentation of many terrestrial habitats. Roads have become one of the severe threats to animal and plant diversity (Forman & Alexander, 1998). Through direct mortality on the roads (Ashley & Robinson, 1996), indirect effects such as the modification of adjacent aquatic and terrestrial communities through vehicle exhaust or runoff (Turtle, 2000), barriers for movement (Oxley *et al.*, 1974) or increased predator activities near roads (Ortega & Capen, 1999). Roads contribute to reducing average heterogeneity and genetic polymorphism (Reh & Seitz, 1990).

Roads appear to be barriers in the movement for some Amphibians, Aves and Mammals (Develey & Stouffer, 2001; Goosem, 2001). The current study is dealing with mortality of relatively slow-moving animals with limited dispersal ability, such as reptiles (Rosen & Lowe, 1994). Herpetofauna with less dispersal ability and higher sensitivity to habitat alteration that anurans, birds and mammals may be more sensitivity to the barrier effect of roads and local populations may become isolated and increasingly become susceptible to extinction (Mader, 1984).

In India few studies were carried out to address the issue of wildlife mortality on roads (Vijaykumar *et al.*, 2001; Gokula, 1997; Chhangani, 2004; Baskaran and Boominathan, 2010; Fellows *et al.*, 2015) and several other has studied particularly on herpetofaunal mortality due to vehicular movement on roads (Foster & Humphrey 1995; Groot & Hazebroek, 1996; Trumbulak & Frissell, 2000; Das *et al.*, 2007; Row *et al.*, 2007; Shwiff *et al.*, 2007; Seshadri *et al.*, 2009; Dutta *et al.*, 2018). However, unfortunately, nearly negligible studies were conducted considering western Rajasthan, which is a diversity hub for peculiar fauna (Sharma, 2013). No study on such ecological loss is hitherto known. The present study is an attempt to report road mortalities of faunal species on a highway segment passing along the middle and southern boundary of Desert National Park, Jaisalmer, and Rajasthan.

MATERIAL AND METHODS

Desert National Park (27°2′22″N 70°53′2″E) is situated in the West Indian state of Rajasthan near the town of Jaisalmer. This is one of the largest national parks, covering an area of 3162 km². The study was carried out from January 2016 to December 2016 on transects of approx 305 km, passing to Desert National Park, Jaisalmer, India. The 35 km long road enters into the Sam village and next to Sudasari, Khuhri and Myajlar in Jaisalmer. This road passes through patchy seasonal fields of Millets, Sorghum, Bajra crops in springs, fragmented grasslands, and scattered rocky terrain, stabilised dunes with scrubland and purely barren dunes. All these adjacent wild, arid habitat are animal corridors and frequently used by small mammals like a wild cat, desert fox, Indian fox, Chinkara, Blue bulls during their to and from movement between above habitats.

The animal crossing increases manifold particularly during the rainy season when the annual water bodies actives. The road transect have taken in to study as 1. Kanoi - Jaisalmer, 2. Barna- Jaisalmer, 3. Sam – Sipla, 4. Kanoi – Barna, 5. Barna – Sundra and 6. Myajlar-Jinjinyawali - Jaisalmer in Desert National Park territory. Overall, nine transects have been implemented in one season. Further three transects plotted each in a season to all six routes in a year of study (Figure 1).

We followed the day and night drive method to detect animals on the road. This method is a type of

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Seasonal Incidence of Insect Pests on Mungbean (*Vigna radiata*)in Correlation with Meteorological data

L. Gehlot, A.K. Prajapat

ABSTRACT

Background: Mung bean is important pulse crop in India due to its nutritional value. Its grain contains protein, fat, carbohydrate, vitamin and minerals therefore human uses it in various ways in food. Mung bean crop cultivated in kharif, rabi and summer season in India. Various species of insect pests are infested to mung bean crop and cause very harmful effect to crop and farmer. These pests decrease productivity and quality of mung bean.

Methods: Field experiment was carried out for the study of seasonal incidence of insect pests on RMG-62 variety of green gram during kharif season 2019. Mung bean was grown on a plot size of 25 m × 25m with 50 cm row to row and 20 cm plant to plant spacing. Randomly selected 20 plants from weekly interval to record population of insect pests. The population of jassid and whitefly was recorded by counting number of pests on 2 upper, 2 middle and 2 lower leaves of a plant whereas population of aphid was recorded by counting number of aphid on 10 cm twig/plant.

Result: The mean population of aphid, jassid and whitefly were recorded. Incidence of aphid started during 33th standard week with 0.9 aphid/10cm twig/plant, jassid and whitefly started during 32th standard week with 0.3 jassid/6 leaves/plant and 2.1 whitefly/6 leaves/plant, respectively. Peak mean population of aphid, jassid and whitefly reached during 36th standard week with 10.2 aphid/ 10cm twig/plant, 10.1 jassid/6 leaves/plant and 14.1 whitefly/6 leaves/plant, respectively. Simultaneously six species of insect pests also infested green gram, these were *Mylabris pustulata, Helicoverpa armigera, Trichoplusia ni., Lampides boeticus, Spoladea recurvalis* and *Diaphania indica*. The population of aphid, jassid and whitefly positively correlated with temperature. Population of aphid and whitefly had positive correlation with humidity, whereas jassid population had positive correlation with minimum humidity and negative correlation with maximum and average humidity. All three pests expressed negative correlation with rainfall.

Key words: Aphid, Insect pests, Jassid, Mungbean, Seasonal incidence, Whitefly.

INTRODUCTION

Mungbean or Green gram, *Vigna radiata* is important pulse crop in India after chickpea and pigeon pea (Ved *et al.* 2008). It is used as fresh green pods, dry seeds as vegetables due to presence of protein, vitamin and mineral (Das *et al.* 2014). Mungbean grains contain 24.2% protein, 1.3% fat and 60.4% carbohydrate (Hussain *et al.* 2011). It is also consumed as fresh sprout, seeds used for making soups, bread and biscuits (Sehrawat *et al.* 2013).

Mungbean is an important *kharif* pulse crop grown in the arid and semi-arid regions of India. India is the largest producer and consumer of mungbean, which is grown in 4.26 million hectare with an annual production of 2.01 million tones and yield 472 kg/hectare. More than 80 per cent of mungbean production comes from 10 states of India. These are Rajasthan, Madhya Pradesh, Maharashtra, Bihar, Karnataka, Tamil Nadu, Gujarat Andhra Pradesh, Odisha and Telangana. Rajasthan with 42.23 per cent area and 39 per cent of production is largest mungbean producing state in India during 2017-18. In Rajasthan, mungbean grown in 17.19 lakh hectare area and production is 7.42 lakh tones (Anonymous, 2018).

Mungbean grow easily in Rajasthan because it has ability to drought tolerance, grow in harsh climate and minimum rainfall, rapid growth, early maturation, restore soil fertility by nitrogen fixation and increase soil fertility (Sharar et al. 2001).

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Many insect pests attack mungbean crop causing extremely elevated losses to the crop and its production. Hence insect pests act as a limiting factor in production of mungbean (Panchabhavi and kadam, 1990). Dar *et al.* (2002) reported *Bemisia tabaci, Empoasca kerri, Aphis craccivora and Ophiomyia phaseoli* on mungbean and urdbean of which *Bemisia tabaci* was major pest during summer season. The insect pests noted on mungbean involve jassid (*Empoasca motti*, Pruthi), thrips (*Caliothrips indicus*, Bagnall), whitefly (*Bemisia tabaci*, Genn.), semilooper (*Plusia orichalcea*, Fab.), green bug (*Nezara viridula*, Linn.), stemfly (*Ophiomyia phaseoli*, Tryon.), pod borers (*Helicoverpa armigera*, Hubner and *Maruca testulalis*, Geyer), tortricid moth (*Cydia ptychora*, Meyr), galerucid beetle (*Madurasia obscurella*, Jacoby) and

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Repellent Power of Some Botanicals Against Pulse Beetle, *Callosobruchus* spp.

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In present study leaves of some arid zone plants were used in the form of powders to evaluate their repellent power against the insect pests of stored mung beans, *Callosobruchus* spp. All powders were applied @0.5, 1 and 2 gmper 100 gmseeds of mung beans. The repellent action of plant powders ranged from 19.33% to 83.33% in comparison to the control and their effect were varied in different plant species as well as different doses of same plant species. Maximum number of insects were repelled in the case of *Azadirachta indica* at all three doses. *Eucalyptus globules, Fagoniacritica, Balanitesa egyptiaca, Ocimum sanctum, Commiphora weightii,* and *Barleria* were also found effective against test insect. Minimum number of insects were repelled with *Salvadora* powder @ 0.5gm/100gm seeds in comparison to the control.

Keywords : Plant powder, Botanicals, *Callosobruchus*

INTRODUCTION

Mung beans are one of the important pulse crops of the arid zone of Rajasthan. It is a common food grain of villagers as well. Due to unfavourable environmental conditions in the arid zone, the yield of mung beans is limited. Hence, users of it are storing the mung beans for long duration, which leads to infestation of several microorganisms and stored grain insect pests.To minimize losses during storage, in modern agriculture the insect pests are controlled by the use of chemicals. These chemicals are often associated with problems such as toxic residues, workers' safety, and development of resistant strains and ever increasing cost of purchase. Sometimes due to wrong identification of pests and diseases the farmers do not apply suitable chemical, which in turn create pollution problems. However, the indiscriminate use of chemicals is not only hazardous to living beings but adversely affects the environment.

Synthetic insecticides had been used and being employed to protect stored grains from stored grain insect pests but their indiscriminate use creates serious problems (Sighamony *et. al.*, 1980) like development of resistant strains (Zettler and Cuperus,1990). Synthetic insecticides are noxious to man and livestock and also adversely affects the environment(Deedant,1994). Concern over environment safety and public health, use of botanical pesticides is safe alternative to the synthetic chemical insecticides for the control of insect pests, these are relatively cheap, safe, biodegradable and environment friendly (Adedire and Lajide 1999). Pest control through botanical pesticides has long history and farmers have been used pesticides prepared from seeds of plants (Tripathi and Tripathi, 1999). Plants are rich source of bioactive organic chemicals (Benner,1993) and known to produce diverse range of secondary metabolites such as terpenoids,alkaloids, flavonoids etc., more than 6000 alkaloids, 3000 terpenoids and 1000 flavonoids have already elucidated (Metcalf and Metcalf 1992). Botanicals which are traditionally produced are quit safe and promising in pest control (Rajapakse *et.al.*,1998 ;Rajapakse *et. al.*, 2002). The biopesticidal activity against the stored grain insect pests was also reported by Mishra *et al.* (1994); Lohra *et.al.*, (2000) and Kiradoo and Srivastava (2010). Muhammad and Bashir (2017) concluded in their review article that control of *Callosobruchus maculatus* on stored cowpea can equally be achieved using plant materials hence, synthetic chemicals should be used with caution due to health and environmental hazards.

MATERIAL AND METHODS

(a) Rearing of insects : The laboratory culture of *Callosobruchus* spp. was maintained at the Department of Zoology, J.N.V. University, Jodhpur. The culture was obtained from naturally infested grains from local market. The test insects were reared on clean un-infested grains in Bakelite jars, covered with muslin cloth (to avoid escape of adults) at 28 ± 2°C temperature and 70 ± 5% relative humidity. New generations of the insect pests was obtained from this stock culture by continuously replacing the devoured and infested seeds with fresh un-infested seeds and introduction of male and female adults into the jar.

Lipids in Health and Disease

RESEARCH Open Access

Phytoconstituents of an ethanolic pod extract of *Prosopis cineraria* triggers the inhibition of HMG-CoA reductase and the regression of atherosclerotic plaque in hypercholesterolemic rabbits

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Abstract

Background: The HMG-CoA reductase is key enzyme of cholesterol biosynthesis which potentially contributes in management of hypercholesterolemia. The present study was designed to assess the inhibitory effect of phytoconstituents of an ethanolic extract of *Prosopis cineraria* pods on HMG – CoA reductase and regression potential of atherosclerotic plaque.

Methods: Healthy, adult male, albino rabbits in which hypercholesterolemia was induced by supplying the high fat diet and a supplement of cholesterol powder with coconut oil (500 mg/5 ml/Day/kg body weight) for 15 days, were used as a disease model. Phytochemical analysis of an ethanolic extract *Prosopis cineraria* pods was conducted using LCMS, GCMS and FTIR analysis. Further, in-vitro, in-vivo and *in-silico* assessments were performed.

Results: The in-vitro assessment of HMG -CoA reductase activity indicated a 67.1 and 97.3% inhibition by the extract and a standard drug (Pravastatin), respectively. Additionally, an *in-silico* evaluation was made using appropriate docking software and results also indicated as significant interactions of the identified compounds with the target enzyme. Treatment of rabbits with the ethanolic extract of *P. cineraria* pod resulted in significant ($P \leq 0.001$) reductions in total cholesterol, LDL cholesterol, VLDL cholesterol, and triglyceride. Accordingly, reductions were occurred in atherosclerotic plaque, intima and media of aortal wall along with lumen volume of the aorta significantly increased ($P \leq 0.001$).

Conclusion: It can be illustrating that the ethanolic extract of *Prosopis cineraria* pod contains potent bioactive phytocompounds might be inhibit HMG – CoA reductase and have regression potential of atherosclerotic plaque.

Keywords: HMG-CoA reductase, Hypercholesterolemia, Lipid profile, Antioxidants, *Prosopis cineraria*, Atherosclerosis

Introduction

Appropriate diets and dietary supplements have the potential for use in the management of various metabolic syndromes and their complications [1]. The fast food and/or junk food associated with many developed countries are having a drastic impact on the health of youth, as well as many adults with insufficient exercise. These types of food are typically rich in free fatty acids and contain a large amount of fatty substances, all of which promote diabetes, hypercholesterolemia, cancer, and other metabolic syndromes [2]. In fact, three metabolic syndromes, cardiovascular diseases, diabetes, and cancer are the cause of up to 60–70% of mortality, worldwide [3]. Hypercholesterolemia is an independent risk factor that alone or together with the consumption of unhealthy foods can accelerate the development of atherosclerosis and further resulted in atherosclerotic plaque [4]. An increased generation of intracellular free radicals has also been demonstrated

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Scopoletin: Antiamyloidogenic, Anticholinesterase, and Neuroprotective Potential of a Natural Compound Present in *Argyreia speciosa* Roots by In Vitro and In Silico Study

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ABSTRACT: Alzheimer's disease (AD) is characterized by depositions of amyloid β (Aβ) peptides aggregates resulting in plaques formation in the central nervous system (CNS). This study evaluates the disease-modifying potential of scopoletin against multiple factors associated with AD such as cholinesterase enzymes, Aβ peptides, and neuroprotective properties against Aβ- and H_2O_2-induced cytotoxicity under in vitro conditions. Scopoletin was identified and quantified using UPLC-QTOF (ultra-high performance liquid chromatography-quadrupole time-of-flight) and high-performance liquid chromatography (HPLC), respectively. The antiamyloidogenic potential was evaluated by thioflavin T and congo red binding assay. Inhibition of key enzymes, that is, acetylcholinesterase and butyrylcholinesterase, was investigated by Ellman's assay. UPLC-QTOF analysis showed that most abundant phytoconstituent present in *Argyreia speciosa* hydroalcoholic root extract was scopoletin followed by festuclavine and ergometrine. Scopoletin was further quantified using novel reverse phase (RP)-HPLC method developed in this study. The neuroprotective potential of scopoletin was found to be 69% against Aβ42-induced neurotoxicity and 73% against H_2O_2-induced cytotoxicity in PC12 cell culture at 40 µM final concentration. At the same concentration, scopoletin inhibited Aβ42 fibril formation up to 57%. The IC_{50} concentration for AChE and BuChE enzyme inhibition by scopoletin was 5.34 and 9.11 µM, respectively. The antiaggregation and enzyme inhibition results were complemented with strong molecular interactions of scopoletin with target proteins validated by in silico molecular docking analysis. Based on this study, it can be concluded that scopoletin can be used as a lead for amelioration of symptoms and disease-modifying effects in AD.

KEYWORDS: scopoletin, *Argyreia speciosa*, Alzheimer's disease, amyloid β, neuroprotection, antiamyloidogenic

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Introduction

Alzheimer's disease (AD), a progressive and irreversible neurodegenerative disorder, accounts for more than 80% cases of dementia in elderly people. Worldwide, 47 million patients estimated to be suffering from AD at present, and this number is expected to increase up to more than 130 million by 2050.[1] The present therapies are unlikely to mitigate AD, as they are focused on single specific drug target, that is, cholinesterase inhibitors. Alzheimer's disease is a complex multifactorial etiopathology, which includes depositions of amyloid β (Aβ) protein aggregates in the central nervous system (CNS).[2] These aggregates are formed by mis-cleavage of amyloid precursor protein (APP) that results in sticky insoluble peptide fragments called Aβ fibrils, mostly consisting of oligomers that get deposited extracellularly on cerebrovascular space.[3] Amyloid β fibrils are mainly of 2 types depending on the C-terminal cleavage pattern of APP. Amyloid β 40 is the most prevalent form but Aβ42 is more neurotoxic hydrophobic form of Aβ, as it has faster aggregation kinetics.[4] Amyloid β 42 plaque formation causes neuronal cell damage and also increases oxidative stress in the CNS. As the AD progresses Aβ fibrillation accelerates on binding to AChE.[5] In the later stages of AD, there is an established direct correlation between Aβ aggregation and oxidative stress due to accumulation of reactive oxygen species (ROS).[6] In addition, Aβ fibrils have affinity to reduce redox-active metals and consequently lead to the formation of hydrogen peroxide and oxidized Aβ.[7] Therefore, compounds that could inhibit cholinesterase, having antioxidant potential and prevent aggregation of Aβ peptide could be used for therapeutic intervention. Current treatment only provides symptomatic relief. Presently, there is an urgent need to discover novel drug compounds that could have disease-modifying effects with negligible side effects. Considering this, the current study was undertaken to evaluate multitarget-directed ligand potential (MTDL) of natural compound scopoletin, an isolated coumarin class of compound, from *A. speciosa* roots.

A. speciosa or *vridhdaraka* meaning antiaging, has been mentioned in Ayurvedic material medica for its medicinal properties such as rheumatism, hepatoprotective, immunomodulatory, antioxidant, anti-inflammatory activity, and neurological disorders.[8,9] The identified compound in this study, scopoletin (6-methoxy-7-hydroxycoumarin) is a phytoalexin, low molecular weight compounds that are biosynthesized in response to microbial attack over the plant. Scopoletin

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Population Dynamics Of Chinkara (Gazella Bennetti) In Desert National Park, Rajasthan, India

B. R. JAIPAL

bstract- The study on population dynamics of Chinkara were carried out in hot desertic landscape. The Chinkara (Gazella bennetti) survives in this diverse climatic conditions and population is very healthy than the other desert of the world. The overall average maximum density of Chinkara was observed in Sudasari study site. The density of Chinkara is affected by poaching, predation, habitat disturbance and availability of food materials. The adult male and adult female sex ratio of Chinkara was obtained equal (1:1) in the Kanoi study site. The adult females to fawns ratio (2:1) was turned in favour of adult female in Kanoi study site while slightly positive changes were observed in fawn side in Khuri and Sudasari sites and those were more than Kanoi site. The maximum mortality was recorded during the month of June. The maximum mortality was occurred due to feral dog. During the first year study period birth rate was 0.58 fawn/female and in the second year, it was 0.52 fawns/female. The overall birth rate of Chinkara was 0.55 fawn/ female. Line transects method, direct count method and focal sampling methods were applied during study.

Key words: Chinkara, Density, Sex ratio, Birth rate, Death rate, Line transects

INTRODUCTION

Desert National Park is situated in the mid of the Thar Desert at Jaisalmer and Barmer distracts. It is spread over 3162 sq km along with Indo-Pak border. It is a paradise of wild life and provides the natural habitat to native and migratory birds. Chinkara population lives in group or herd. The herd size remains smaller in summer and larger in monsoon season. The composition and size of herd are influenced by the behaviour of dominant male, poaching, habitat disturbance, season, availability of food and water. Indian gazelles are distributed throughout the Thar region but healthy population are seen in Bishnoi and Jat dominated areas (1). The Chinkara is found in arid region, hilly area, dry scrub and light forest (2). It has been listed under IUCN Red list as vulnerable species. Due to hunting activities the population of Chinkara are probably rare in Afghanistan, scattered in Pakistan and fragmented in Iran. In Indian at the Thar Desert its population is stable. In Pakistan and Iran it is protected in nine and five areas respectively while in India it is found in 80 protected areas (2, 3). Enclosures of DNP play important role in conservation of the Chinkara population.

,TERIALS AND METHODS

The study about population dynamics of Chinkara were conducted in Desert National Park. Study area was divided into three specific sites on the basis of topography. The Sudasari (Plain ground) site is protected area while Khuri (sand dunes) and Kanoi (Gravel with hillocks) are open areas where grassing, agricultural and other activities were going on. The transects of 2 km length and 400-meter width were laid randomly in each study site and surveyed in morning from 7.00 am to 9.00 am to find out encounter rates of Chinkara. We were run on transects on the feet and data were collected by direct count method (4). To avoid the false encounter, the fast running individuals those were crossing the line transect were not counted. Focal sampling method (5) was used to collect the data of sex ratio. Observations were taken from down to evening twilight. During each observation the number of individuals, age and sex of group members were recorded. The information about death and birth were collected through direct observation and interviews of shepherd. The birth rate and death rate were estimated as follows (6):

$B = le/lt$

Where

B is birth rate, le is the number of fawn born in one year, lt is total number of adult female observed in one year

$D = dn/ln$

Where

D is death rate, dn is the number of animals died in one year, ln is total number of animals observed in specific group of the animals during the year

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RESULTS AND DISCUSSION

Density

Chinkara population lives in mixed herd and all male herds. Living in the herd may be for safety and fulfil the other needs. The mixed herds have social organization. It is depends upon population density, age and sex ratio etc. The overall average density of Chinkara in Desert National Park was 2.20 animal /sq km. The highest density of Chinkara was obtained 3.95 animal/sq km in the Sudasri study site while in Khuri site it was noted 1.71 animal/sq km and the lowest density was observed 1.66 animal/sq km in Kanoi site **(Table 1)**. The Sudasari study site is protected by fencing and plenty of vegetation and water were available there. Fencing play important role to protect the animal from the poachers, feral dogs and competition of livestock. Due to it the highest density of Chinkara was noted in Sudasari study site. In the Kanoi study site, the density of Chinkara was found lowest due to the fact that this study site was surrounded by villages. The livestock of those villages were grazed in the study area and vegetations were consumed by livestock till end of November due to that the Chinkara faced scarcity of food in winter and summer season. Chinkara population were also disturbed by the agricultural activities, feral dogs, poachers in Kanoi and Khuri study sites. The density of Chinkara was influenced by poaching, predation, habitat disturbance and availability of food materials.

Table 1. Seasonal variation in density of Chinkara

S. No.	Study site	Density			Average density
		Winter	Summer	Monsoon	
1.	Sudasari	3.60	3.95	2.20	3.25
2.	Khuri	1.60	2.05	1.50	1.71
3.	Kanoi	1.50	2.20	1.25	1.66

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DENSITY AND DAILY ACTIVITIES OF DESERT FOX IN THE THAR DESERT OF RAJASTHAN

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ABSTRACT : Desert fox is a solitary and shy animal. It is well adapted carnivore in sandy and scrub habitats of the Thar Desert. The poaching and habitat loss are main causes of population decline in the region. Desert fox is mainly a nocturnal but it was active during day time. The major daily activities were depended on climatic conditions. The density of desert fox in Desert National Park was 0.71 animal/sq. The highest density (0.83 animal/sq km) was noted in Sudasari site, while the lowest density (0.57) was in Kanoi site. The Daily activities are done to fulfil the basic needs. During day it spent maximum time on moving in winter season and minimum time in summer season. Desert fox spent maximum time in search of the food material during morning and evening. The resting period varied from seasons to season but maximum time (47.62%) was spent on resting in summer season. The fox consumed more times to eat the bird than eat on other food items. Hunting activity played important role in obtained the fleshy food. The fox hunted solitarily and maximum hunting activities took place in birds and rodents dominated areas. The maximum playing activities were observed in early morning and evening. During study the direct count method and line transect method were used to calculate the density. The focal sampling method was applied to collect the data of different daily activities of desert fox in three different seasons.

Key words : Thar desert, *Vulpes vulpes*, daily activity, season

INTRODUCTION

The Red foxes (*Vulpes vulpes*) are adapted to cold climatic conditions and distributed in different types of habitats like Deserts, Mountains, Tundra, Green land, Forest and agro ecosystem. They are found near human population and farmland in urban and sub urban areas (Harris, 1978; Macdonald, 1980; Hersteinsson and Macdonald, 1982). A total forty five sub species of red foxes are found in world of which three sub species are distributed in India. The desert fox (*Vulpes vulpes pusilla*) is one of them. It is lightest and smallest than other three sub species (Menon, 2003; Wozencraft, 2005). It is distributed in Baluchistan, Rawalpindi, Rajputana, Kutch, southern Iran and Iraq (Pocock, 1941). In the Thar Desert, maximum population of desert fox are localized near human settlement such as Dhanies, clustered villages and healthy population are found in Jat and Vishnoi dominated area (Jaipal, 2013 and 2019). The distribution of desert fox is depend on availability of food material which is composed of rodents, birds, insects, scorpion, reptiles, eggs, dead bodies of livestock, delivered placenta and seeds of different desert plant (Jaipal, 2015). Main threats to desert fox population in the Thar region are habitat loss, poaching and Sarcoptic mange (disease). In this region the desert fox are dependent on dens for shelter and protection. Maximum numbers of dens are noted near Dhanies at basal part of bushes because root system of bushes give mechanical support to den and save them from collapse (Jaipal, 2013 and 2015). The different activities of red foxes are influenced by the distribution and availability of prey (Blanco, 1986; Boitani *et al*, 1986; Lovari *et al*, 1994). In urban areas the foxes travel about 4 km distance during night. The male travels more distance and spend more time in defending and maintaining the territory while female remains busy in pups rearing activity (Servin *et al*, 1991). The desert fox plays important role in ecological balancing in the Thar desert.

MATERIALS AND METHODS

Desert fox is shy in nature so the study about behaviour and other activities was difficult. Even though, considerable information was collected. Density of desert fox was calculated by using line transects method. The line transect length of each transect of 2 km and width of 80 meters were laid randomly in each study site. Total 360 km distance was travelled on the feet and data were

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HOME RANGE AND TERRITORIAL ACTIVITIES OF CHINKARA (*GAZELLA BENNETTI*) IN THE THAR LANDSCAPE

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ABSTRACT : Study was conducted on territorial activities and home range of Chinkara in the Desert National Park of Thar land scape. Home range and territory play important role in the animal population. Home range is an area which is habitually used by the animal or a social group of a species for daily activity or to find the different materials which are necessary to fulfil their basic needs. The size of home range varieswith season and size of herd. We observed different type's size and shape of home range but most of them were circular. All parts of the home range were not visited every day by the chinkara herd but favourable part was mostly travelled. Home range was not defended by the dominant male. It was over lapped by the other group. The largest home range (2.58 sq km) was observed during summer in Kanoi site and the smallest home range (1.0 sq km)was recorded inSudasari study site in monsoon season. The size of home range was influenced by the distribution of food resources, availability of water and type of habitat. Territory is an area, which is strictly defended by the dominant (Resident) male of the group. It is mostly occupied to protect the necessary resources and during the breeding season to minimize the interference of other animals. We observed the dominant male to demark the boundary of the territory by visual and scent marking territorial activities like gland rubbing,thrashing of branches, faecal pellets defecation and bed site path fixation. The maximum branch hitting episodes were noted in monsoon season. The odour of semi liquid substance and urine may warn the other male and curb them from invade the territory.The size of territory was influenced by the availability of food material, interference of other animalsand purpose for which territory was established.

Key words : Home range, territory Chinkara herd, visual and scent mark

INTRODUCTION

Food and habitat both are closely related to home range. The home range is areas that is normally travelled by the animal for its normal activities such as food gathering, mating and look after the youngs. The migratory animals have different home range area in different season (Burt, 1943). The areas those have no food are not visited by the animal but animal familiar with them are home range (Frefjord and Prestrud, 1992), while the large area more than four hectare are not included into the home range (Pulliainen, 1984). Animals apply different sign post to defend and mark the territory. Majority of animals rely on smell and mark their territory through scent marking specially during breeding season (Gittleman, 2013 and Parker *et al*, 1991). For scent marking they deposit thestrong smell having substance such as urine, faeces and scent of glands. These smell remains for long time due to urine protein or pheromones (Hurst *et al*, 1998). Many animals use the various threats such as vocalization, visual display and give warnings to invader. If intruder ignore the warning its result is fighting with each other (Parker *et al*, 1991). Some species chew or scratch the plant and leave the tuft of fur as visual marks (Cabrera, 2013 and Burst and Pelton, 1983). Male black buck defends the resources in the territory and only female are allowed to visit their (Isvaran and Jhala, 2000 and Rajagopal *et al*, 2011). The black buck and Chinkara marks their territory with eye rubbing and faecal pellet heaps (Gehlot, 2006). The territorial activities and home range prevent the unnecessary interference and play important role in maintaining the discipline in population of chinkara.

MATERIALS AND METHODS

Study was carried out in the Desert National Park. This is situated in the Thar desert at Barmer and Jaisalmer districts of Rajasthan. The area is situated in hot climatic condition. During summer season temperature rises up to 50°C in summer season. The humidity is very low and rain fall is scanty and occurs during monsoon season only in month of July and August. Vegetations consist of drought resistant thorny bushes and scanty scattered

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Study on The Effect of Mining Activities on Floral Diversity In Western Rajasthan

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Abstract

The mining is a dangerous activity produced by humans for giving indispensable quality and security to their expectation for everyday comforts. The mining in the concerned zones gives crude materials as gravels, crusher and stones etc. for development of roads, railroad lines and other infrastructures. From the most recent couple of years the mining rate has expanded a few times. It brings about the loss of biodiversity of both vegetation and fauna and land form changes of the concerned zone. After the mining activity in any territory is finished, the indication of same lean back for quite a long time and might be until the end of time. it brings about formation of such huge numbers of environmental issues and health risks. During the investigation, effects of mining over plant biodiversity at Chaukri kalan have been assessed. At the investigation site, a sum of 81 diverse plant types of herbs, shrubs and trees were identified. The whole site is viewed as biodiversity rich, which have danger of loss because of mining and its related exercises.

Article History

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Keywords

Floral diversity,
Mining,
SPM,
Western Rajasthan

Introduction

Mining is extraction of valuable minerals or other geological materials in or on the earth planet. The mining procedures, the materials are expelled from the earth by stabbing and detonating. The two methods of mining for desolation of nature ore are: opencast (surface mining) and underground mining. Opencast mining process is making for extracting minerals near the surface of the earth or for soft rocks. The classification of these types of mining is based desired parameters for their application. Open cast mining cause unnecessary air pollution as they produce huge quantities of wastes than underground mining.[1] It has therefore become necessary for governments, regulatory agencies, local communities and the industry itself to adopt strategies attributing landscape, flora and fauna properties to ensuring the functionality of reclaimed ecosystem. The top soil especially gets seriously damaged during extraction.[2] Mining is a worldwide Marvel and has been the reason for concern wherever on the planet, including the propelled nations. In one

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LIVING STRATEGIES OF INDIAN FOX IN WARM CLIMATIC CONDITIONS IN THE THAR DESERT

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ABSTRACT : Deserts are hot, dry areas made up in most cases of sand, rock and mountains and the Thar desert is one of them. In widespread, deserts are described as areas where greater water evaporates into the air than falls to the ground as rain. An animal lives in deserts with the aid of residing underground or resting in burrows throughout the warmth of the day. Some creatures get the moisture they want from their meals so that they don't want to drink much water if any. The Indian fox *Vulpes bengalensis* spread over India and found around the scrub and dry grassland habitats of western desert areas. The study was conducted on its living strategies in warm climatic conditions using direct observation and line transects technique during 2015 to 2019. The observations examined a mixture of natural and human-dominated habitats in the hilly, irrigated and sandy areas with sand dunes in Balotra region in Barmer, Rajasthan. They exist wherever they can dig dens into the soil and find prey.

Key words : Indian fox, living strategies, climate, Thar desert.

INTRODUCTION

The desert is definitely one of the selective areas of terrestrial biotopes for both flora and fauna. Actually, these show such a similarly morphological and physiological conversion that lets them face climatic severity and water loss (Hadley, 1972). In several species, burrowing behaviour helped conversely through the strengthening and shortening of the legs, has evolved (Lull, 1940).

The Indian fox (*Vulpes bengalensis*) is a successful member of the canidae family. In India, it is classified worldwide as Least Concern by the IUCN and listed as threatened species under Schedule-II of Wild Life Protection Act, 1972. Survival of the Indian fox is depended on the natural habitat those are found in its surrounding environments. It is versatile in habitat selection, make their living in the wilderness and they are less possible to live where conditions are extreme. The Indian fox can be differentiated from other fox species by their bushy and black tail tip.

The part of the Thar desert is spread over Rajasthan state. It is an arid and semi-arid zone with varied types of mammalian fauna. *Vulpes bengalensis* is also called common fox and Lokri in the western part of Indian sub-continents. The favored habitat of Indian foxes is mixed landscape such as made up of grasslands, patches of forests and different land-use types. It is different from other foxes due to some characteristics like presence of black hair upper portion of the muzzle and anterior portion of the eyes, greyish body pelage that lacks blending of red hairs, tips of tails are black and legs are brownish rufous in colour (Pocock, 1936, 1941; Prater, 1980; Roberts, 1997; Menon, 2003; Johnsingh and Jhala, 2004).

It is threatened because of poaching in their habitat and their habitat is in danger due to rapid habitat loss (Vanak *et al*, 2008). The Indian fox is recognized to inhabit relatively parched areas, as well as short grasslands, deciduous forests, scrub-thorn forests and marginal region of croplands (Rodgers *et al*, 2000). Indian fox is rarely plentiful within its range (Vanak, 2005).

It avoids the dense forest, tall grassland and true desert (Johnsingh and Jhala, 2004; Macdonald and Sillero-Zubiri, 2004; Prater, 1980). The Indian foxes are usually reported in protected areas having grasses than disturbed habitats having crops reportable within the survey of southern India (Vanak, 2005). The Indian foxes used three types of dens such as simple (concise dens with two openings used for temporary relaxation), complex dens (with several openings) and dens beneath the crevices of rocks (Johnsingh, 1978). These foxes will typically dig their own dens however sometimes they are going to appropriate and expand holes of gerbil (Manakadan and

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Food and Feeding Ecology of Nilgai (*Boselaphus tragocamelus*) in the Thar Desert of Rajasthan, India

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ABSTRACT

Nilgai is largest and fast moving Indian antelope. In western Rajasthan it is commonly known as Roj. It is protected under the schedule III of Wildlife Protection Act, 1972. It lives in herd and starts daily activities before the sun rise. Mainly Nilgai is grazer but it became browser in the scarcity of grasses during winter and summer. During monsoon the Nilgai Preferred green grasses and herbs very much while browsed only on leaves and young twigs of *Prosopis cineraria*, *Ziziphus nummularia* and *Acacia senegal*. The feeding preferences changed according to season and depended upon availability and quality of vegetation. Nilgai did not prefer the Gramno (*Panicum antidotale*), Murat (*Penicum turgidum*), Karad (*Dichanthium annulatum*), Moth (*Cyperus rotundus*), Kheemp (*Leptadenia pyrotechnica*), Angreji babul (*Prosopis juliflora*), Jal (*Salvadora spp.*), Bui (*Aerva javanica*), Murat makro (*Brachiaria ramose*) etc. in monsoon season. During summer they were observed feeding upon those plants which were avoided by them during monsoon and winter. In agricultural field Nilgai damaged the Kharif crop maximum at fruiting stage of them the fruit of Matira (*Citrullus lanatus*) were highly preferred.

Keywords: Nilgai, Grazer, Browser, Feeding preference, Season.

INTRODUCTION

Nilgai is common Indian antelope and is found in different types of habitats from ground level to hilly areas. It is native to India and Pakistan. It avoids the thick forest but prefers the open forest (Sterndale and Finn, 1929; Prakash, 1956a and 1956b; Prater, 1980; Majupuria, 1982). Nilgai are found in fair number all along Indira Gandhi canal command region and double cropped areas of desert but previously they were not seen in that region (Prakash, 1994). It shows clear sexual dimorphism. In male the base of horns are triangular but circular pointed towards tip. Adult female and young individuals are light in colour. White spot are present below the chin and on both sides of cheek. Two white bands are found above the hoof(Sterndale and Finn, 1929; Prater, 1980; Eleman and Morrison-Scott, 1951, Fall, 1972). Similar to other antelopes it has the specific glands below the hooves which help in communication (Prater, 1980). When it was chased Nilgai jumped over 7 feet high fencing (Jaipal, 2012). Nilgai feeds upon different natural and cultivated plants. It is also a crop pest (Chopra and Ray, 2010; Chouhan and Sawarkar, 1989). The blue bull is voracious herbivore (Rajpurohit *et al.*, 2006). Chhangani and robbins (2008) noted that *Coriandrum sativum* is most favourite food and they repeatedly attack on coriander leaf.

MATERIAL AND METHODS

Study area

The study was conducted at Desert National Park which is situated in the Thar Desert. The park is spread on 3162 km^2 in Jaisalmer and Barmer districts at 25°47' to 26°46' in northern latitude and 70°15' to 70°45' in eastern longitude. Area has been divided into core zone and buffer zone. Core areas have been sub divided into 28 enclosures and are protected by wire fencing but 76 villages are located in buffer area where agricultural and grazing activities are permissible. The area is characterised by low humidity, extremes of diurnal and annual temperatures. In summer

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DIET AND DIETARY PREFERENCES OF DESERT FOX (*VULPES VULPES PUSILLA*) IN THE THAR DESERT OF RAJASTHAN, INDIA

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ABSTRACT : Desert fox (*Vulpes vulpes pusilla*) is distributed throughout western Rajasthanin the Thar Desert. It is adaptable in a hot climate and survives easily in adverse conditions of Desert. It belongs to order Carnivora, but it is opportunistic omnivores. It feeds upon a variety of food items that support it to stay alive in the desert. Feeding habitat is the most important feature of carnivore ecology. It feeds upon seeds and fruits of Khejari (*Prosopis cineraria*), Ker (*Caparis decidua*), Jal (*Salvedora* spp.), Ber (*Zizipus* spp.), Banwali (*Vachellia jacquemontii*), Kankeri (*Maytenuse marginata*), Kachara (*Cucumis melo*), Watermelon (*Citrullus lanatus*) and invertebrates, small mammals, reptiles and aves. To find out the different undigested material from the scats, we have used the faecal matter analysis method. In the summer and winter season, it highly preferred seeds and fruits compared to animals. In monsoon season, it mostly preferred animals specially Arthropods. It consumes maximum food materials in the monsoon season and its diet depends on the surrounding environment and availability of food sources. The opportunistic feeding habit enables the desert fox to survive in a different type ofconditions and habitat.

Key words : Desert fox, food material, scat, frequency, weight, season

INTRODUCTION

The red fox is distributed throughout most of Asian countries and in other parts of the world (Lloyd, 1980 and Voigt, 1987). Red foxes have been reported in different areas such as the Desert, Mountain, Sand dunes, Tundra, Forest and landscape with abundant edges of scrub, agricultural areas from sea level to 4500m (Macdonald *et al*, 2008). The red fox is a predator and it has opportunistic feeding behaviour. It uses food resources based on availability (Webbon *et al*, 2006 and Dell's Arte *et al*, 2007). The feeding difference of fox varying according to environment and habitat (Fedriani, 1996 and Gortazar, 1999). The climate and environmental factors affect the availability of food materials and it also affects the foodcomposition and diversity (Hill and Dunbar, 2002). Dietary diversity and composition of particular prey are changes according to the altitudinal gradient (Clavero *et al*, 2003). The small mammals are primary food but didn't frequently consume at lower altitudes, where other food materials wereavailable abundantly throughout the year (Zhou *et al*, 2011). Foxes predation on livestock and it is lost to farmers (Moberly *et al*, 2004). Red fox plays a major role in ecosystem services like Herbivore prey population regulation (Ripple and Beschta, 2012). Red fox play important role in seed dispersion in long-distance (Jordano *et al*, 2007; Guitian and Munilla, 2010; Rosalino *et al*, 2010, Suarez-Esteban *et al*, 2013). The red fox obtains a high quantity of food materials from the agricultural, urban and rural areas (Leckie *et al*, 1998 and Volpi, 1996; Ferrari and Weber, 1995; Cavallini and Lovari, 1991; Contesse *et al*, 2004). Desert fox feeds on Rodents, Aves, Reptiles and a variety of Arthropods, Dead bodies of cattle, Delivered the placenta, Eggs, Fruits, and Seeds of Watermelon, Ber, Groundnuts, Ker, Khejari, etc. (Jaipal, 2015). Desert fox and Cat both carnivores used the same habitat but they don't share the food materials. Chinkara and Nilgai herbivores are a competitor of Desert fox they chased the desert fox at the time of feedingthe fallen fruits (Kanwar *et al*, 2019).

MATERIALS AND METHODS

Survey related to diet and dietary preferences of Desert fox (*Vulpes vulpes pusilla*) was done at Jajiwal Dhora near Jodhpur. It is situated on 26.3275N Latitude and 73.2151E Longitude. Scats were collected from the study area from February 2017 to February 2019 in every season. Total of 215 scats collected and analyzed. Scats were stored in plastic bags and labelled with information about collection date, time, and season. The faecal matter analysis method of Jaipal (2012) was applied to find out

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Food Compositions of the Indian Fox (*Vulpes bengalensis*) in the Desert Region of Rajasthan, India

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ABSTRACT

The study on food compositions of the Indian fox (*Vulpes bengalensis*) was carried out in Balotra (Barmer) in hot desertic land. This threatened species listed with Schedule II of Wildlife (Protection) Act 1992. This opportunistic and omnivorous animal feeds upon small rodents, birds, eggs, snake, lizards and insects. It also feeds upon seed and seasonal fruits of *Capparis decidua*, *Acacia tortilis*, *Acacia senegal*, *Aerva javanica*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora persica*, *Ziziphus* species, *Cucumis melo*, *Citrullus lanatus*, *Cordia myxa*, *Punica granatum*. Direct observation technique and scat analysis were used to recognize the diet compositions. In total, 202 scats were collected across the study sites during the year of 2015 to 2018. Scats are analyzed to categorize the prey species of the fox. Seasonal variations were found in fox's diet. During winter season the fox mostly depended upon ber, aves and mammals while in summer it mostly likes *Prosopis juliflora*, *Acacia tortilis*, *Prosopis cineraria*, hair and bones of animals. During monsoon season it feeds on *Ziziphus* and small mammals.

Keywords: Indian fox, food composition, scat analysis, prey, desert.

INTRODUCTION

The *Vulpes bengalensis* is a mammal from the order Carnivora, Caniformia suborder and Canidae family. It is locally known as lokri or lomri. The Indian fox is endemic species in India and spread from the lower regions of the Himalaya to the Southern tip of the Indian Peninsula and extends from Sindh Province of Pakistan east to Bangladesh (Pocock, 1936; Prater, 1980; Gompper and Vanak, 2006; Johnsingh and Jhala, 2004). The range of *Vulpes bengalensis* is restricted to the Indian subcontinent (Gompper and Vanak, 2006). The species is comparatively abundant in the biogeographically zones of the desert, semi-arid and also the Deccan Peninsula of India (Rodgers et al., 2002). It is threatened species because of the loss of habitat and hunting its habitat (Vanak et al., 2008).

The Indian fox prefers relatively parched areas, short grasslands, deciduous forests and scrub-thorn forests (Rodgers et al., 2000). Indian foxes are generally observed in protected grasslands habitat compared to the agricultural scenario that reports in Southern India's survey (Vanak, 2005). The home ranges are calculated at approximately 2 km^2 (Maurya, 2012). The number of the Indian fox is rarely in abundance in its range and it may be absent from many places within its range (Vanak, 2005).

Vulpes bengalensis is opportunistic feeder (Johnsingh, 1978). The foxes are nocturnal in habit and eating regimen includes arthropods, small mammals, birds, reptiles, and different vegetative parts (Johnsingh, 1978; Johnsingh and Jhala, 2004; Manakadan and Rahmani, 2000; Cavallini and Lovari, 1991; Vanak, 2003). The presence of many types of vertebrates and invertebrates prey species were isolated by the fecal examination in southern Tamil Nadu (Johnsingh, 1978). Hairs of rodent were commonly reported in the scats of pups (Manakadan and Rahmani, 2000).

MATERIAL AND METHOD

Study area: Research of the diet composition of Indian foxes was conducted in the different intensive study sites, which is situated near Balotra in Barmer district. It is the north-west part of the Rajasthan and falls in the hot desert region. It lies between 24° 58' to 26° 32' north latitudes and 70° 05' to 72° 52' east longitudes. The western

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Crop Damage by the Blackbuck (*Antilope Cervicapra*) and other Ungulates in Around Rohat Region, Rajasthan, India

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Abstract

Blackbuck (Antilope cervicapra) and other ungulates caused extensive damage to most crops. The signs of hoof marks, broken plants, uprooted plants, damaged crop and feeding marks give the indirect evidence of the presence of Blackbuck and other ungulates in crop field from dusk to dawn [9]. Blackbuck and nilgai are highly adaptive antelope. This note is part of the preliminary survey based on the observation and questionnaires of ecology and pest status of Blackbuck and other ungulates from May 2019 to April 2020 in the Rohat-Pali Region. Animals were followed for regular observation and protocols were recorded for scan, adlibitum sampling [12]. One of the dominant females in a herd does inspect the location and enters easily in the crop field. During entering in the crop, the male stands behind and fawn (blackbuck), calves (Nilgai) in the mid position. Mostly immature crop damage gains due to feeding and ripe crop damage due to trampling. The herd of blackbuck, deer, and nilgai has been observed shifting from one area to another, depending upon the availability of crops.

Keyword: Blackbuck, Crop damage, ecology, feeding, ungulates.

Introduction

In India, after the introduction of the Wildlife Protection Act (1972) and through associated management actions, the populations of many wildlife species have increased considerably, and a few of them have decidedly become locally overabundant [1].

Crop damage caused by raiding wildlife is a prevalent form of human-wildlife conflict along protected area boundaries [2].

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A PERSPECTIVE STUDY ON SEASONAL THREATS OF BLACKBUCK, *ANTILOPE CERVICAPRA* IN MARWAR REGION OF RAJASTHAN, INDIA

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ABSTRACT : Marwar region is lacking in natural habitat of blackbuck population. The decreasing natural habitats lead to conflict and threats to the blackbuck population. The present study of blackbuck at marwar region was carried out through bi-seasonal (pre-monsoon and post monsoon). The field work was completed from April of 2019 to September of 2019. The maximum population of blackbuck in the marwar region in living in open cultivated field. The study reported that main threat observed was in rainy season. The main reason for their number coming down in the rainy season was the feral dogs. Which were easy to prey most of the prey was fowns and due to the flooding of fields in rainy season, their feet easily fall in, cause's death. Blackbuck was once found abundantly throughout Marwar region, but they are limited to the some region, driven almost to extinction in the rest of marwar. Mainly because of habitat destruction, hunting pouching, road accident, overgrazing of livestock and wildlife crime.

Key words : Accidents t, blackbuck, conflict, crop, habitat, natural, predictors, threats.

INTRODUCATION

The *Antilope cervicapra* belongs to the family Bovidae. It is found in the Indian subcontinent and also in part of Pakistan and Nepal (Udaya kumar Das, 2015). Based on the coat colour, shape and length of the horn. The maximum population of Blackbucks within the state resides in open cultivated fields. Blackbucks were once found abundantly throughout Rajasthan, but now they are limited to the western Rajasthan part of the state, driven.

Almost to extinction in the rest of Rajasthan, mainly because of habitat destruction and wildlife crime (Kumar *et al*, 2018). Blackbuck is including in the list of threatened animals is struggling for its existence. The conservation status of blackbuck is listed in Red Data Book of IUCN (International Union for Conservation of Nature and Natural resources.) as Vulnerable, under CITES (Convention on International trade for Endangered species of wild flora and fauna), it is categorized in Appendix III. It is classified in Schedule I of Wildlife (Protection) Act 1972 (Kumar and Kar *et al*, 2008). Presently, human-wildlife conflict is one of the large threats to the survival of many wildlife species. The human-wildlife conflict is the main factor for the loss of forest and conflict is individual due to the conservation of forest into major scale monoculture plantation, shifting cultivation, overgrazing, forest cutting and transgression in the home range which decrease theavailability of natural food to the wild animals (Pant and Joshi, 2019). The blackbuck is now an endangered species within the natural habitats of India, Nepal and Pakistan. Loss and change also as encroachment and fragmentation of habitat are the principal reasons for the decrease within the number and distribution of blackbuck. Livestock encroachment is a rapid problem within the blackbuck habitat. The illegal grazing of livestock in the field not only removes the biomass but also harasses and disturbs the blackbuck

Fig. 1 : Blackbuck (*Anitlope cervicapra*).

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STUDY ON SEASONAL VARIATIONS OF DISSOLVED NUTRIENTS AND I IMPACT ON EUTROPHICATION IN SAMBHAR LAKE

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ABSTRACT : Water is not only essential for drinking, but also needed for agriculture and industrial use. Present study w carried out for water quality of samples collected from different sites in the Lake periphery as well as in catchment are Samples were collected from different locations of Sambhar Lake city and its adjoining area for their physico-chemical stud The standard methods of APHA were used to analysis samples. The analytical results show Phosphate-phosphorus var between 0.27 to 1.91 mg/L during the course of study whereas ammonia-nitrogenrecorded during the present investigatio ranged between 0.013 to 0.141 mg. Seasonal fluctuations in silica content of the water bodies under study showed a range 0.216 – 1.310 mg/L with maximum values during June, 2018 and minimum during February, 2019.

Key words : Sambhar lake, dissolved solids, nitrogen, phosphorus, silica.

INTRODUCTION

Lakes are dynamic lentic ecosystems which are significant inland water resources for meeting the increasing water demand. However, all these functions depend on the quality of water, which is based on a well-balanced environment in terms of its physical, chemical and biological variables (Yu *et al*, 2010). Anthropogenic disturbance to nutrients and eutrophication impair river water quality and ecology (Crossman, 2016; Dupas *et al*, 2017; Jarvie *et al*, 2012a). Eutrophication has been recognised as a significant environmental issue in Great Britain and across Europe since the late 1980s and continues to present a long-term challenge for sustainable nutrientmanagement (European Environment Agency, 2010; Leaf, 2017).

Wetlands have always been of utmost importance for human existence since time immemorial. Inhabitants of the desert state of Rajasthan have traditionally protectedand cared for the wetlands like a treasure owing to the severe water scarcity, frequentdroughts and famines in this part of the world. Wetlands, as the abode of richbiodiversity and dynamic ecotones, require wise resource management and implementationot the conservational strategies suggested by experts at national andinternational forums from time to time. The Ramsar Convention is one such endeavour that unites the globe for conserving our fast degrading wetlands. Among the Ramsar Sites of India, Rajasthan owns, Sambhar Salt Lake. Lake is also known as "Salt Lake of Rajasthan the largest inland salt lake in India. Spread in the " km area, this India's largest inland salt lake also regarde as a 'Gift from Thar desert'. This saline lake is divid by a 5.1 km long dam, which helps in salt making

Dissolved substance in water play a very importa role in the metabolism of various groups of organisms. Some of these dissolved substances are to be of greater importance as they serve both and micro-nutrients, for the growth and produc aquatic organisms. Climatic and edaphic factor essential source of energies and nutrients. Accord Likens and Bormann (1972), nutrients in a lent originate from biological, geological and pathways. They are considered to be importance. The importance of various nutri as nitrogen, phosphorus and silicates has long recognized and their action on the biological ac the ponds and lakes has been discussed in detail by (1963) and Hutchinson (1975). Increased nutrient may have detrimental effect on the health of ecosystem leading to excess accumulation biomass, aquatic macrophytes and the depletion in water. Generally, the lake water chemistry describe the seasonalvarriations in the behaviour of dissol and catchment characteristics (Anshumali Ramanathan, 2007). The present thesis was de monitor seasonal variation in water quality

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A PERCEPTIVE STUDY ON FEEDING PATTERN OF NILGAII, *BOSELAPHUS TRAGOCAMELUS* IN JODHPUR REGION, RAJASTHAN, INDIA

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ABSTRACT : Nilgaii antelope (*Boselaphus tragocamelus*) are an exotic ungulate species in Inda. Food pattern and seas variation of nilgaii (*Boselaphus tragocamelus*) was studied during March 2017 to February 2019 in adjoining areas of Jodl region. A two year food habit study of nilgaii and its forage selection was conducted. The results have shown that nil preferred to feed on large open areas interspersed with cover and ponded water. They were grazers, their average diet consis of 60% grasses, 25% forbs and 15% browse. They augmented the nutritive level of their basic diet by selecting nutrit plant parts and changing their selections as the parts appeared, waned and fluctuated in quality with the seasons. When food scarce, nilgaii ate more browse, dead vegetation, and dry dung of large herbivores. The food pattern of the nilgaii varied fr season to season.

Key words : Food habits, Nilgaii, mixed feeder, wild ungulate, preference rating.

INTRODUTION

The Republic of India, with an area of 3,287,263km², is the seventh largest country in the world. India lies between 804'N and 3706'N and between 6807'E and 97025'E, and occupies a dominant position in the Indomalayan biogeographical region. It is connected to the Palaearctic in the north and the Ethiopian region in the west. The combination of India's position, the great contrasts inits physical characters and variations in climate has resulted in a rich biodiversity, represented by many biogeographical regions and many unique biota of its own. Mean annual rainfall varies from as little as 50mm in the extreme northwestparts of the Thar Desert to >10,000mm in Chirapunjeein northeastern India. A large part of India lies in the subtropical zone, though, as a whole, India experiences a typical, tropical monsoon climate (Negi, 1993). The Himalayan mountain chain in the north forces the southwest monsoon clouds to bring rain to most parts of the country and prevents the cold winds of central Asia from reaching India.

Nilgaii mainly occur in northern, western and central India. They are locally abundant in agricultural areas, in states such as Uttar Pradesh, Haryana, Rajasthan and Gujarat, where they are not molested for religious reasons. They are common to abundant in many protected areas, although most of the population occurs outside protected areas. Nilgaii are expanding their range in canal-irriga parts of the Thar Desert (Rahmani, 1994). A full cen has not been carriedout, but numbers could be more th 100,000. In the Gir Forest (140,000ha), nilgai density w 0.58 per km² in 1989 (Khan *et al.*, 1996) and in agricultu areas of Haryana, density reached 5.67 per km² (Sing 1995).

The nilgai (*Boselaphus tragocamelus*) is the la Asian antelope, reaching sizes up to 210 cm long shoulder height and 288 kg weight (Leslie, 2008). to peninsular India, Pakistan and Nepal.

Habitat, food and reproduction

Nilgaii are very adaptable and occur in arid, sem areas and dry deciduous forests, but they avoid extre deserts and dense forests. Nilgai browse and g feeding on the leaves of *Zizyphus* and other trees (Sin 1980). Calves are born throughout the year and tw are common. They are sedentary and are usually see groups of four to 10, though large assemblages of animals are sometimes found in good feeding area generally crop fields (Qureshi, 1992; Singh, 1995).

Status within the country

Satisfactory, numerous, and apest in some agricu areas. Protected by law, but huntingis allowed w damage becomes excessive.

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ORIGINAL ARTICLE **OPEN ACCESS**

Blackbuck (*Antilope cervicapra*) Population Status Around Jodhpur, Rajasthan

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ABSTRACT

Antelopes found in India and have a wide distribution in Rajasthan. The Jodhpur District of Rajasthan has the maximum numbers of Blackbuck. A study was conducted to assess the Blackbuck population in the Jodhpur District Rajasthan. Populace status of the ultimate wild population of endangered and guarded species of Blackbuck (Antilope cervicapra) was studied at Jodhpur, Rajasthan by the direct observation method from August 2019 to Feb 2020 for detail. The total population of Blackbuck during that period was 303 with the crude population density of 14 individuals/ Km2 and the ecological density of 32 individuals/ Km2 at the core habitat. The average herd size was computed to be of 8 individuals per herd. The male to female sex ratio was 1:3 showing a sex ratio of 78.26 bucks to 100 does. The annual natality rate was computed to be 12 per matured female per year and the mortality rate was 26 per individual per year. However, thereafter till 2019, annual lump sum population data only are given for general overview.

Keywords: *Blackbuck (Antilope cervicapra), Population, individual, Natality, Annual, Jodhpur, Rajasthan.*

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INTRODUCTION

An elegant Blackbuck Antilope cervicapra Linnaeus (1758) is a species of Bovidae family. Blackbuck groups are largely found in many regions of India, Pakistan, Nepal, Srilanka, except for the north-eastern region. It is also known by a number of other names like Kala Hiran, Krishna America. The conservation status of Blackbuck is listed in Red Data Book of IUCN (International Union for Conservation of Nature and Natural Resources) as near-threatened since 2003, in CITES
(Convention of International Trade for Endangered Species of Wild Flora and Fauna) is categorized in Appendix III. It is classified in schedule I of Wildlife Protection Act, 1972. Essentially a species of open plain, it is found in a wide range of habitats from arid grassland, scrubland to marshy coastal plains, and open woodlands [1]. It is primarily a grazer and browser, in the absence of grass; it can be considered a mixed feeder [2, 3 and 4].

The Blackbuck can utilize a range of habitats including tropical and subtropical weed land, dry deciduous forest, open plain (grassland), riverbanks, and semi-desert habitats, and can forage in cropland and pasture land. They are generally sedentary, but they may move for long distances in search of water and forage in summer [1]. The average life-span of Blackbuck determined in captivity is 12 years and the upper limit is 16 years [5].

Population dynamics of the Blackbuck and the land use of the Blackbuck area at Jodhpur are not documented scientifically. Considering limited resources and multiplying needs with a growing human population, management supported a holistic research approach that is important and appropriate
Biological data, which incorporates the present population status and understanding of behavior, are vital for in-situ conservation of any species. This study extrapolates the population characteristics of the endangered species of Blackbuck in Jodhpur [6].

MATERIAL AND METHODS

Study Area:-The study of population of Blackbuck is carried out in the entire district of Jodhpur from August 2019 to Feb 2020. The observations were made for 5 days in every month visiting. Jodhpur

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RECENT TRENDS OF POPULATION AND NESTING OF THREATENED VULTURE SPECIES IN THAR DESERT OF RAJASTHAN, INDIA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author RPS designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author RK managed the analyses of the study. Author AP managed the literature searches and supervised the study. All authors read and approved the final manuscript.

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ABSTRACT

The data obtained the population fluctuation between seven species of vultures in the Thar Desert of Rajasthan is of great significance. A systematic study carried out the objective of demography, breeding, and nesting records of vulture species in Thar Desert of Rajasthan starting from 2016 and over three successive years. Linear regression used to determine a trend in the population of residents and migratory vulture species. Egyptian vulture observed the highest and White-backed vulture resulted in the lowest population trends. Potential records of nesting of resident vulture species also gathered at the right proportion. The patterns of declines and the presence of dead birds, various accidental tragedies, habitat loss, and windmills indicate some possible cause even after the ban on Diclofenac in 2006.

Keywords: Demography; nesting; thar desert; vulture.

1. INTRODUCTION

Grass root level information such as long term population monitoring, availability of adequate food, favourable ecological conditions, and geographic distribution are the new parameters that rely upon the proper application of appropriate conservation action used in research for the threatened species such as vultures [1]. Demography estimated as the addition (births and immigration) and loss (deaths and emigration) of individuals from a population which is regulated by intrinsic factors (i.e., life-history, first breeding, fertility, longevity, and dispersal) and extrinsic (i.e., food resources, topography and abiotic factors [2].

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ORIGINAL ARTICLE OPEN ACCESS

Contamination of Pesticides Residues in Vegetables (Green Chili, Ladyfinger and Bottle Gourd) of Godwar Area (Bali and Falna) of Western Rajasthan, India

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ABSTRACT
The present study evaluates the contamination of pesticides in green vegetables as green chili, ladyfinger and bottle gourd in godwar area of western Rajasthan. These three types of vegetables are collected from different farm of Bali, Falna in Pali district and analysis of pesticides residues by using QuEChERS method. These two vegetable sample as ladyfinger and bottle gourd are found uncontaminated while green chili sample are found minimum contaminated with organochlorine pesticide alpha endosulphan (0.03ppm). The minimum contamination was found which show that farmers of this area are using eco-friendly method to prevent vegetables from pest and improve production.
Keywords: *Pesticides residues, QuEChERS method, Contamination and Vegetables.*

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INTRODUCTION

India is an agrarian country where about 60-65% of population is depending on agriculture and contributes 16-17% of GDP of India1.India is the largest pesticides consumer and second largest pesticide manufacturer in Asia. From India news report[2] "India farmers use about 6000 tons of active ingredients of pesticides to control pests of vegetables and fruits". Personal talk with farmer shows that about 95% of farmer use synthetic pesticides in vegetables to protect them from different pests. Fact that 50-60% of the vegetables we get across the geographically regions are contaminated with pesticides even those banned several years before as DDT, Aldrin and Endrin. Broad variety comes include fungicides, herbacides, insecticides and on the basis of chemical structure can be classified as organochlorine, organosulphur and organophosphorous pesticides. Applications of pesticides are widely used before and after the harvesting, to protect the vegetables from pest and damage. The main reason of using pesticides is to protect the vegetables, fruits from pests and improve production and quality. A 2008 document of AVRDC [3] the world vegetable center, thus tightly suggest India pesticides use on vegetables alarmingly high.
We know that vegetables and fruits are very important part of our daily balance diet. It's provides many types of minerals and vitamins, which are essential for human body metabolism, But the truth is that this mineral and vitamins source like vegetable and fruits are going to contaminated day by day with different types of pesticides [4]. These types of pesticides cause harmful side effects on human body as well as on environment. This pesticides residue causes different types of health issues as respiratory, neurological damage etc. Common effects of pesticides residue on human body are nausea, vomiting and disorder in pregnancy. We study on various types of vegetable mostly on green chili, ladyfinger and bottle gourd of different farms of godwar area of western Rajasthan to find out the pesticide residues in these vegetables. We work mostly in Falna, and Bali area in Pali district of western Rajasthan and found interesting result, only green chili sample are found a minimum contaminated rather than other vegetables sample.

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A review on impact of coal mining on soil properties and reclamation by organic amendments

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ABSTRACT

Coal is one of the most abundant fossil fuel on earth which is involved in the production of power and energy all over the world. Coal mining process generates abundance of mined spoils and waste rocks which oxidizes under atmospheric conditions and releases metal-loaded effluents to the water bodies and soil. These effluents degrade physical, chemical and microbiological quality of soil and, in turn, create threat to human being and ecosystem. New cost effective and environment friendly strategies are needed to restore the disturbed coal mine soil. Therefore, using the organic amendments for the soil restoration may provide such opportunity to reclaim the degraded soil. Organic amendments such as manures, biosolids, pulp, paper, mill sludges, agriculture/crop residues, food processing waste etc. improve the fertility status and biological activity of degraded soil and decrease restoration cost in eco-friendly manner. The objective of this paper is to review the impact of coal mining on soil physico-chemical and biological properties of mined degraded land. This paper also reviews the role of organic amendments in soil reclamation of mine spoils.

Key words: Coal mining, Organic amendments, Mine spoils, Reclamation

Introduction

Coal is the most abundant fossil fuel resource in the country. India ranks as the third largest coal producer of the World, next only to China and USA. It is important constituent of the present Indian economy. Coal Mining is done in two major ways: underground mining and opencast mining. In India more than 85% of the coal production is currently from opencast mines. Opencast mining is a type of surface mining, which entails removing the vegetation, top soil and rock (called overburden materials) above the mineral deposits (Mukherjee and Pahari, 2019), and thus affects the fertility of the surrounding lands (Banerjee and Mistri, 2019).

Coal mining process generates abundance of mined spoils and waste rocks which oxidizes under atmospheric conditions and releases metal-loaded effluents to the surrounding environment. These effluents affect the quality of surface waters and shallow groundwater near the mines.Also, several changes take place in the physical, chemical, and micro-biological characteristics of soil. Masto *et al.* (2015) have assessed that soil quality as one of the

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Quarantine and social distancing: scientific means in Indian traditional culture

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Abstract

Coronavirus disease (COVID-19) pandemic has introduced the term quarantine worldwide. The concept of quarantine is not new in Indian culture. It is practised in Indian society since ancient times mainly during the ceremony of birth and death, during which there are high chances of infection. Quarantine is a modern form of concept '*Sutak* or *Patak*' of our Hindu culture, which means preservation and restoration. According to our rituals after birth and death rituals quarantine or isolation have been followed by Indian people. Social distancing is being followed and maintained by the *Namaste* concept of our traditional culture while showing respect and gratitude. Lockdown triggered by coronа pandemic has reminded, re-evaluated and relooked our ancient and traditional way of living and life. The current Pandemic (COVID-19) scenario has given an enlightening message and lesson of revisiting and revalidating our traditional culture and customs which are not only based on scientific principles but are also true in the present situation of this acute infectious respiratory disease.

Keywords: COVID-19, *Namaste*, *Patak*, Quarantine, *Sutak*

1. Introduction

Coronavirus disease (COVID-19) pandemic has introduced the term quarantine worldwide. The word 'quarantine' was derived from the Italian words '*Quaranta giorni*' which means forty days (Sehdev, 2002). The book of Leviticus in the Bible refers to restrictions for leprosy and the word quarantine was termed to prevent the spreading of the Black Death (epidemic of bubonic plague) in the fourteen century in Britain also (Newman, 2012; Rosenberger *et al*., 2012). Quarantine is being practiced at various places in the world for a long time as a measure of disease prevention. Quarantine may be applied at the individual or group level which normally involves restriction to their home or a designated facility (Cetron and Landwirth, 2005). During chickenpox or smallpox (before eradication), the common practice in India was to keep a child in a separate room, not allowing him/her to play with other children. They had to avoid visiting each other's house and refraining others to come to one's house was one of the oldest examples of isolation to prevent the spread of infection. Though, the rationale for restrictions was described to please the Goddess for early recovery yet the motive was isolation to prevent the disease from spreading. Moreover, a visit to the temple after recovery can be considered as a method of the announcement of recovery and completion of isolation period (Nicholas, 1981; Saxena *et al*., 2014). In terms of COVID-19, this is used to break the spreading of the chain of corona virus among the people. Social distancing and the concept of quarantine have always been a form of public-health response to any pandemic from the time of the black death in the mid-1300s and the first outbreak of cholera to the 1918 influenza pandemic (Cohen, 1974). The first instance of an organized quarantine as a state-led strategy was first introduced in 1377 in Dubrovnik on Croatia's Dalmatian Coast. The black death or the great bubonic plague emerged in Italy and pandemic word was introduced to mankind. It was the most devastating plague in

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REVIEW ARTICLE OPEN ACCESS

Biochar Mitigates Soil Salinity: A review

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ABSTRACT
Salinity is one of the most limiting factors of environment which affect the productivity of agricultural crops. Most crops are perceptive to soil salinity which is caused by high concentration of salts in the soil. In order to meet the global challenges of food demands, it is important to bring saline soils under cultivation. A recent concept of "biochar"is gaining considerable attention in enhancing various physico-chemical and biological properties under saline soil conditions. Biochar improves soil structure, increase pH, and augmented soil aeration and moisture content.Further extensive work is required for investigating the effect of various biochar amendments on different saline soils with different physico-chemical properties, different concentration of salinities at both laboratory and field scale. The main objective of the present review paper is to discuss the recent studies and investigations on the role of biochar in improving soil properties and plant growth in saline soils.
Key Words-Agriculture, Biochar, Environment, Soil, Salinity

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INTRODUCTION

Soil salinity is one of the main constraints present in irrigated agricultural lands world-wide. In India about 8.6 mha of land area is affected by soil salinity [28] and it is increasing every year as a result of secondary salinization. In India, the problem of salinity is found in the states of Uttar Pradesh, Gujarat, West Bengal, Rajasthan, Punjab, Maharashtra, Haryana, Orissa, Delhi, Kerala and Tamilnadu[18]. Almost 2.8 million hectares of salt-affected soils are present within the Indo-Gangetic alluvial plain occupying parts of Punjab, Haryana, Uttar Pradesh, Delhi, Bihar and Rajasthan states [2]. At least 20% of all irrigated lands are salt affected with some estimates being as high as 50% (by year 2050) whereas the world's population continues to rise, the total land area under irrigation appears to have levelled off [14, 18].

Most crops are sensitive to salinity caused by high concentration of salts in the soil. The soluble salts that occur in soils are found in various proportions of the cations sodium, calcium and magnesium, and the anions chloride and sulphate. The minor amounts of cation potassium and the anions bicarbonate, carbonate and nitrate are also present. A saline soil is generally defined as one in which the electrical conductivity of the saturation extract in the root zone exceeds 4 dS m^{-1} (approximately 40 mMNaCl) at 25 °C and has an exchangeable sodium of 15% [26]. Salinization associated with agriculture occurs when salts build up in the root zone, either because the soil is intrinsically saline, or because the drainage of water from the sub-soil is not sufficient to prevent saline water rising into the root zone. This problem is very common in arid and semi-arid regions where leaching of salt is poor due to lower rainfall; where there are strongly saline sub-soils formed from marine deposits or where irrigation changes water tables and salt flow; also due to excessive evapotranspiration in these regions, the secondary salinization is becoming important factor for salinity [35].

All soils contain some water-soluble salts. Plants absorb essential nutrients in the form of soluble salts, but excessive accumulation strongly suppresses the plant growth. Salinity not only decreases the agricultural production of most crops but also effects soil physicochemical properties, and ecological balance of the particular region. The impacts of salinity mainly include the low agricultural productivity, low economic returns and soil erosions [13]. Salinity effects are the results of complex interactions among morphological, physiological, molecular and biochemical processes including seed germination, plant

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An Approach of Water Conservation in Agriculture By Mulching, in Arid and Semi-Arid Regions of Rajasthan, India

Poonam Poonia, Sangeeta Parihar

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ABSTRACT

Water is one of the most important inputs essential for the agricultural practices. Most arid and semi-arid areas have insufficient and unreliable rainfall pattern. Also, a high rate of evaporation, loss of run off water and soil infertility is big problem. Under these climatic conditions the most important targets are to improve soil and water conservation and efficient use of rain water. Under these circumstances it is essential to understand and find new ways and techniques to preserve and conserve the water resources. Application of mulching to agricultural land can mitigates these problems. Mulching possess positive impact on soil by improving rainfall acceptance by enhancement of soil structure and reducing erosion along with additional benefits of increasing soil microorganisms, soil nutrients and thus improved crop growth. This study discusses the importance of both inorganic and organic mulches and its applicability under arid and semi-arid conditions. The paper focuses and highlights the recent research progress on various types of mulching to use to conserve soil water in agricultural practices especially in arid and semi-arid climatic conditions.

Keywords Conservation, Infilteration, Mulching, Runoff, Water.

INTRODUCTION

Rajasthan is the largest state in India covering an area of 34.22 million hectares, i.e., 10.5% of the country's geographical area, but sharing only 1.15% of its water resources. The state is predominantly agrarian as the livelihood of 70% of its people depends on agriculture-based activities. In the last 50 years, a threefold increase in the human population and a doubling of the livestock populations have put tremendous pressure on the fragile water and land resources of Rajasthan. Water scarcity problem becomes further complex in arid and semi-arid regions. Most of the state (60—75%) is arid or semi-arid. The arid and semi-arid regions are usually with low and erratic rainfall, high summer temperature, low humidity and high-velocity wind causing an average potential evapotranspiration of 2,000 mm, a negative water balance and acute water deficit. Further, enhanced global warming and uneven rainfall patterns are responsible for the scarcity of water resources which check the agricultural production in arid and semi-arid regions (Li et al. 2017). The farmers use excess quantity of fertilizers and pesticides so to increase the crop production but these also causes threats on soil health. Also, over irrigation of farmland is causing the problems of soil erosion and salinity. Therefore, the

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A Reviewon Plastic Pollutionin MarineEnvironment

Poonam Poonia, Loveena Gaur

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ABSTRACT

Production and distribution of plastics continue to increase both in developed and developing countries. Plastic pollution in marine environment was reported nearly 50 years ago. Plastic debris has been found in all major marine habitats worldwide. Micro-plastics are the major among plastic debris and have emerged as a threat as well as eco-toxicological and ecological risk for marine habitats. Hazardous and deleterious effects were seen on marine biota as animals ingest plastic debris and get entangled. Measuring or forecasting this issue is a complex and challenging task due to technical limitations and uncoordinated assessment campaigns. Acting to tackle this issue requires adequate metrics to guide and prioritise action at different levels, ranging from sound product design and efficient regional infrastructure, to adequate policies and enforcement. In this review paper, we reflect on the extensive literature on the sources and effects of marine litter, current knowledge on the effects of policies and other actions that are taken worldwide to mitigate and prevent pollution and the recommendations for initiatives, policies and strategies.

Keywords: Marine, Plastic, Pollution, Egestion.

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INTRODUCTION

Plastics are synthetic organic polymers. The plastic material is used for various purposes in everyday life and due to which this material is continuing with great demand over past three decades (Hansen 1990). Plastics are characterized by their low cost, high durability, light weight and strength. They are used in great number of applications, ranging from clothing, household and personal goods and packaging to construction materials resulting in plastic pollutionin environment in various sizes (Am. Chem.Counc.2015). The smallest forms are called micro-plastics categorized further into primary micro-plastics (occur as micro-plastics by design) and secondary micro-plastics (formed by degradation of larger plastic waste) (Soloman and Palanisamiet al. 2016). The plastic pollutants are present in the form of spheres, pellets, irregular fragments and fibers in freshwater, deep oceans and sediments (Alomar et al. 2016).It is estimated that about 70-80% plastic con-

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Benefits of Mulching in Dry Land Agriculture

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ABSTRACT

Dry land agricultural crops are characterized by very low and highly variable and uncertain yields. Crop failures are quite common at these areas because of inadequate and uneven distribution of rainfall, prolonged dry spells during the crop period, low moisture retention capacity and low fertility of soils. To overcome the constraints of dry land agriculture, mulching is gaining a considerable attention worldwide as agronomic measures for water and soil conservation. Mulching is the process of forming the protective layer, organic and inorganic material, around the plant. It is beneficial for plant health by creating a microclimate around the plant root zone. Mulching improves the soil quality by preventing the runoff of soil, reduces the weed growth and also limits the evaporation of water. Mulching improve water holding capacity of soil, conserve soil moisture, and improves physical, chemical and biological properties of soil. Thus, enhances the soil fertility by generating nutrients to the soil and increases the growth and yield of crops. The paper has information of all the aspect of mulches with reference to their types, origin and beneficiary effects. The paper also discusses the advantages of these mulches in terms of soil environment, water conservation, weed control, crop growth and yield.

Key words: Mulch, Plant growth, Soil health, Water conservation

Dry land is the areas which receives annual rainfall of approximately 750mm or less and where there is no irrigation facilities to raise the crops. Dry lands are also characterized by high rate of evaporation, hot summers with high day temperature, low humidity rate, high run off with extreme problem of soil erosion. The soils of dry land area are also low in nutrients and with high salinity. About 72% of the global dryland are in the developing nations and rest 28% falls in industrialized nations (Millennium Ecosystem Assessment 2005). Geographically dry-land agriculture area in India includes the north western desert regions of Rajasthan, the plateau region of central India, the alluvial plains of Ganga Yamuna river basin, the central highlands of Gujarat, Maharashtra and Madhya Pradesh, the rain shadow regions of Deccan in Maharashtra, the Deccan Plateau of Andhra Pradesh and the Tamil Nadu highlands (Rao and Ryan 2004, Singh *et al.* 2004).

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In our country, of 8 million 129 hectares of cultivated land 33% irrigated area are dry land and 67% are rain-fed. Dryland agriculture contributes about 44% of total national food grain production and thus play very important role in nation's food security. It may contribute up to 75% of total food grain production if we fully utilize the all the source of irrigation (Arun Katyayan 2009, Magray *et al.* 2014). With the increase in population in India, the need of food production is also increasing. Thus, there is need to adopt soil and water management practices, that can enhance crop yield (food production) in dry areas limiting conditions. To overcome the constraints of dry land agriculture mulching is gaining a considerable attention worldwide as agronomic measures because of its low cost and rapid effect. Mulching is ancient traditional practice in dry land agricultural field. Mulch is a protective covering of organic and inorganic matters, to be placed around plants to prevent the evaporation of moisture, and the growth of weeds (Kader *et al.* 2019). The word mulch has probably derived from the German word "molsch" means soft to decay, which apparently referred to the gardener's use of straw and leaves as a spread over the ground as Mulch (Jack *et al.* 1955).

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8. Influence of Temperature on Daily Growth Rate of COVID 19 Cases in Rajasthan, India

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Abstract:

This research has objective to deduce the link among temperature and COVID-19 epidemic in Rajasthan province in India. This research paper attempt to analyses relationship of daily maximum and minimum temperature on corona virus daily expansion rate. In order to understand the influence of temperature, We let both Maximum and Minimum Temperature as dependent variable and developed two Separate Regression Models considering daily Max. and Min. Temperature of JAIPUR and JODHPUR Cities which are highly Populated and Most COVID 19 infected .We explore for mathematical link & analysis for daily

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Research Paper

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A Comparative Study of Data Mining Techniques for Predicting Disease Using Statlog Heart Disease Database

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Abstract:- *Data Mining (DM), frequently treated as synonymous to Knowledge Discovery in Databases (KDD) is actually a part of knowledge discovery process and is the process of extracting information including hidden patterns, trends and relationships between variables from large databases in order to make the information understandable and meaningful. The ultimate goal of data mining is prediction of unknown patterns and predictive data mining is the most common type of that which has the most direct real life applications. The process basically consists of three stages: (1) the initial data exploration, (2) model building or pattern identification with validation/verification process and (3) deployment of the data mining model. Therefore, in this research paper data mining techniques will be compared using the benchmark datasets. The different types of data classification methods and techniques are available such as Statistics, Visualization, Clustering, Decision Tree, Association Rule, Neural Networks, K-Nearest Neighbor Method and Genetic algorithms. The objective of this research paper is to do the comparative study and evaluation of decision tree, artificial neural network with the help of Statlog Heart Diseases Database collected from UCI machine learning repository. The advantages and disadvantages, of the data mining techniques depend on the capability and efficiency of the data mining techniques or algorithms to classify the large volume of database and predicting the relevant patterns for decision making process. The consequences of choosing any technique and the methods of implementation is very important factor. Data mining techniques such as Decision Tree and Artificial Neural Networks are used for the classification of Statlog heart disease datasets. These supervise machine learning algorithms are compared on the basis of classification accuracy and performance matrices.*

Keywords- *Data Mining, Knowledge Discovery in Databases, Statlog Heart Disease Database, K-nearest Neighbor Method, Genetic Algorithm.*

I. INTRODUCTION

Progress in digital data acquisition and storage technology has resulted in the growth of huge databases. This has occurred in all areas of human endeavour, from the mundane (such as supermarket transaction data, credit card usage records, telephone call details, and government statistics and Electronic Health Records) to the more exotic (such as images of astronomical bodies, molecular databases, and medical test records). With the rapid development of advanced computing resources, Internet technology and information processing tools and techniques in the last several decades, an enormous amount of data in science and engineering has been and will continuously be generated in massive scale, either being stored in gigantic storage devices or owing into and out of the system in the form of data streams.

Data mining is an essential step in the knowledge discovery in databases (KDD) [18]. The terms of KDD and data mining are different; KDD refers to the overall process of discovering useful knowledge from data. Data mining refers to discover new patterns from a wealth of data in databases by focusing on the algorithms to extract useful knowledge [18]. In information era, knowledge is becoming a crucial organizational resource that provides competitive advantage and giving rise to knowledge management (KM) initiatives. The goal of pattern mining is to find item sets, sub sequences, or substructures that appear in a data set with frequency no less than a user-specified threshold. Pattern analysis can be a valuable tool for finding correlations, clusters, classification models, sequential and structural patterns, and outliers.

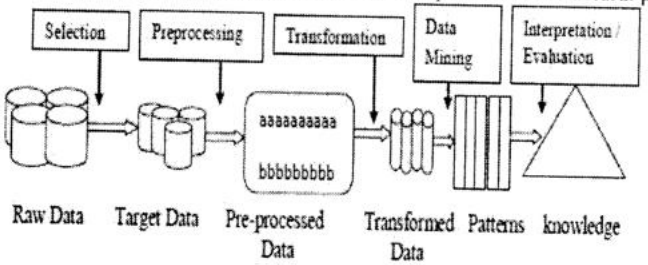

Figure 1.1: Data Mining Process

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Performance Evaluation of Decision Tree and Neural Networks for Classification of Hematology Databases

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Abstract:-Clinical databases are playing the major role for prediction of many types of diseases. Through many types of clinical processes very large volume of pathological datasets are generated for the care of patients. Pathologists analyze these data or test results obtained with the help of many clinical processes and take cares according to the predicted symptoms of disease. These datasets are more helpful for the doctors and health care centers to predict the relevant cause of diseases and to provide better medical treatment. To analyze and classify all these datasets is a very tedious process. Clinical datasets are very complex and require more efficient and accurate algorithms and data analyzing tools. Machine learning algorithms are used in many fields for the classification of large volume of data to generate the rules for building the knowledge base system. These machine learning algorithms are widely used in the medical field to build the disease diagnosis support system. This has become the emerging field of medical research. Many types of machine learning algorithms has been developed and deployed. In this research paper Hematology datasets which are very important for the pathologists to predict symptoms of many diseases. These datasets are classified as normal samples and abnormal samples using decision tree and neural networks. These machine learning algorithms are used for the classification of Hematology datasets. The classification performance of the decision tree and neural networks are evaluated on the basis of classification accuracy and performance matrices.

Index Terms:-Clinical databases, Pathological databases, Hematology datasets, Disease Diagnosis, Classification, Neural Networks, Machine learning

I. INTRODUCTION

Decision tree is a tree-shaped structure that represents sets of decisions. These decisions generate rules for the classification of a dataset. Decision Tree is a popular classifier which is simple and easy to implement [1]. It requires no domain knowledge or parameter setting and can handle high dimensional data. Hence it is more appropriate for exploratory knowledge discovery. It still suffers from repetition and replication. Therefore necessary steps need to be taken to handle repetition and replication. The performance of decision trees can be enhanced with suitable attribute selection. Correct selection of attributes partition the data set into distinct classes. A decision tree is a classifier expressed as a recursive partition of the instance space. The decision tree consists of nodes that form a rooted tree, meaning it is a directed tree with a node called "root" that has no incoming edges. All other nodes are called leaves (also known as terminal or decision nodes).

Neural networks process information in a similar way the human brain does. The network is composed of a large number of highly interconnected processing elements (neurons) working in parallel to solve a specific problem. Neural networks learn by example. They cannot be programmed to perform a specific task. The examples must be selected carefully otherwise
useful time is wasted or even worse the network might be functioning incorrectly. An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the biological nervous systems, such as the brain, [2].

The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurones) working in unison to solve specific problems. ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Artificial Neural Networks (ANN's) have been used widely in many application areas in recent years. Most applications use feed forward ANN's and the backpropagation (BP) training algorithm. There are numerous variants of the classical BP algorithm and other training algorithms. All these training algorithms assume a fixed ANN architecture.

II. DECISION TREE ALGORITHM FOR THE CLASSIFICATION OF HEMATOLOGY DATASETS

Before constructing and using the Decision Tree algorithms to classify the databases, a Relevance Analysis of the features of collected databases is performed. Relevance Analysis aims to improve the classification efficiency by

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Predicting Consumer Behaviour Using Artificial Neural Network

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Abstract: *Artificial Neural Networks (ANNs), a computational model inspired by the architecture of the human brain, exhibit certain features such as the ability to learn complex patterns of information and generalize the learned information They are used for a number of data analysis tasks such as prediction, classification and clustering. They can operate even with partial and noisy information. In this paper, an application of ANN for predicting consumer behaviour has been discussed. It helps marketers to understand how consumers behave from alternatives (like products, brands and the like) and how consumers are influenced by their environment (reference groups, their family, salespersons and so on). Consumers' buying behavior is influenced by their cultural, social, personal and psychological factors. Most of them are uncontrollable and beyond the hands of marketers, but they have to be considered while trying to understand the complex behaviour of consumers. This paper is focused to understand the behaviour of consumers towards the purchase of two-wheelers by using an artificial neural network.*

Keywords: Artificial neural networks, consumer behaviour, prediction.

I. INTRODUCTION

Neural Networks are massive parallel distributed processes that have a natural propensity for storing experiential knowledge and making it available for use. Neural Networks are powerful data mining and modeling techniques that are capable of capturing and identifying complex relationships by input/output mechanism. The greatest advantage of Neural Networks is its ability of learning both linear and non-linear relationships in the modeling dataset. Since the development of ANNs is inspired from the human brain, it resembles the brain in two respects:

- Knowledge is acquired by the network from its environment through a learning process, i.e. learn from examples.
- Inter - neuron connection strengths, known as synaptic weights, are used to store the acquired knowledge. The accuracy of the acquired knowledge increases as the number of examples increases.

Based on connection methods among the neurons and the information flow directions in the network, neural network models can be divided into two kinds. Firstly, the feed forward neural network that has only forward information transfer but no feedback information. Second, the feedback neural network that has not only forward transfer of information but also reverse transfer (feedback) information. In this paper, a feed forward and back propagation neural network is used.

II. PREDICTING CONSUMER BEHAVIOUR USING NEURAL NETWORK

For predicting purchase behaviour of the consumers of two-wheeler companies, a survey was conducted which involved 400 consumers from different areas of Jodhpur city. The questionnaire used for the survey consists of 26 questions for collecting detailed information about consumers and five leading two-wheeler companies. For the survey data, a neural network has been developed which takes the 26 variables as input and predict the choice of the consumer. The variables considered for predicting the consumer behaviour are monthly income, profession, source of purchase, decision maker for purchase, purchase by cash or loan, availability of service provider, after sales service, before sales service, infrastructure, price satisfaction, less maintenance requirement, style, durability, mileage, easy driving, brand reputation, colour, special offer, exchange offer, special gift, cash discount, mileage after purchase, availability of service provider after purchase, price satisfaction after purchase, after service satisfaction, on road pickup and maintenance service.

The descriptions of the variables including their role, type and code are shown in Table 1.

Table 1: Description of Variables

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Research Issues in Object Distance Estimation Using a Laser Pointer and a Webcam

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Abstract—The depth perception of objects in a scene is the primary research objective of the machine vision system. It has many industrial applications, such as robot navigation, scene understanding, metrology, etc. In this paper, some issues of low cost image processing based distance estimation systems are described. The low cost systems use commonly available laser pointer pens and a web camera. These systems are based on the principle of triangulation along with the perspective projection and the fact that light travels in a straight line. The paper presents a prototype system of a laser range estimation system consisting of a laser light pen and a webcam. The main contribution of the paper is a simple procedure for the system calibration and the camera parameter estimation. The system is implemented in the Matlab environment and gives good results.

Keywords-depth; camera calibration; perspective projection; laser spot.

I. INTRODUCTION

Distance estimation of various objects around us is essential for our daily activities, especially for our collision free navigation. There are currently three leading principles used for distance estimation: (1) time of flight, (2) stereo vision, and (3) monocular vision. In the time of flight system, the travel time of a wave from the source to the object and back to the receiver, for example the ultrasonic wave, is used to estimate the distance between the source and the object. This method is sensitive to the surrounding noises. The stereo vision system, which imitates the human vision system, evaluates the distance using the spatial disparity of an object point in two images (captured using a pair of cameras) with the triangulation method. The method is capable to work in any environment, but it is computationally very expensive. Further, the point correspondence problem, i.e. finding the locations of the projections of a scene point in both images, is practically very difficult to solve for real life stereo images in varying lighting conditions [1].

Humans successfully use various clues, such as texture variations, texture gradients, occlusion, known object sizes, haze and defocus, to judge depth from monocular images [2]. However, it is not possible to estimate distances from a single image without additional assumptions and information. For example, in an image of a clear blue sky with a patch, it is difficult to tell if this patch is infinitely far away (sky), or if it is a part of a blue object[2].

Due to ambiguities like these, one needs to look at the overall organization of the image to determine depths [2]. As observed by [2], the further difficulty with the monocular clues is that most of these monocular cues are global properties of an image and cannot be inferred from small image patches. For example, occlusion cannot be determined if we look at just a small portion of an occluded object.

To overcome the above difficulties in estimating depth from a single image, many researchers proposed to use some sort of projections of known structures before capturing the image [3]. These projected structures work as additional clues to estimate the distance of objects in a scene.

The present work extends the work presented in [3] by incorporating a low cost solution to calibration of the system and a simple procedure to calculate camera constant. The work presented in [3] is specific to the underwater distance measurement system, hence uses a sophisticated camera and high power laser rays. In contrast to [3], present work uses a commonly used webcam and a laser pointer pen used in our daily power point presentation.

The remaining part of the paper is organized as follows. Section 2 explains the working principle of the proposed system. Section 3 explains the experimental setup along with the alignment and calibration mechanisms. Section 4 presents results obtained by the setup. The final section presents conclusion followed by the relevant references.

II. WORKING PRINCIPLE

The proposed system is based on two well established facts: (1) the fact that as an object moves away from a camera, it appears smaller in the image captured by the camera and (2) the fact that light (laser) travels in a straight line. The fact one alone cannot be used for estimating objects distances using image processing as sizes of scene objects are not known in priori. As can be seen from figure 1(a), objects of different sizes located at different distances appear of the same size. In figure1(a), the object AB and object CD are of different heights (sizes) and are placed at different depths, but the images of both the objects are same in size, as shown by EF. Hence, the image size of an object alone cannot be used to estimate depths. However, it is possible to estimate the distance of an object if the size of the object is known. To simulate an object of known size in a scene, a laser ray parallel to the camera axis is projected on the scene object. Since the camera axis and the laser ray are parallel to each other, the distance between the center of the image and the dot created by the

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A Comparative Study of Multilayer Perceptron, Radial Basis Function Networks and logistic Regression for Healthcare Data Classification

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Abstract- *The Healthcare databases are becoming more important nowadays. Many Healthcare institutions are maintaining the large volume of healthcare databases to provide the best clinical services and insurance claims. The profits of Healthcare insurance companies are totally depending on the care of their customers. It is predicted by the healthcare department of United States of America that the early detection of any disease and its cause is very important strategy to save the big amount of insurance claim. Therefore Healthcare data classification approach has become the dominant process to save the big amount of budget allocation for the government sector. There are many types of classification approaches used for classification and prediction. In this research paper mainly multilayered Perceptron, Radial basis function networks and Logistic Regression are used to classify the Healthcare databases and on the basis of classification trends the decision are taken. All these approaches of data classification are covered. in this paper.*

Index Terms– Healthcare databases, clinical services, data classification, classification and prediction, multilayered Perceptron, Radial basis function networks, Logistic Regression.

I. INTRODUCTION

Data Mining has become one of the prominent approaches of knowledge discovery in databases. There are many types of data mining techniques and algorithms are available for data classification and prediction. Finding the hidden patterns with help of data mining techniques are used in many fields. These techniques are playing the major role in banking data classification, Healthcare data classification, Fraud detection, spam detection and many other fields. To build the efficient data classification model is a very typical task. In this process many approaches of data cleaning, transformations are used. The healthcare databases are more complex and sophisticated machine learning approaches are used for better classification and prediction. The selection of a particular data classification approach is not an easy process. The selection is mainly based on the nature of the data. There are basically two machine learning approaches are used. Supervising learning and unsupervised learning. Multilayer Perceptron, Radial basis function networks and logistic Regression are the best supervise machine learning techniques. With help of these methods large volume of databases can be classified. Data are collected, cleaned and transformed in a suitable format for the classification. Multilayer Perceptron (MLP) network models are the popular network architectures used in most of the research applications in medicine, engineering, mathematical modelling. In MLP, the weighted sum of the inputs and bias term are passed to activation level through a transfer function to produce the output, and the units are arranged in a layered feed-forward topology called Feed Forward Neural Network (FFNN) [1].

The idea of Radial Basis Function (RBF) Networks derives from the theory of function approximation. In general, a function approximation problem asks us to select a function among a well-defined class that closely matches ("approximates") a target function in a task-specific way [16]. Radial basis function networks (RBF, [1]–[4]) are used for classification. Here, these neural networks are trained to estimate posterior probabilities of class membership by means of mixtures of Gaussian basis functions and hyperplanes. From a structural viewpoint, RBF networks are closely related to direct kernel methods [5] and support vector machines (SVM) with Gaussian kernel functions [1], [6]. Logistic regression is the appropriate regression analysis to conduct when the dependent variable is dichotomous (binary). Like all regression analyses, the logistic regression is a predictive analysis. Logistic regression is used to describe data and to explain the relationship between one dependent binary variable and one or more metric (interval or ratio scale) independent variables. Standard linear regression requires the dependent variable to be of metric (interval or ratio) scale. Logistic regression assumes that the dependent variable is a stochastic event. That is that for instance if we analyze a pesticides kill rate the outcome event is either killed or alive.

Since even the most resistant bug can only be either of these two states, logistic regression thinks in likelihoods of the bug getting killed. If the likelihood of killing the bug is > 0.5 it is assumed dead, if it is < 0.5 it is assumed alive[7].

II. LITERATURE SURVEY

A good deal of effort has been made in the recent past by researchers in their attempt to develop the computational intelligence models with an acceptable level of classification accuracy. It is fount through literature review that Radial

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IMAGE CLASSIFICATION WITH DEEP LEARNING BASED ON DIFFERENT CONVOLUTIONAL LAYERS USING TENSORFLOW

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ABSTRACT

Deep learning is the subfield of machine learning which uses neural networks that inspired by the structure and functioning of the human brain. Deep learning is a new approach for data analysis and prediction; it has become very popular recently. Deep learning has achieved much higher success than machine learning in many applications, one of the reason for this is, that machine learning not able to process large amount of data effectively as well as it also not able to extract the features from the data automatically. Deep learning is being recognized as an essential tool for artificial intelligence research, with various applications in several areas such as speech recognition, object recognition and image classification. In particular, Deep Learning is preferred in the classification of images, because it can provide efficient results. In this paper, a deep learning convolutional neural network based on Tensor Flow and Keras is deployed for 2D Image Classification, using animal dataset. In this study, we used Tensor flow, one of the most popular Python programming language libraries for deep learning to classify Images and sigmoid classifier and Rectified Linear Unit (ReLu) function for deep learning convolutional neural network. At last, the each image features are trained with convolutional neural network for image classification. The proposed approach is compared for one and two convolutional layers on CPU system and finally we conclude that image classification with two convolutional layers gives better validation accuracy.

KEYWORDS –

Deep Learning; Tensorflow; Keras; Conolutional Neural Network; ReLu; Sigmoid Classifier; Image Classification

1.INTRODUCTION

Deep learning is a new approach for data analysis and prediction; it has become very popular recently. Deep learning is being recognized as an essential tool for artificial intelligence research, with various applications in several areas such as speech recognition, object recognition and image classification [3]. For Classification problems, more accurate values can be obtained using Deep Learning instead of Machine Learning.

Deep Learning can be classified into four types: Deep Neural Network (DNN), Convolution Neural Network (CNN), Recurrent Neural Network (RNN) and Q-learning. These Deep Learning types are rapidly evolving, with several software packages including Theano, CuDNN, Caffee, and Keras [3].

By using a Convolutional neural network in deep learning, a model can be created to enable powerful and often correct assumptions by changing various parameters such as activation function and number of convolutional layers. There are several libraries used in deep learning studies [2].

TensorFlow is one of the libraries used for image classification in deep learning. TensorFlow is an open-source software library developed by the Google in 2015 for numerical computation. TensorFlow can deploy RNN, DNN and CNN not only to multi core CPUs, but also to GPUs. It also supports the AdaGrad, Dropout, and ReLu functions, which are very

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Comparative Study of MapReduce Frameworks in Big Data Analytics

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Abstract: Big Data is large and rapidly growing volume of information that is mostly untapped by existing analytical applications and data warehousing systems. One such example of this data is social networking information from web sites such as Facebook and Twitter. Most organizations now understand that if they capture all the data that streams into their businesses, they can apply analytics and get significant value from it. Big data analytics helps organizations harness their data and use it to identify new opportunities. That, in turn, leads to smarter business moves, more efficient operations, higher profits and happier customers. The volume of data with the speed it is generated makes it difficult for the current computing infrastructure to handle big data. To overcome this drawback, big data processing can be performed through one of the programming paradigm known as MapReduce. Typical, implementation of the MapReduce paradigm requires networked attached storage and parallel processing. Apache Hadoop is an open source platform which is used for storage and parallel processing of huge amounts of data and has been adopted by a number of organizations. The drawbacks and limitations in Hadoop led to the development of the next generation Hadoop called Apache YARN, in which the resource management component is separated from the programming paradigm and a number of programming paradigms beyond Map-Reduce frameworks are supported like Spark, Tez, Hoya, REEF etc. The most important features included were the HDFS High Availability, YARN and HDFS federation, besides some performance tuning. At the same time, Facebook which used Apache Hadoop for its storage and processing began to see issues as Apache Hadoop could not handle its scalability and processing needs. To address these issues Facebook modified the architecture of Hadoop to create a new framework called Corona. This paper compares three parallel programming frameworks - Hadoop, YARN and Corona based on various parameters such as Architecture, HDFS Federation, MapReduce Availability and HDFS Availability.

Keywords: Hadoop, MapReduce, HDFS, YARN, Corona

I. INTRODUCTION

Hadoop provides a distributed file system and a framework for the analysis and transformation of very large data sets using the Map-Reduce paradigm. An important characteristic of Hadoop is the partitioning of data and computation across many (thousands) of hosts, and executing application computations in parallel close to their data. A Hadoop cluster scales computation capacity, storage capacity and IO bandwidth by simply adding commodity servers. Hadoop clusters at Yahoo! span 25 000 servers, and store 25 petabytes of application data, with the largest cluster being 3500 servers. One hundred other organizations worldwide report using Hadoop [1]. Apache Hadoop has two core components, the Hadoop Distributed File System (HDFS) [5] for storage which is open source versions of Google File System (GFS) [2] and the MapReduce [4] Engine for computation which is open source version of Google's MapReduce.

A Hadoop Map-Reduce cluster employs a master-slave architecture where one master node (known as JobTracker) manages a number of worker nodes (known as the TaskTrackers). Hadoop launches a Map-Reduce job by first splitting (logically) the input dataset into multiple data splits. Each map task is then scheduled to one TaskTracker node where the data split resides. A Task Scheduler is responsible for scheduling the execution of the tasks as far as possible in a data-local manner. In a typical Map-Reduce job, input files are read from the Hadoop Distributed File System (HDFS).

Facebook initially employed the MapReduce implementation from Apache Hadoop. Over half a petabyte of new data arrived in the warehouse of Facebook every 24 hours, and adhoc queries, data pipelines, and custom MapReduce jobs processed this raw data around the clock to generate more meaningful features and aggregations. Facebook cluster had 100 PB of data and to process that it crunched more than 60,000 Hive queries a day. The data warehouse of Facebook grown by 2500x in the past four years, and was expected to continue growing with Facebook's

RESEARCH ARTICLE OPEN ACCESS

Efficiency Enhancing Resource Scheduling Strategies in Cloud Computing

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Abstract:

The clouds have changed the patterns of traditional way of using the software and infrastructures. In cloud computing job scheduling is used to schedule certain jobs to particular resources at particular time. In this paper, some scheduling strategies are discussed which schedule computing resources in a way that providers achieve high resource utilization, low power consumption and users meet their applications performance requirements with minimum expenditure.

Keywords — **Scheduler, Virtual Machine, Round Robin.**

I. INTRODUCTION

The enterprises can rapidly complete some business and reduce a lot of cost by using clouds. The cloud computing system is divided into consumers, service providers and resource providers, which is currently the major way to layer the cloud computing. The service providers want to minimize the cost of using the resources offered by the resource providers, and to reduce the response time for consumers. An application operated in the cloud consisting of one or more services which is sent to the service provider stating two main constraints, time and cost [1, 2]. Service/job scheduling is one of the most important methods to achieve these. The actual processing time is longer than the original estimated time because of delays occurring on the provider's side. As the cloud computing are primarily operated by the principle of paying by time, so the service provider want to reduce the delay and improve the quality of their service [3]. The ultimate goal of scheduling in cloud computing is to have efficient resource utilization.

II. SCHEDULING PROCESS IN CLOUD COMPUTING

The process dealing with normal service requests from consumers is as follow:

a) The cloud service provider receives the service request of user's [4]
b) Execution of the receiving.
c) The process of service/job scheduling.
d) The process of resource allocation.

Service/job scheduling work is carried out in the step(c). The service providers have a huge number of users; they have to deal with massive data [5], which are more difficult to schedule. The requests from users must be scheduled efficiently, so scheduler needs to calculate a proper sequence to response those requests.

A. *Main Components in Service/Job Scheduling*

The main components performing Service/job scheduling are shown in Fig. 1, which is composed of classifier, scheduler, and summary component.

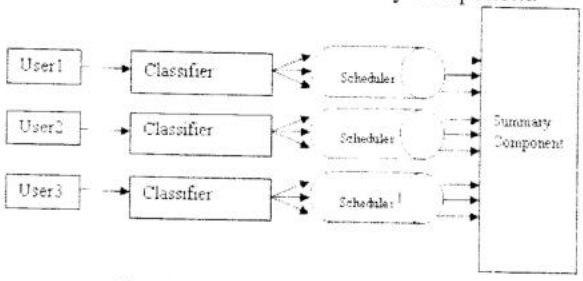

Fig. 1 Component in Service/Job Scheduling

a) Classifier. This component receives all requests from consumers, analyzes them and

Design and Calibration of an Experimental Setup for 3-D Reconstruction of A Scene from Stereo Images

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Abstract—**The ultimate goal of a stereo vision system is to reconstruct 3D geometrical models of scenes. Once a 3D model is available, it can be used in many real life applications such as autonomous navigation of robots, metrology, artificial eyes, etc. This paper reports a design of an experimental stereo vision setup for generating 3D geometrical models of scenes from stereo pair images. It further reports the results of stereo camera calibration, intrinsic and extrinsic parameters, of the stereo system along with the calibration procedure. These parameters are used to rectify captured stereo pair images for generating the disparity map. The paper further describes the basic steps of 3D reconstruction from a pair of stereo image. Finally, the paper presents a reconstructed scene from the stereo image captured by the stereo system.**

Keywords— Stereo vision, 3D reconstruction, camera calibration,disparity map.

I. INTRODUCTION

The stereo vision is based on optics of a set of two pin-hole cameras where three-dimensional real world scene is projected as two-dimensional images and a set of intelligent algorithms to interpret these images. In this, two images of a scene are simultaneously captured by our two eyes. These images are further processed by our brain to recreate the three-dimensional model for visualization, depth perception and many other applications. It has been theoretically established that a set of two projections of a scene captured by two cameras from two slightly different viewpoints are enough to reconstruct three-dimensional model of the scene. Physics of binocular vision system is simple and very powerful. As per pinhole camera image formation concept, it is found that the projection of a scene point in one image captured by one eye is slightly displaced in the image captured by the other eye. The displacement between the locations of a point in the two images is commonly referred as disparity and it is inversely proportional to distance between scene point and eyes. This is the fundamental mechanism used by the stereo vision system to reconstruct the scene and depth perception. The perception of depth which is so intuitive in humans and other animals is eluding researchers in computer vision from past few decades to develop visual perception capabilities in machine.

The ability of a machine to reconstruct a 3D scene from 2D images is extremely useful for many applications in science and industry. One such application is robotics/machine vision where proper distance estimation is important for obstacle avoidance. Other applications include automatic navigation of mobile robots in an environment where human intervention is dangerous or is unreachable and automatic driving and navigation of road vehicles. The stereo vision is also useful for accurate human face recognition system, reconstructing 3D environment for path planning, retrieving a 3D object, creation of 3D maps and many other applications in engineering and medicine where human vision like capability is required.

Currently, active sensing technologies such as SONAR (Sound Navigation and Ranging), LIDAR (Light Detection and ranging), structured light etc. are used for automatic navigation and other vision applications. These methods are based on emitting energy into the environment and analyzing the reflected pattern. Unfortunately, such techniques are invasive and have limited range, and thus have a restricted application domain [1]. Further, they require special purpose hardware (laser projector) that is bulky, expensive and power consuming. Besides, these methods are sensitive to the reflection properties of the elements in the scene. Passive sensing approaches, such as multi view stereo vision are robust and very cheap alternatives because only cameras (two in case of binocular stereo) and a computer are required and no energy emission is involved. However, this technology is in its infancy and requires extensive research to make it a commercially and technically viable alternative to above mentioned methods. Specific issues of concern are computational efficiency and improper reconstruction near object boundaries and textureless areas [2].

In this paper, the design of an experimental stereo camera setup for acquiring stereo pair images is presented. It further reports the results of stereo camera calibration in the form of intrinsic and extrinsic parameters of the stereo system along with the calibration procedure. These parameters are used to rectify the captured stereo pair images for generating the disparity map. The paper also describes the basic steps of 3D reconstruction from stereo images. Finally, the paper presents a reconstructed scene from stereo images captured by the stereo system using the disparity map generated by the algorithms developed by the authors in their earlier work [3-4].

II. RELATED WORK

The major challenge to obtain 3D reconstruction of a scene is to generate an accurate disparity map in real time.

Development of an Intelligent Database System to Automate the Recognition of Machining Features from a Solid Model Using Graph Theory

Rachna Verma and A. K. Verma

Abstract—**Automatic recognition of machining features is essential for the integration of CAD and CAM. Graph-based recognition is the most researched feature recognition method as the B-Rep CAD modelers' database uses graph to store the model data. A graph-based feature recognition system uses attributed graphs to store CAD models as well as machining feature templates. The graph isomorphism is used to extract features in the model graph and template graphs. There are two main research issues in this system- (1) Efficiently recognize the features as the graph isomorphism is computationally very expensive and (2) incrementally expanding the feature template database to include new features, without any structural change in the recognizer. In this paper, the application of feature vectors (a heuristic developed by the authors that converts a feature graph into a unique vector of integers, irrespective of the node-labeling scheme used by B-Rep modelers), to automatically expand the recognizer's feature template database, is presented. It facilitates automatic inclusion of new features in a feature database, without requiring any additional programming effort from the user or any changes in the structure of the recognizer. The proposed system has been implemented in Visual C++ and ACIS solid modeling toolkit. Further, the proposed system is intelligent as it has the capabilities to learn from the examples to incrementally build the feature database.**

Index Terms—**Machining feature, feature recognition, graph matching, solid model.**

I. Introduction

An intelligent database is a full-text database that employs some artificial intelligence to return the most relevant information possible requested by the user depending on the context. This is in contrast to a traditional database, which is searchable only by keywords and verbatim phrases with some relational operators. In this paper, definition of intelligent database is extended to include geometrical data along with the textual data. Further a system is presented that interact with this raw geometrical database to extract useful machining features for automated manufacturing of the various parts. The manufacturing process and operation selection is highly dependent of the shape of the part to be produced. Since there are infinite possibilities of shapes it is not possible to create a predefined library of it, hence shapes are stored in the solid model database in terms of low level geometrical entities such as vertex, edges and faces in the form of a graph or in some other suitable structure. Hence there is a requirement of a system that can extract patterns in this low level database that can be used to automate the manufacturing of the given shape. There are a number of techniques used for this purpose but graph-based recognition is the most researched feature recognition method due to sound mathematical background of graph theory and a graph's structural similarity with B-Rep CAD modelers' database. A graph-based feature recognition system represents geometry and topology information of a part using a graph structure. The graph carries all the useful information of part features as certain attributes assigned to its arcs and/or nodes. This explains the inherent advantage of B-Rep-based solid models over others in graph-based feature recognition. Pre-defined manufacturing features, known as manufacturing primitives are also represented by similar graphs. Graph isomorphism is then used to extract features.

A feature recognition system uses a pre-defined database of feature templates. Thus, a simple mechanism is needed to define new features and expand the template database to include user-defined features without any structural change in the recognizer. This led to development of various methods to represent features. Pratt [1] proposed a non-manifold feature representation scheme using B-Rep for volumetric features. He introduced the concept of implicit and explicit feature representations. In explicit representation, a full geometric shape is defined, while in implicit representation, minimal information is used to define the feature but other details have to be computed when needed. Shah and Rogers [2] and Wang and Ozsoy [3] used hybrid CSG and B-Rep schemes for feature representation. None of these schemes, however, is suitable for feature recognition as the B-Rep or CSG representations of a shape are not unique.

The ASU feature test bed [4], a system developed by Laakko and Mantyla [5], and STEP [International Standard for Exchange of Product data] all use feature definition languages to define new features [6].

In this paper a heuristic has been reported that converts a feature graph into a vector of integers, called feature vector [7], [8]. A feature vector uniquely represents a feature graph, irrespective of the node-labelling scheme used by B-Rep modelers. It can be generated automatically from the modeler database. Its usage is intended to reduce the graph matching time complexity to a polynomial of order three. It also facilitates automatic inclusion of new features in a feature

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Security Keys: Modern Security Feature of Web

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ABSTRACT
Security providing devices that are used to protect against multiple threats like man-in-the-middle attack and phishing are known as "security keys". With the help of security keys, user can register himself with any kind of online services that works with this protocol. If we install these security keys in some devices, deployment, implementation and use becomes very easy. We can also see the security keys in some browsers like chrome, Mozilla, even in some online services as well. These keys provide more satisfaction to user with the help of higher security level. This work is all about security keys which are second-factor devices that are used to improve the state of the art for authentication purpose for real consumers in terms of privacy, security, and usability.

Keywords
Authentication, client, keys, signature, registration

1 INTRODUCTION
There are many research papers which have been proposed to work on some other security feature rather than passwords. But till no such efforts is successful. Even most of the service providers works on password-based authentication with one other feature i.e. OTP (One Time Password). One Time Passwords also not provide complete security in some of the common attacks. In this way deployment of OTPs is limited in case of reliability and security perspective. Each and every client who is working on the internet wants security of information but sometimes he or she do not know that someone else may be a intruder is collecting the information. Information is an asset that must be protected [11]. At the same time, other authentication and security factors related to response and challenge based protocols also suffer from some deployment problems. On the other hand smart cards and NID (National ID) cards require some pre-installation before use. Protocol is proven to be secure under CDH assumption in both the random oracle model and the ideal cipher model [8].Over forty years of research have demonstrated that passwords are plagued by security problems [2] and openly hated by users [3]

The security is achieved in the formal security model of Bellare et al. [9].This work is related to one other security factor provided by "Security Keys". These Security keys help the user in better way than OTPs in terms of usability, authentication, privacy etc. Here we will see how security keys increase the security level and how they provide satisfaction to user.

2 RELATED WORKS
Now we will have an overview of related work. Some schemes can do better than passwords on security as expected, given that inventors of alternatives to passwords tend to come from the security community. The concept of using combining functions to determine the combined effect of vulnerabilities in a network[12].Network security involves the authorization of access to data in a network, which is controlled by the network administrator [10]. Some schemes do better and some worse on usability- -suggesting that the community needs to work harder there.[1] Before that let's see some basic knowledge that will help us to understand the work done.

One Time Passcodes: Even though One Time Passwords provides higher security than simple passwords, still we suffer from some problems. First, OTPs are vulnerable to some cyber-attack like man-in-the-middle attack and phishing. Second, OTPs require the availability of phones and internet as they are send via messages or emails. OTPs offer a sub-optimal user expertise as they typically need the user to manually copy codes from one device to a different. Security Keys are unit immune to phishing and man-in-the-middle by design; our preliminary study conjointly shows that they supply a far better user expertise.

Smartphone: Many of the efforts were taken to take the leverage of user's mobile phone to provide more security, whether it is in industry or academies. At the time of promising, they face lots of challenges: Like, on a general purpose, protection of application logic from malware is very difficult. Even though, sometimes user's phone gets unreachable or data connection problem is there or battery related issue

may be there. There is no requirement of batteries in security keys.

Smart Cards: Security Keys work into the what you have class of authentication schemes and have a detailed relationship to smart cards. Whereas Security Keys are often enforced on prime or top of a smart card platform like JavaCard. Security Keys defines a specific protocol for which smart cards area unit only one attainable implementation platform.

TLS: TLS is a Transport Layer Security (TLS) protocol which is used to provide security, data integrity and privacy between two communicating parties. Now a Days TLS is the only security protocol which is widely deployed today. On the other hand TLS is used for Web browsers and some other kind of applications which requires data to be securely transmitted over a network like VPN Connections, Voice over IP, File Transfer and instant messaging. TLS basically consists of two types of protocols:

- TLS Record Protocol and
- TLS Handshake Protocol

Protocol is proven secure Password-Based Group Key Exchange in a Constant Number of Rounds aga nst dictionary attacks under the DDH assumption, in the ideal-cipher and random oracle models [4]. Proposed the use of probability scores for each vulnerability to represent the likelihood that one attacker or the percentage of attackers that will exploit the vulnerability [13].Record protocol is used to provide secure connection and Handshake Protocol permits the client to authenticate server and vice versa.

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Performance Analysis of AODV and AOMDV Routing Protocols Using ZigBee for Precision Agriculture

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Abstract - **The need for intelligent farming especially in developing countries like India has grown to a greater extent. Moreover, the research in the area of ZigBee based wireless sensor network in precision agriculture, such as monitoring of environmental conditions like soil moisture content, monitoring growth of the crop, and automated irrigation facility has taken a new dimension. Manual collection of data for desired factors can be sporadic, time-consuming, noncontinuous and may produce variations from incorrect measurement taking. Wireless distinct sensor nodes can reduce time and effort required for monitoring the environment along with the guarantying accuracy of data. The logging of data allows for reduction of data being lost or misplaced. The present study compares AODV and AOMDV routing protocols in mesh and star topology on basis of five parameters including Average Energy, Average Throughput, Average End-To-End Delay, Average Jitter and Packet Delivery Ratio. Furthermore, the study compares the two given routing protocols at different distances of 10 meters and 20 meters and at various numbers of nodes including 11, 21 and 31. The NS-2 simulator has been used for experimental setup in the study which provides an environment for the networks, topology and the nodes. The study aims at analyzing the derived results from the experimental setup and thereby suggesting the most suitable topology and routing protocol for developing an effective and efficient model in ZigBee for the real-time implementation in precision agriculture.**

Keywords- Precision Agriculture; Wireless Senor Network; ZigBee; Routing Protocols; AODV; AOMDV; Star Topology; Mesh Topology

I INTRODUCTION

The current scenario of agriculture has drastically changed over the recent years. Today, agriculture routinely employs sophisticated technologies such as temperature and moisture sensors, robots, aerial images, smart power systems, Global Positioning System (GPS) technology and farm management software. These advanced devices, precision agriculture, and robotic systems help save time and money of the farmer and allow businesses to be more profitable, efficient and more environmentally friendly.

Precision agriculture (PA) is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops. The goal of precision agriculture research is to define a Decision Support System (DSS) for whole farm management with the goal of optimizing returns on inputs while preserving resources [1] [2]. Precision farming involves the application of technologies and principles to manage spatial and temporal variability that is associated with various aspects of agricultural production for improving the environmental qualities and crop performance. The logic behind the precision farming is that production inputs (fertilizer, seeds, chemicals, etc.) should be implied as and where needed.

II WIRELESS SENSOR NETWORK IN PRECISION AGRICULTURE

The major technology that drives precision agriculture is Wireless Sensor Network. The sensor network can guide the farmers' attention towards the crop zones in need of nutrients, water, etc. The derived information can result in an increase in farming efficiency provided that the farmer receives it in time and has the capacity to act on the same. Several kinds of sensors can be consolidated into the sensor node, thus, the conditions of the soil and crops, including illumination, temperature, pests, humidity, crop disease, etc. can be monitored both - remotely and in real-time.

WSN nodes are categorized into three types of network topologies. One is the star topology, wherein each node connects directly to a gateway. Another is cluster tree network wherein each node connects to a node higher in the tree and then to the gateway, and data is routed from the lowest node on the tree to the gateway. Finally, to offer increased reliability, mesh networks feature nodes that can connect to multiple nodes in the system and pass data through the most reliable path available. This mesh link is often referred to as a router [3].

III STATEMENT OF THE RESARCH PROBLEM

At present, automatic systems have few manual operations, insufficient flexibility, and inaccuracy. Therefore, agricultural field requires automatic control system in order to provide adequate irrigation to a specific area and detecting other plant needs right on time without having to go in the field to check each plant individually. This study aims at proposing a based on the wireless sensor network for the control of various parameters of the irrigation system. In addition to the proposed system, the study uses ZigBee technology for the long distance communication

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Analyzing Big Data Using Updatable Classifiers

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***Abstract*---There is exponential growth in amount of data that is generated in various sectors like genetics, telecommunication, banking sectors etc. This enormous data has lot patterns and information stored in it. There is need to extract this intel from the data. Machine learning is used in identifying these patterns and the relation between inputs and outputs. Traditional algorithms like decision tree, neural network, random forest and others were used in machine learning models. But these models become inefficient with large number of instances and when input data varies with time like in stock markets, spams or biological viruses. In this paper, techniques to analyse big data using updatable classifiers in WEKA will be discussed. With the development in algorithms that automate adversarial sample generation like deep neural networks. There is an urgent need to fight these perturbations that are introduced to yield adversary selected misclassifications. The adversaries adapt to the data miner's reactions, and data mining algorithms constructed based on a training dataset degrades quickly. These kind chunks in classifiers help spammers and hackers to exploit our privacy. To help in these environments there is need for classifiers that can update themselves with evolving inputs.**

***Keywords*—Updatable Classifiers, WEKA, Big Data, Adversarial Learning, Cyber Security, Spam Filters, Machine Learning.**

I. INTRODUCTION

The industrial revolution was a major turning point in the history of humanity. It enabled businesses to be more productive, create more jobs, and raise the overall standard of living. Today, we are on the precipice of another revolution. With machine learning done right, organizations can develop insights instantly and dramatically grow their business.

Machine learning enables cognitive systems to learn, reason and engage with us in a natural and personalized way. Think Netflix movie recommendations, Internet ads based on browsing habits, or even stock trades — these are all ways machine learning is helping us navigate our world in powerful new ways. Learning here is not by remembering and following step by step instructions but recognizing complex patterns and makes intelligent decisions based on data. The difficulty lies in the fact that the set of all possible decisions given all possible inputs is too complex to describe. To tackle this problem the field of Machine Learning develops algorithms that discover knowledge from specific data and experience, based on sound statistical and computational principles

With the exponential growth in the amount of data that is being generated there was a great opportunity to exploit that by finding patterns and relations between the data. Traditionally algorithms like decision trees, random forest, neural networks etc. were used and they are very efficient in what their results are but they have their limitations.

Problem with these algorithms were that they needed the whole data in the memory while training their models. Another limitation with these logarithms that they were prone to adversarial samples that are crafted to force a target model to Classify them in a class different from their legitimate class which lead to many security issues like the failing of spam filters, image recognizers etc.

In this paper, we discuss how to apply concept of machine learning on Big data using updatable classifiers and using similar kind of algorithms in to deal with adversarial opponents. We will be using WEKA to analyze the working of updatable classifiers. Updatable classifiers do not need whole training data in memory while building the model they update the model tuple by tuple. They have the edge when dealing with inputs which change with time like spam mails, as models can then be updated seeing how it is performing on new inputs.

2. OPEN SOURCE DATA MINING TOOL: WEKA

Waikato Environment for Knowledge Analysis (Weka) is a popular suite of machine learning software written in Java, developed at the University of Waikato [9]. Weka is a work bench that contains a collection of visualization tools and algorithms for data analysis and predictive modeling, together with graphical user interfaces for easy access to these functions. Weka supports several standard data mining tasks, more specifically, data preprocessing, clustering, classification, regression, visualization, and feature selection. Weka's main user interface is the Explorer, but essentially the same functionality can be accessed through the component-based Knowledge Flow interface and from the command line. There is also the Experimenter, which allows the systematic comparison of the predictive performance of Weka's machine learning algorithms on a collection of datasets. In this paper we will be using explorer and the data generator of the WEKA tool [10].

3. UPDATABLE CLASSIFIERS

3.1 Naive Bayes Updatable

It is an incremental form of Bayesian networks, as it assumes that each feature is not dependent on the remaining features. The naive Bayes algorithm usually used for a batch learning, because when algorithm handles each training sample separately, it could not perform its operations well, described in. As per the characteristics of the incremental learning algorithm, the naive Bayes algorithm can be trained by using one pass only as per the steps below[3]:

1. Initialize count and total=0
   - Go through all the training samples, one sample at a time.
   - Each training sample, t (x, y) will have its label associated with it.
   - Increment the value of count, as it goes through the particular training sample.
2. The probability is calculated by dividing individual count by the set of training data samples of the similar class attribute.
3. Compute the previous probabilities as the portion of entirely training samples which are in classy.

Classification can be made. Its probabilistic model can directly handle situations where some data are missing.

3.2 IB1/IBk

This algorithm does not built the model, it generates prediction

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Analysis of Consumer Behavior on SCM Related Factors Using Data Mining: A Case Study of the Indian E-Commerce Industry

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Abstract: The electronic commerce (e-commerce) supply chain management (SCM) or ECSCM is a new and rapidly developing area of study in India and abroad. At the same time there are several challenges faced by e-commerce. These challenges lead to customers refraining from its use due to poor experiences while shopping online. According to industry experts, these issues are mostly pertaining to inefficient SCM. To confirm it, three hypotheses are proposed on discussions with the industry experts. First hypothesis states negative correlation of problems faced with overall customer satisfaction. Second states negative correlation of problems faced with the factors re-establishing trust. Third hypothesis states positive correlation of factor re-establishing trust with the overall satisfaction. A survey has been launched fetching replies from 401 Indian e-commerce consumers. The responses are processed by a statistical tool named Smart PLS 3.0 and the proposed hypothesis are checked by creating a suitable model. The results confirmed the three proposed hypothesis. The survey provides a clear understanding of demands, problems faced and solutions proposed by consumers themselves. The knowledge generated through this work could prove to be a win-win situation for both consumers and e-commerce companies. The consumers could be benefited by enhanced shopping experience according to their preferences. The e-commerce companies will be benefitted with better consumer loyalty which ultimately leads to increased profits.

Keywords: E-commerce, supply chain management, data mining, consumer behavior.

I. INTRODUCTION

Today all businesses are making their mark on internet to reach maximum number of customers, expanding business and generating larger revenues. But, with growth comes several challenges and issues. These obstacles if not handled properly, make the respective company loose customer loyalty and hence business. But, if these obstacles are well addressed, not only the business prospects and customer loyalty are maintained but it further attracts a larger number of new customers as well. These obstacles could be easily known by taking feedback from the customers. Considering the Indian e-commerce industry in this case, and after analyzing various research papers, the attention is focused on the supply chain management (SCM) related issues pertaining in this industry. Electronic commerce supply chain management (ECSCM) is a new and rapidly developing area of study in India and abroad given the exponential growth of e-commerce in every sector of the market. In conventional and e-business, its effective implementation could build trust for consumers or ineffective implementation could break that trust. Every company takes appropriate measures to curb out the elements of distrust.

Direct implementation inculcates various costs and risks involved for its success or failure, there the best options seems taking customer reviews for a lot and extrapolating the results. For this, a survey has to be launched asking questions to the customers which depict their view points. The obtained data cannot be processed through manual methods as it is large data, therefore data mining techniques are used for processing, translating, analysis and drawing useful inferences out of it.

A. Research objectives

The main objective of this study is to validate the conformance / non-conformance of the hypothesis which are stated as follows:-

1) *Hypothesis 1:* The problems faced by e-commerce customers tend to create a sense of distrust i.e. negatively affects overall satisfaction.
2) *Hypothesis 2:* The problems faced by e-commerce customers tend to decrease trust in factors that re-establish trust i.e. problems faced are negatively co-related to factors that re-establish trust.

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3D Trajectory Reconstruction of a Moving Object from a Stereo Video using Particle Filter

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Abstract: *Moving object detection and tracking in videos is an actively researched area for the last two decades due to its practical applications in many areas, such as trajectory analysis of moving objects, making game playing robots, human computer interaction, etc. This paper presents an experimental study to reconstruct the 3D trajectory of a coloured moving object by combing particle filter and stereo vision. Although, the initial results obtained are encouraging, but the generated trajectory has waviness. Further research is required to reduce the waviness and generate more accurate trajectory.*

Keywords: *Object detection, object tracking, particle filter, 3D trajectory, Kalman filter, optical flow*

I. INTRODUCTION

Detecting and tracking objects in videos and reconstructing their 3D trajectories are an active research area of computer vision. These technologies have many potential applications, such as analysis of sport videos to detect faulty motions of a sportsman, trace the trajectory of a ball, etc[1], understanding human postures to improve human machine interactions, prediction trajectories of moving objects to detect and avoid collisions, catching moving objects by robots, surveillance, etc. The reconstruction of the 3D trajectory of a moving object is impossible from a monocular video alone without making prior assumptions about the motion of the object [2]. Biological and artificial systems use binocular stereoscopy to calculate the 3D co-ordinates of a scene point by utilizing the disparity in the projections of the scene point in the two views captured by a pair of two cameras positioned side by side at a distance. However, the calculation of disparities of all the points of a scene is a time consuming process and no real time solution is yet available for commonly available hardware. To efficiently reconstruct the 3D trajectory of a moving object, the combination of the stereo vision concept and moving object detection techniques, such as optical flow, background subtraction, particle filter, Kalman filter, etc, can be combined. The combination reduces the correspondence matching to only objects of interest, making the process more efficient. In this paper, the particle filter object tracking concept is combined with the stereoscopy concept to efficiently calculate the 3D trajectory of a moving object from a stereo video. The remaining part of the paper is organized as follows: section 2 reviews the related work. It introduces the basic concepts of stereoscopy and gives an overview of the particle filter object tracking concept. Section 3 describes the proposed system. Section 4 presents some experimental results and finally, section 5 concludes the paper.

II. RELATED WORK

Vision based object tracking has been actively researched for the past three decades. However, most of the research is limited to monocular videos, which alone is insufficient to create the 3D trajectories of the tracked objects in a scene without relying on assumptions about the scene that are too strong for any practical application [3]. To overcome the inherent limitations of monocular vision to recreate 3D trajectory, many researchers proposed to use stereoscopy. Harville [4] and Zhao et al [5] proposed to use dense stereo and static background model to recreate 3D trajectories of moving objects. Since they use dense stereo vision, the process is computationally inefficient to generate the trajectory in real time and their assumption of static background model also limits the domain of the object tracking.

Mittal and Davis [6] proposed to use region based stereo vision to track moving object. The method is more efficient than the methods proposed by Harville [4] and Zhao et al [5], but they also used the static background model. Hence, the method has the similar limitations.

Tsutsui et al [7] uses stereovision and optical flow to recreate the 3D trajectory of a moving person. The optical flow method is very sensitive to illumination change and require static background model. Zhongwei et al [8] used stereoscopy in combination with camshaft algorithm to reconstruct the 3D Trajectory. They used dynamic programming for the correspondence matching and disparity calculation.

Park at el. [2] used the multiple perspective projections of a scene to reconstruct 3D trajectory of moving objects. They used co-ordinate independent basis vectors derived from the stationary areas of the scene, which reduces the computational complexity of the trajectory reconstruction.

The method proposed in this paper is an extension of the method presented by Heath and Guibas [4] which uses sparse stereo vision and particle filter to reconstruct the 3D trajectory. In contrast to multiple stereo cameras used by

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A Review of Object Detection and Tracking Methods

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Abstract: *Moving object tracking in videos is an actively researched area for the last two decades due to its practical applications in many areas, such as event analysis, human computer interaction, crowd analysis, etc. Extensive research reported some success applications in highly constrained domains, but there are still many challenges that need to be resolved, such as abrupt object motion, changes in appearance of the object, non-rigid objects, occlusion, illumination, etc. This paper presents a comprehensive review of various object tracking approaches reported in literature and proposes a new categorization to group various tracking approaches to streamline future researches. It also discusses, in detail, methods used in each category for tracking single and multiple objects. Finally, the paper concludes by setting directions for further research.*

Keywords: *Object detection, object tracking, particle filter, Kalman filter, background subtraction, optical flow*

I. INTRODUCTION

Now a days, many researchers are actively involved in the development of computer vision systems that try to simulate the basic abilities of biological systems, such as the abilities to understand scenes, detect objects(static or moving), understand surrounding, recognize events, analyze crowd, count people, detect people and vehicles detection, etc. Object detection refers to finding an object of some interest in a scene, for example detecting people, vehicles, etc. in a scene. Object tracking refers to estimate the trajectory of a moving object in a scene, for example, tracking the trajectory of a moving car to find lane violation. For tracking objects, videos are generated either from static cameras, such as surveillance cameras, or moving cameras, such as cameras mounted on a mobile robot. In a static camera, the background is always static and objects move, while in a moving camera, objects move in a dynamic background.

In order to design a robust visual tracker, there are some fundamental problems, such as abrupt object motion, changes in appearance of the object, occlusion, illumination, non-rigid objects and real time processing requirements, which need to be resolved. The appearance of the object often varies during tracking, for example appearance changes due to articulation, rotation or geometrical transformations of the object. Therefore, to achieve the robustness in tracking, adaptability to appearance changes is necessary.

II. OBJECT TRACKING FRAMEWORK

A typical object tracking framework, as shown in Figure 1, generally consists of three modules: Object Detection, Object Modeling and Object Tracking. They interact with each other during a tracking process. These are discussed in detail in the following sections.

III. OBJECT DETECTION

Object detection, a pre-requisite for initializing a tracking process, refers to locate the object of interest in every frame of a video sequence. There are generally two approaches of object detection strategies commonly used to initialize a tracking process: (1) manually locating the object in the first frame and let the system detects features, such as corners, to track the object in the next frame and (2) automatic detection of the object using predefined features, such as color. There are many techniques to detect moving objects: Background subtraction, Kalman filter, particle filter.

Background Subtraction [1-3] is widely used in video sequences having static background. The method segments the image into foreground and background. The foreground contains moving objects such as moving people, cars while the background contains static objects, like road, building, trees, stationary cars, etc.

In this technique, a reference background image is first captured when the objects of interest are not present in the scene. The moving object is detected by subtracting the current image frame from the reference background image. The resulting difference image has values below a predefined threshold in the background area of the current image except the area occupied by the object. The pixels where the difference is above the threshold are classified as foreground. As, in practice, the background of any scene gradually changes with time, the reference background image should be updated from time to time to avoid false detection of objects.

Temporal differencing [4] is a method most suitable for scenarios where the camera is moving. It detects objects by taking differences of consecutive frames (two or three), pixel by pixel. In a moving camera situation, the motion of the camera and the motion of the object are mixed up. Therefore, some researchers [2] proposed to estimated and adjust camera motion first and then apply the background subtraction method. The temporal differencing method fails to detect

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Comparative Performance Evaluation of Various Color-Based Object Tracking Methods

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Abstract —*Extensive research in object detection and tracking has produced many techniques for detecting and tracking objects in videos. The most widely researched techniques include color-intensity based, particle filter based and optical flow based trackers. Each technique has its own merits and limitations. This paper presents a comparative performance evaluation of these leading object detection and tracking techniques. After a brief overview of various techniques, viz. particle filter, color-intensity based and color optical flow trackers, that directly or indirectly uses color for the purpose of object detection and tracking, their performance on a test video is reported in this paper.*

Keywords — *Object detection, object tracking, optical flow, particle filter, color-based tracking*

I. INTRODUCTION

Object detection and tracking is one of the active research areas of computer vision. It has many practical applications, such as analysis of sport videos to detect faulty motions of a sportsman, tracing the trajectory of an object of interest, human computer interaction, target localization, event analysis, etc. Object detection refers to finding the object of interest in a scene while object tracking refers to locating the object of interest in successive video frames for generating the trajectory, for example tracking the trajectory of a moving car to find lane violation.

Object tracking is a challenging problem in a natural scene due to abrupt changes in object motion directions, changes in appearance of the object in different frames, object occlusion, illumination changes, non-rigid transformation of objects, noises in images, and computational complexity to meet real time processing requirements. A robust object tracker should be able to track single or multiple objects moving in a dynamic background. Typically, an object tracker consists of three modules [1]: Object Detection, Object Modeling and Object Tracking. During the last two decades, various object tracking methods have been emerged focusing on designing a robust tracker. A categorization of various tracking approaches is presented in [1].

This paper investigates comparative performance of some of the leading object tracking methods, viz. color-based method, optical flow method and Particle filter method, to track a red color object. These three methods are briefly discussed in the following sections for tracking primary color objects; their comparative evaluation in terms of performance is also presented. The results are reported for a test video captured by the author in common household lighting conditions.

The remaining part of the paper is organized as follows: Section 2 describes the basic work flow of a typical color-based object detection and tracking system. Section 3 presents a brief description of color-intensity based object detection and tracking system developed by the author. Section 4 presents a color-based optical flow method, which is modified by the author to handle a dynamic background. Section 5 discusses the standard color-based particle filter method, which is commonly used by the researchers. In section 6, the results of the methods developed/modified by the author are evaluated and compared with the results obtained by the standard particle filter. Finally, conclusions are drawn and the direction for the future research is proposed.

II. COLOR-BASED OBJECT DETECTION AND TACKING METHODS

Color is one of the most important features of an object that is used extensively in literature to detect and track objects. The basic work flow in typical color-based object detection and tracking system is given in figure 1. Recent advances using color as a feature often use color histograms to model the object. Besides having low computational cost, color histogram distribution is robust against non-rigidity, scale and rotation transformation of objects.

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Detecting and Tracking a Moving Object in a Dynamic Background using Color-Based Optical Flow

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Abstract— In this paper, a hybrid object detection and tracking system is proposed that combines object color and optical flow method to enable the optical flow method capable to track objects in a dynamic background. The proposed method uses the formula developed by the author to convert RGB images into corresponding intensity images that highlights the selected color in images and suppresses other colors. Thus, the object of interest is automatically detected without use of computationally expensive matching methods. This makes the overall process efficient. However, the proposed method is limited to only objects of primary color shades.

***Index Terms*—Object tracking, Object detection, Optical flow.**

I. Introduction

Detecting and tracking moving objects in videos and reconstructing trajectories are an active research area of computer vision [1]. Many techniques, such as optical flow, background subtraction, particle filter, Kalman filter, have been developed for moving object detection and tracking in videos. Most of the researches in this area assume situations in which backgrounds are assumed to be fixed. However, most of the real-life situations have changing background. The ability to track a moving object in a changing background is a difficult problem. Detecting and tracking objects in a dynamic environment has many practical applications, such as video surveillance, human computer interaction, robot navigation in a dynamic environment, etc.

Optical flow is very effective in tracking objects in a stationary background, but its performance degrades to an unacceptable level in a dynamic background. It cannot tolerate even a slight change in lighting conditions. On the other hand, color-based techniques have some tolerance to changing background situations, but its performance degrades if backgrounds contain colors similar to the colors of moving objects.

In this paper, a new method is proposed that can detect and track a moving object in a changing background. The method combines color feature with optical flow. This combination makes optical flow adaptable to changing background situations. Traditionally, optical flow uses intensity image to detect the motion of a moving object in two consecutive video frames. However, intensity images generated by the popular RGB to intensity conversion scheme have no discriminating power to highlight a particular color. Therefore, in this paper, the new intensity calculation formula developed by the author [2] for converting an RGB image into an intensity image has been used, which facilitates detection of primary color objects more accurately and efficiently.

The remaining part of the paper is organized as follows: section 2 reviews the related work. It introduces, briefly, the optical flow object tracking concept and the new intensity conversion scheme. Section 3 describes the proposed system. Section 4 presents some experimental results and finally, section 5 concludes the paper and sets directions for the future research.

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II. Related Work

Vision based object tracking has been actively researched for the past three decades. Many techniques, such as optical flow, background subtraction, particle filter, Kalman filter, have been developed for moving object detection and tracking in videos. Each technique has some strength that makes it suitable in a particular situation. Readers can find overview of various methods and their merits and demerits in [3]. The optical flow method is one of the most researched methods for object detection and tacking as it is found to resemble to the animal and human visual systems.

The moving objects in a scene form dynamic patterns, known as the optic flow field, on the retinas of our eyes. These patterns contain a wealth of information about the world around, which help us to extract many useful information, such as the directions of moving objects, the distances to objects from us and their relative positions in the observed scene, etc. However, it is unclear how the visual system accomplishes this task [4]. Motivated from natural visual systems, researchers in computer vision have developed various methods to detect and track moving objects using the concept of optical flow. In the context to computer vision, optical flow is a velocity field associated with the change of the location of a group of pixels, assumed to be the object of interest, with certain brightness, under the assumption of brightness consistency, in two consecutive image frames of a video [5]. In other words, optical flow is the apparent motion of brightness patterns in two consecutive video frames. The assumption of brightness consistency, which is rarely observed in real life situations, is the major limitation of the optical flow method. Due to this assumption,

Query Performance Analysis on Hadoop over Cloud Architecture

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Abstract: Big data Analysis is widely used now and a huge amount of data is being generated every second. This needs an efficient cloud infrastructure environment to process huge amount of data by using the Hadoop cloud environment; we can process this huge data in seconds. In this paper the Big Data processing tool as Hadoop is used to perform query execution in terms of processing time by using Hive. Datasets of two different sizes and varying number of nodes in a cluster are used to measure the performance. It is observed that query performance increases when processing some large datasets on increasing number of nodes.

Index Terms **- Big Data; Hadoop; Hive; Performance Analysis; Data Processing; Query Execution Time;**

I. INTRODUCTION

The quick growth and development of technology and inventions in the area of computer science and technology requires the efficient use of data generated by these technologies. A large number of organizations utilize the services of data warehouse for the analysis of their data. These organizations use data analytics to make the decision for their growth. Thus, to make the accurate decisions we need to process data accurately. But the data sizes nowadays are growing and are available in peta bytes and that amount of data cannot be handled by using centralized server architecture.

With the introduction of the internet it improved the business growth at small scale. The big internet tycoons like Facebook, Google etc. are managing their data using Big Data technologies. Facebook is generating about 2-3 Terabytes (TB) of data per day [1]. The large amount of data and use of distributed computing creates a new set of challenges to manage and perform computational operations on data using data mining, machine learning and other data analytics approaches. A huge amount of time and cost is required for managing and utilizing the large amount of data. So efficiency is the key factor in data analytics.

The technologies related to data storage and analytics are growing rapidly which increases the trend of data analytics with more accurate and efficient way and the data processing cost has also been decreased in an organization. For the data processing a large amount of resources like computing power and data transfer capability has also been increased which made the traditional technologies and tools outdated. The new tools and technologies are being explored. Big Data [4] and Big Data analytics provides a good solution for processing the huge amount of data. Hadoop an open source software platform became a widely used solution to process and store Big Data in the data oriented enterprise/industries.

In this paper, the cloud environment such as Microsoft Azure HD Insight has been used to process data. HDFS and Hive [7], tools of Hadoop [5] has been used to store and process the datasets. In this research work we used datasets of size 2GB and 6GB to perform the data analysis. In the initial step all the required installation is done and then datasets are stored on azures storage engine. After that all the datasets are loaded in the Hive tables. Finally, a series of six different types of queries are executed on Hive. The execution is carried on the different sets of node of Hadoop cluster and results are analyzed.

II. BACKGROUND STUDY

A. Big Data and Analytics

The huge growth in data during the last decade in the world has introduced a new term Big Data in the technology field. The data which have been out of the limit of traditional system is often referred to as Big Data. To get some useful insights there is a need to process and analyze the huge amount of data has introduced a new form of data analytics called Big Data Analytics.

Big Data analytics uncovers the hidden patterns and other useful insights by analyzing the large amount of data. To gain insights in many businesses applications, increase the revenue and profit of many data analytics organization and to get competitive advantage over their rivals, organizations are using Big Data Analytics.

The characteristics of Big Data are mainly divided into four Vs i.e. Volume, Velocity, Varity and Variability. Volume means the size of the data. Velocity refers to the pace at which data is generated; Varity and Variability refers to the complexity and structure of data and different ways of interpreting it.

Query Execution Performance Analysis of Hive and Pig in Cloud Architecture

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Abstract*—Cloud platforms require a skilled computing infrastructure. At this level, a large amount of data is generated in fractions of a second, so traditional computing techniques are not enough. Big data provides answers to such huge calculations and supports measurement storage based on application requirements. Big data is the next generation storage infrastructure. This paper examines the big data environments and compares data retrieval techniques. For comparative research, Pig and Hive techniques are chosen. These technologies provide effective data processing capabilities. Hadoop storage is designed for comparative research and then configures pig and hive with the help of the MapReduce framework. In addition, in order to evaluate the efficiency of query execution in terms of processing time, a list of similar questions is prepared and used for processing each query. Both technologies are used for the resulting queries. The hive queries have been found to be processed inless time as compared to Pig in library dataset.*

***Index Terms*—Big Data; Hadoop; Hive;Pig; Performance Analysis; Data Processing; Query Execution Time.**

I. INTRODUCTION

In order to rapidly develop technologies and inventions in the fields of computer science and technology, it is necessary to effectively use the data generated by these technologies. Many organizations use data warehousing services to analyze their data. These organizations use data analytics to make decisions for their development. In this way, we need to process the data accurately to make accurate decisions. But now the amount of data is increasing and is available in PETA bytes, and the centralized server architecture cannot be used to control the amount of data.

With the introduction of the Internet, it has improved small-scale business development. Large Internet giants like Facebook, Google, etc. are using big data to manage their data. Facebook generates 2-3 terabytes of data per day [1]. The large amount of data and usage of distributed computing presents a new set of challenges for managing and performing computational operations such as mining, machine learning, and artificial Intelligence. Managing and using large amounts of data requires a lot of time and cost so, efficiency is critical in data analysis.

The technology is rapidly increasing, which increases the demand of the users and increases the cost of data processing in an organization. A large number of resources (such as computing power and data transmission capabilities) in data processing have also increased,

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Devanagri character recognition model using deep convolution neural network

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Abstract

In recent times, there has been a significant increase in the use of deep learning in the field of computer vision and image analysis. Deep learning is a subfield of machine learning which uses artificial neural networks that is inspired by the structure and function of the human brain. Identifying hand written text by machines has been achieved remarkable success with the use of artificial neural networks. In Optical Character Recognition for hand written text, the majority of work has been done for the popular languages such as English, Arabic or Chinese languages. There is very limited work in the literature for the handwritten character recognition for Devanagri characters. In this paper, we focus on recognition of Devanagri characters using deep convolution neural networks. Devanagri lipi is responsible for twelve languages used in India. In this paper, we optimize the network by selecting best hyperparameters for the network. Experimental results show the effectiveness of the proposed approach on the benchmark dataset.

Keywords: *Deep Learning, Convolution Neural Network, Optical Character Recognition, Activation Functions, Devanagri Characters*

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OBJECT DETECTION AND CLASSIFICATION THROUGH DEEP LEARNING APPROACHES

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ABSTRACT-In this paper, we implemented the image classification and object detection. This paper presents a deep learning approach for traffic light detection in adapting a single shot detection(SSD) approach and image classification of two categories of bicycle by retraining inceptionv3 model both using an open source tool called TensorFlow Object Detection API. We reviewed the current literature on convolutional object detection and tested the implementability of one of the methods and discovered that convolutional object detection is still evolving as a technology despite that convolutional object detection has outranked other object detection methods. To implement object detection and image classification there is free availability of datasets and pre-trained networks it is possible to create a functional implementation of a deep neural network without access to specialist hardware.

KEYWORDS-Object detection, Deep learning, Convolutional neural network, TensorFlow Object Detection API, SSD model, InceptionV3, InceptionV2.

I. INTRODUCTION

Classification of objects into their specific categories is often been vital tasks of machine learning. In recent years, deep learning has been utilized in image classification, object detection. To increase the performance of image classification deep learning uses a neural network with more than one hidden layer. For image classification and object detection one of the most frequently used deep learning neural network with more number of hidden layers is the convolutional neural network (CNN). CNN information gets directly from the image, so it eliminates manual feature extraction.There is a common problem in classifying image with deep learning, is lower performance because of over-fitting. To increase performance, and to prevent over-fitting we use large datasets. CNN have fewer connections and hyper parameter that make CNN model easy to train and perform slightly worse than other models [5].

Robotized driving on roadways is an effectively looked into issue which has prompted the rise of numerous driver help frameworks. Urban territories give another arrangement of difficulties which require more advanced calculations in different zones running from observation over conduct intending to impact shirking frameworks. One essential piece of recognition is the identification and classification of traffic lights. Traffic lights exhibit a testing issue because of their little size and high vagueness with different items introduce in the urban condition, for example, lights, beautifications, and reflections [7], [14].

Recent enhancements in object detection area unit driven by the success of convolutional neural networks (CNN). They're able to learn rich features outperforming hand stitched options. So far, research in traffic light detection mainly focused on hand-crafted features, admire color, shape or brightness of the traffic light bulb. In this research work we present a deep learning approach for traffic light detection in adapting a single shot detection (SSD) approach. SSD performs object proposals creation and classification using a single CNN. The initial SSD struggles in sleuthing terribly tiny objects, which is essential for traffic light detection. By our variations it's potential to find objects a lot of smaller than 10 pixels while not increasing the input image size. As a result, we have a tendency to reach high accuracy [13].

In this paper, we performed two separate experiments, for the first experiment we are classifying images of bikes, we are taking two different categories of bike images for e.g. mountain bikes and road bikes and for the second experiment traffic light detection in an image and its classification. We have used TensorFlow object detection API to train and evaluate convolutional neural network, one of the most popular Python programming language libraries for deep learning.The flow diagram of Proposed Methodology is shown in Figure 1 and 2.

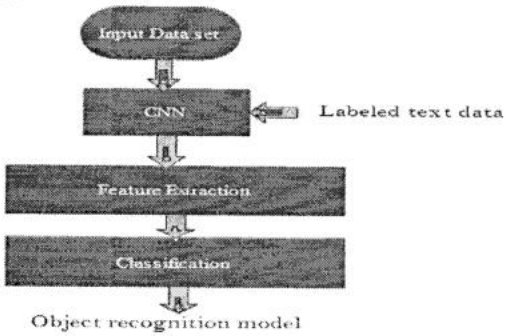

Figure 1:Training dataset

KNN Classification for the Face Spoof Detection

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Abstract- The face spoof technique was proposed to identify and detect the spoofed and non-spoofed images. The DWT technique is used to analyze the textual features present within the test images. There is a possibility that some exceptional disturbances are available like geometric disturbances and the artificial texture disturbances. The face spoof detection techniques are based on two steps, the first step is of feature extraction and second is of classification. The Eigen based technique is applied for the feature extraction and SVM classifier is applied for the classification. To improve accuracy of the face spoof detection SVM classifier will be replaced with the KNN classifier. The Comparisons are made to analyze the performance of the proposed algorithm and the existing algorithm in terms of accuracy and time of execution.

Keywords- Feature Extraction, SVM, KNN

I. INTRODUCTION

The process of producing input images in a particular place is called imaging. It contains a metric and topological edge which is used for image analysis and crack edge for creating structure between the pixels. Analysis shows that the intensity is varied from small neighborhood of pixel boundary. The pixel boundary is another significant topic used in image processing. The image is visible to computer through sinkhole. The processing is completely based on knowledge and execution [1]. It consists of human cognition abilities in order to make decisions according to the information provided. The image quality is used to assess the percentage of degradation. Image processing is defined as the process use to perform some operation on the images, which generate an enhanced version of the images or extract some features from it. It signal processing in which image act as the input and characteristic or features act as the output of that image. The image similarities are significant as they are used to assist retrieval from image database. The original images are often degraded by errors called noises [2]. This happens at the time of image capture, transmission of images contents. The perception of human color adds another subjective layer on the top highlighting the physical properties of electromagnetic radiations. The object will be transferred between client and the server. It is responsible for graph storage analysis from resource images. Every node of graph works as the processing unit of the application. Face recognition is also one of the very widely used security purpose used technique. As the numbers of crimes are increasing day by day, so to maintain the proper check on the people such type of methods are employed on various fields like banks, hospitals, industries and so on. There is huge success in this area, by applying them on several applications like human-computer interaction (HCI), biometric analysis, content-based coding of images and videos, and surveillance [3]. Face recognition is proved to be very difficult to imitate artificially, although there are certain similarities in some faces most probably due their age, gender, color. The biggest problem this method is facing is image quality, expressions, background and other climatic conditions. Face detection as the name suggests, it suggests where the face is located in an image. As it seems to be very easy task but in reality it is very difficult to detect images. We have to consider all the possible constraints like single face or multiple faces, image rotation, pose etc. this give rise to some false detection of an image, or it sometimes does not contain any image [4]. There are various types of techniques available for face detection. When someone tries to interferes in the face biometric system by presenting a false face towards the camera. It attacks on face recognition systems which involve all the artificial faces of authorized users to cleverly go inside the biometric security systems. These attacks are very easy to carry by just having printed photographs or digitalized images being displayed on the screen. If we want to differentiate between the real face features from fake faces, the face liveness technique is used. It aims at detection of physiological signs of life. Biometric technologies are used to measure and analyze human body characteristics [5]. It can be categorized into two parts, physical characteristics in which fingerprints, faces or iris patterns are used and then activity characteristics which includes voice signatures or strolling patterns. It is the most prominent challenge being varied in biometric systems. The variations involve chances of fraud which is most commonly known as spoofing attack. The stolen data will effectively ruin and mimicked by the adversary to have a unauthorized access to the systems. This technique is based on facial statistics in the light weighing physiological properties detection. Moreover, the false faces are of two types i.e. positive and the negative one. The positive faces are real faces and having restricted variation and negative includes spoof faces on images, dummy and so on. Spoofing attack is type of attack in which the attacker submits the fake identity and evidence to the biometric system in order to get access to the network. It is very easy for the attacker to generate attack in the face recognition system because the images and videos are easily available on the social networking sites [6]. The attacker can store images from the

A Literature Survey on Automatic License Plate Recognition System (ALPR)

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Abstract- Automatic license plate recognition system is the optical character recognition which aims at extracting the number of license plate from a vehicle. In this paper we have discussed various existing ALPR systems, the basic algorithm used, the variations in the existing algorithm to improve the overall system. There are also a plenty of applications where this system could be used, among these criminal surveillance is one of the most wanted application. This system mostly concentrates on localization of license plates and then go on to extract the characters by using morphological operations such as dilation, eroding the image, dilating, filtering etc. All these morphological operations leads to the efficiency of overall system.ANPR is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed.

Index Terms– Automatic license plate recognition, ALPR, Vehicle, optical character recognition, localization, surveillance system.

I. INTRODUCTION

Automatic number plate recognition systems (ANPR) is based on the localization of license plate and recognition of characters by extraction. This whole problem is generally sub-divided into 5 parts:(1) image acquisition i.e. capturing the image of the license plate (2) pre-processing the image i.e. normalization ,adjusting the brightness , skewness and contrast of the image (3) localizing th license plate(4) character segmentation i.e. locating and identifying the individual symbol images on the plate,(5) optical character recognition. There may be further refinements over these (like matching the vehicle license number with a particular database to track suspected vehicles etc.) but the basic structure remains the same. Provide a means to overcome the drawbacks and deficiency of successful surveillance of the cctv cameras. The ANPR system is well developed in certain countries such as USA and Dubai, and existed from a longtime, but only in the late 90s it became an important application because of the large increase in the number of vehicles. The information extracted from the license plates is mainly used for traffic monitoring, access control, parking, motor way road tolling, and border control, making car logs for parking systems, journey time measurement for toll booth etc. by the law enforcement agencies. A guiding parameter in this regard is country-specific traffic norms and standards. This helps to fine tune the system i.e. number of characters in the license plate, text luminance level (relative index i.e. dark text on light back ground or light text on dark background) etc. So the problem can then be narrowed down for application in a particular country. For example, in India the norm is printing the license plate numbers in black color on a white background for private vehicles and on a yellow background for commercial vehicles. The general format for the license plate is two letters(for state code) followed by district code, then a four digit code specific to a particular vehicle.

II. STEPS OF ALPR

The number plate background should not match the color of the vehicle It is a pattern with very high variations of contrast. If the number plate is very similar to background it's difficult to identify the location. Brightness and contrast is changes as light fall changes to it. The morphological operations are used to extract the contrast feature within the plate. The work is divided into several parts. The basic four stage algorithm for ALPR system is:

Image acquisition
License plate localization
Character Segmentation
Character recognition

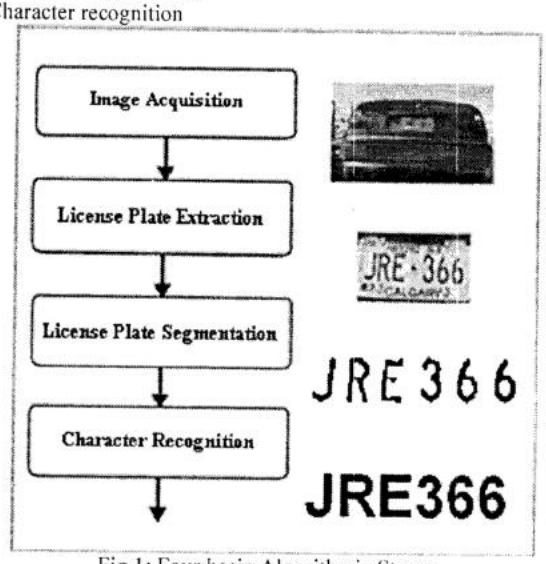

Fig.1: Four basic Algorithmic Stages.

First step among the 4 basic algorithms is to acquire all the raw images of the number plate, then the images are converted into grayscale or binarization is done. After grayscale conversion De-noising of image is done. After reduction of

A Hybrid Feature Extraction Approach for Finding Local Discriminative Coordinates for Face Recognition

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Abstract. Several techniques have been proposed for face recognition that use global and local approaches for finding most eligible features for classification. Generally, methods based on localized feature selection techniques are found to be more robust towards illumination, pose and expression variations. In this paper, author has proposed an architecture that uses wavelet decomposition and informational entropy for finding localized discriminative coordinates in the image space for face recognition. The identified coordinates are supplied to a Gabor filters based face recognition model for classification. The proposed system uses single image per subject for training database and is able to achieve a recognition rate of 92.5% with ORL face database.

Keywords: Discriminative coordinates · Face recognition · Gabor filters
Informational entropy

1 Introduction

Among the widely used biometric identity systems, physiological methods (i.e. fingerprint, face, DNA etc.) are usually more stable because of their non-mutable properties (except in the case of severe injuries or medical interference). Face recognition is one of the few biometric methods that possess the merits of both high accuracy and low intrusiveness. For this reason, since the early 70's [1], face recognition has drawn the attention of researchers in fields from security, psychology, image processing and computer vision [2, 3].

Face Recognition, generally, refers to the process of identification of individuals from a database of digital raster images. A face recognition system can be, generally, divided into three parts: (1) Face Detection, (2) Feature Extraction and (3) Classification [4]. The detection step is to determine - whether any human faces appear in a given image, and where these faces are located at. The output of face detection is supposed to be patches containing each face in the input image -effectively processed to justify the scales and orientations of respective faces. These face patches are then processed in feature extraction step to obtain a low-dimensional unique representation of each face. The output is usually a fixed dimension vector or a set of fiducial points (i.e. their respective locations in face image) corresponding to each face image. At last, the

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COMPARATIVE ANALYSIS OF NON CO OPERATIVE AND CO OPERATIVE ROUTING PROTOCOLS IN UNDERWATER COMMUNICATION NETWORKS

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Abstract: Underwater communication networks (UWCNs) include sensors and autonomous underwater vehicles (AUVs) that interact to perform specific applications such as underwater monitoring. Some of the applications like Mission critical applications require reliability and network efficiency in Underwater Communication Networks, so for coordination and data forwarding between sensor nodes cooperative communication routing protocols are developed that enhances network efficiency. Cooperation is added to the existing non-cooperative routing protocol at network layer that perform better in terms of reliability and throughput. This paper focuses on evaluation of non co operative routing protocols DBR (Depth Based Routing Protocol), EEDBR (Energy Efficient Depth Based Routing Protocol) and cooperative routing protocols Co DBR, Co EEDBR in terms of packet delivery ratio, end to end delay, throughput and energy consumption. NS2 simulator judge the performance of these protocols. Simulation results show that Cooperative Routing Protocols outperforms than Non Cooperative Routing Protocols.

Keywords: DBR, EEDBR, Co DBR, Co EEDBR

1. INTRODUCTION

Underwater communication has become an important data transmission technology that is widely used in various ocean applications such as oil/gas spill monitoring, off-shore oil industry, pollution monitoring in environmental, disaster prevention, submarine detection and surveying sea floor for detection of objects and search for new resources. Underwater communication networks consist of a variable number of sensors equipped with transducer, buoys, surface sink, stations [3] and autonomous underwater vehicles (AUVs) that interact each other for a particular application over given area. Acoustic signal is best suited for underwater communication [1,4].

Routing in underwater sensor networks (UWCNs) is very challenging because of unique characteristics of UWCNs and also UWCNs have very dynamic topology as sensors move with water currents. A number of routing protocols have been proposed to deal with the challenging problem in UWCNs. Localization process which requires full dimensional location of sensor nodes is used in most of the routing protocol. That is yet major challenging issue to be solved in UWCNs. Recently, many geographical routing protocols have been proposed for UWCNs, which can be classified into two sections, localization-based and localization-free routing protocols [2].In this paper localization free routing protocols DBR, EEDBR, Co DBR and Co EEDBR based on co operation are considered for further analysis. DBR [8] is a non-cooperative receiver based routing protocol in which the routing is depends only on depth of the sensor node. Drawbacks of DBR is improved in the EEDBR, where depth from sink as well as residual energy of sensor nodes is used to select the candidate forwarder to achieve load balancing. Co DBR overcomes the problems associated with DBR and EEDBR by using cooperative diversity [14]. Co DBR transmits the packet to the destination thru two relay nodes [13] .The relay nodes selects on the basis of minimum depth and they cooperatively deliver the data to the sink. The packet delivery ratio will be increases because in case of any link failure at least one link is capable of delivering the data successfully to the destination. Co DBR consumes three times more transmission energy than DBR because it uses source node and two relay nodes to transmit data, so to achieve reliability energy will be compromised also every time it consider the lower depth nodes. To handle problems associated with all these three protocols, a new cooperative routing protocol Co EEDBR [9] is introduced. Co EEDBR route the data through the UW network nodes with reduced path-loss [15] over the channel [14]. Advantages of single-hop and multi-hop are taken into account as well. Relaying techniques used are AF and FR.

2. ROUTING PROTOCOLS IN UWCN

Recently, many geographical routing protocols have been proposed for UWCNs, which can be classified into two sections, localization-based and localization-free routing protocols. In this paper the localization free routing protocols are considered for further analysis.

2.1 DBR (Depth Based Routing) Protocol

DBR is a non-cooperative receiver based routing protocol in which source node broadcasts its data to all its neighbors [5]. DBR transmits data packets greedily towards the water surface where data sinks are situated and the transmission is based on the depth information of each sensor. In DBR After receiving a packet node holds the packet for certain amount of time called holding time and then transmits the packet if the depth of the node is smaller than the depth of previous sender that is embedded in the packet. Otherwise, it discards the packet [5,10,11]. Holding time depends on the

Review of Different Deep Learning Approaches for Image Classification

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Abstract : As a major breakthrough in artificial intelligence, deep learning has achieved very impressive success in solving grand challenges in many fields including speech recognition, natural language processing, computer vision, image and video processing, and multimedia. Deep Learning is the subpart of machine learning; it uses neural networks which stimulate by the human brain's structure and working. It is a new approach for data analysis and prediction and has become very popular recently. Deep Learning has achieved much higher success than machine learning in many applications, one of the reasons for that is, machine learning not able to process large amount of data effectively but also not able to extract the features from the data automatically. Since Deep Learning has been the core topic in machine learning and convolutional neural network have become state of the art methods for image classification over the last couple of years. Convolutional neural network has won numerous competitions in recent years. It has outstanding results in image recognition. In this paper, different deep learning approaches will be reviewed which have been used in the field of image classification and localization.

IndexTerms **- Artificial Intelligence, machine learning, deep learning, image classification, neural network, convolutional neural network, artificial neural network**

I. INTRODUCTION

Recent advances in deep learning made possible tasks such as image and speech recognition. Deep learning is a subset of machine learning algorithms that is very good at recognizing patterns, but generally requires a large amount of data. Deep learning is excellent in the recognition of objects in images, since it is implemented using 3 or more layers of artificial neural networks where each layer is responsible for extracting one or more characteristics of the image.
Neural network: a computational model that works in a similar way to neurons in the human brain. Each neuron takes an input, performs some operations and then passes the output to the next neuron. Representation of neural network (src). we will teach the computer to recognize the images and classify them into one of these categories:

To do this, we must first teach the computer how a cat, a dog, a bird, etc. looks before we can recognize a new object. The more cats see the computer, the better it will be to recognize cats again. This is called supervised learning. We can carry out this task by labeling the images, the computer will begin to recognize the patterns present in the images of cats that are absent from others and will begin to develop their own cognition. We are going to use Python and TensorFlow to write the program. TensorFlow is an open source deep learning framework created by Google that gives developers granular control over each neuron (known as a "node" in TensorFlow) so that it can adjust weights and achieve optimal performance. TensorFlow has many integrated libraries (some of which we will use for image classification) and has an incredible community, so you can find open source implementations for virtually any deep learning topic.

II. MACHINE LEARNING

Machine Learning Algorithm is a step by step process to get information from the given set of data, without relying on a fix program. This information is useful to predict output for a given input.
Machine Learning Algorithms find patterns inside the set of data, i.e. given to it. These Patterns are useful to make better decisions and predictions. Today ML algorithms are useful in many areas to make better decisions like, in medical diagnosis, stock trading, and energy load forecasting, etc. These algorithms are used by media sites to recommend movies and songs to users and also use by retailers to recommend products to customers, based on their purchasing behavior [1].

A. Machine Learning Algorithms

Mainly two types of Machine Learning Algorithms are defined based on their learning capability. Which are shown below in Fig 1.

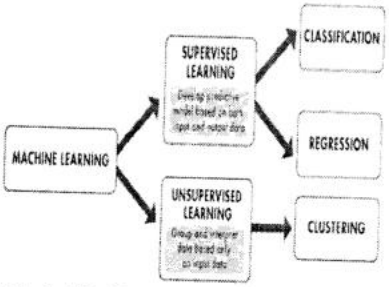

Fig 1: Machine Learning Architecture

Deep Learning Approach for the Classification of Small and Large Size Image Datasets

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Abstract

*Deep learning is a new approach for data analysis and prediction; it has become very popular recently. Deep learning technologies are becoming the major approaches for natural signal and information processing, like image classification, speech recognition. Convolutional Neural Networks have become very popular for image classification in deep learning; CNN's perform better than human subjects on many of the image classification datasets. In this paper, deep learning convolutional neural network is deployed based on keras and tensorflow libraries using python for image classification. Here, two different CIFAR image datasets are used to compare the accuracy of CNN based on size of image dataset which is small and large size dataset (32*32, 64*64). This dataset contains images of different categories for image classification. Two different structures of Convolutional neural network are deployed on CPU system, with different Convolutional Neural Network parameters and obtained the accuracies.*

Keywords: *CNN, Deep Learning, CIFAR, Image Classification*

1. Introduction

Deep learning for image classification has become an essential use of the machine learning method. To increase performance, the application of neural networks to learning tasks that contain more than one hidden layer. Deep learning is part of a wider family of machine learning methods based on representations of learning data, unlike hard code machine algorithms.

Learning can be supervised, partially supervised or unsupervised. Deep learning architectures, such as deep neural networks, deep belief networks and recurrent neural networks, have been applied to fields such as computer vision, speech recognition, natural language processing, audio recognition, the classification of images, the filtering of social networks, the automatic translation and the bioinformatics, in which they produced results comparable and in some cases superior to human experts.[1]

Popular datasets used for image classification like MNIST, ImageNet, PASCAL, and CIFAR10/100, all classify the images by the type of a prominent object or feature in the image. In this research work, Here I present image classification through CIFAR-10 dataset using Convolutional Neural Network and find the accuracies of small dataset (32*32) and Large dataset (64*64).

2. Convolutional Neural Network

CNN is a type of deep learning model for processing data that has a grid pattern, such as images, which is inspired by the organization of animal visual cortex [2] and designed to automatically and adaptively learn spatial hierarchies of features, from low- to high-level patterns. CNN is a mathematical construct that is typically composed of three types of layers (or building blocks): convolution, pooling, and fully connected layers. The first

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Sentiment Analysis of Twitter Datasets using Support Vector Machine and Naïve Bayes Classifiers

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ABSTRACT

Social networking sites are the great source of communication for internet users nowadays. Millions of people conveniently express their views and opinions on a wide array of topics using micro-blogging websites. Natural language processing is the discipline that studies how to make the machines read and interpret the language that the people use, the natural language. But in the machines world, the words not exist and they are represented by sequences of numbers that the machine represents with a character when displaying them on screen. Growing use of social media websites and cloud computing technology advances have bumped up a huge amount of online data available so the information is convoluted with varying interests, opinions and emotions. This data consisted primarily Textual and numerical forms that can be categorized as Structured, semi-structured or non-structured.

Sentiment analysis which is also known as opinion mining is basically done to computationally identify and extract subjective information from source materials and to categorize this information to know the user's behavior towards a particular agenda. This categorization is basically done broadly into Positive, Neutral, or Negative. In this paper, the extraction of sentiment from a famous micro-blogging website, Twitter where the user posts their views and opinion will be discussed. The twitter datasets has been collected using twitter APIs. For actual implementation, python with NLTK and python-twitter APIs has been used.

Keywords *– Machine Learning, Sentiment Analysis, Support Vector Machine, Naïve Bayes, Python*

I. INTRODUCTION

Sentiment Analysis, which is also referred as opinion mining, is the computational study of people's opinions, attitudes and emotions towards an entity (e.g. individuals, events or topics). People express and share their view and opinion using social media application such as Twitter, Facebook, WhatsApp and Instagram etc. Two fundamental approaches are there in sentiment analysis i.e. Supervised learning and unsupervised learning Approaches. Sentiment classification of twitter data is done using supervised machine learning approaches like Naïve-Bayes, SVM, and Maximum-Entropy etc.

Today internet has become the major part of our life. Most of the people use online blogging sites or social networking sites to express their opinions on certain things. They also use these sites to know what other

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A preliminary note on big data and machine learning technologies

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Abstract

Big data is high-volume, high-velocity and variable information assets which demand cost-effective, innovative forms of processing for enhanced insight and decision making. An essential quality of the Big Data is the large volume which is heterogeneous and of different dimensions. Data mining and machine learning systems are utilized to separate the important and concealed examples from the huge volume of data. Many machine learning strategies are coordinated with big data analytics tools

Keywords: Machine learning, Big data, Data mining.

Introduction

In recent times there has been an exponential production of data from various sources of the web, smart phones or smart sensors, which has lead to generation of big data. The term big data can be referred to as enormous, fast, arising, various classes and with parts of undesirable noises that are hard to store, process, analyze, translate, expend and settle for better decision in the field of medicinal services, funds, and business or industries. Gigantic data have originated from people through the usage of PC, advanced mobile phones, gadgets which are utilized to share message and recordings with companions in internet based life such as Facebook, Instagram, Whatsapp, etc, for sharing short clips, share their perspectives and purchase where data gathering has developed enormously and is already past the capacity of commonly utilized software tools to capture, manage, and process inside a "tolerable elapsed time" (Wu *et al.*, 2014) (Blazquez and Domenech, 2018)

Indeed, the activity of people and their exercises are recorded by smart sensors which are set in part of urban communities and in diverse public places. The most fundamental challenge for Big Data applications is to investigate the enormous volumes of data and focus on helpful data or information for future activities. In many cases, the learning/extraction procedure must be productive and near continuous on the grounds that putting away all watched data(Wu *et al.*, 2014).

Big Data begins with huge volume of heterogeneous, self-ruling sources with distributed and decentralized control, and tries to investigate complex and advancing connections among data which is known as HACE Hypothesis. These attributes make

3D Trajectory Reconstruction Using Color-Based Optical Flow and Stereo Vision

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Abstract. Automatic trajectory estimation of a moving object in a video is one of the most active research areas of computer vision, which finds many practical applications, such as development of sport playing robots, predicting trajectory for avoiding obstacle collision, automatic navigation of driverless vehicles, monitoring target hitting, etc. However, most of the work reported in literature only considers monocular videos. Due to the availability of low price stereo cameras, many applications take their advantages by incorporating depth information. In this paper, the 3D trajectory of a primary color (red or green or blue) object is estimated using color based optical flow and stereo vision. The purpose of using stereo vision is to gain depth information for generating 3D trajectory. The system has been tested on many stereo videos and experimental results are quite accurate. Besides, the low computation time required for finding depth of the tracked path makes it suitable for real time applications.

Keywords: Object detection · Object tracking · Optical flow · 3D trajectory · Stereo vision

1 Introduction

Trajectory estimation has received a considerable attention by researchers due to many practical applications, such as predicting trajectory for avoiding obstacle collision, location estimation of a robot, tracing the trajectory of a moving vehicle for lane violation, etc. Trajectory generation is a two step process: (1) detect the object in the initial frame of a video and (2) then locate the object in the subsequent frames.

It is established that the 3D trajectories of moving objects in a scene is impossible from monocular videos without prior assumptions about the scene, which restricts its practical utilities [1]. However, it is possible to generate 3D trajectories by combining stereo vision with any object tracking technique. In stereo vision, two views of the same scene are captured by a pair of cameras and the disparities of scene points in the captured images are used to calculate depths of scene points, using the principle of triangulation. The calculated depths are utilized to construct the 3D trajectories of the objects of interest.

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Rachna

Building Machine Learning Based Diseases Diagnosis System Considering Various Features of Datasets

Shrwan Ram and Shloak Gupta

Abstract Millions of people worldwide suffer from late diagnosis of diseases. Machine learning algorithms can significantly help in solving healthcare systems that can assist physicians in early diagnosis of diseases. Algorithms in Machine Learning provide the ways to classify data efficiently, at great speed and with high accuracy. Many types of machine learning algorithms are widely adopted and implemented for the early detection of various diseases; these algorithms are like Decision Tree, Naïve Bayes, Support Vector Machine, and Logistic Regression. The results show that there is no particular algorithm available which provides best accuracy in all kind of the healthcare data classification. Most appropriate method can be chosen only after analyzing the nature of the datasets. All the available machine learning techniques are used based on their performances in terms of accuracy and comprehensibility. The datasets considered in this paper are on breast cancer, dermatology, chronic kidney disorder, and biomechanical analysis of orthopedic patients. Data sets from UCI machine learning repository were taken to show applications of Machine Learning on wide variety of Life Sciences data. The four algorithms are implemented with considering various parameters of classification.

Keywords Machine learning · Diseases diagnosis · Supervised learning

1 Introduction

The Machine Learning is all about developing mathematical, computational, and statistical methodologies for finding patterns in and extracting insight from data. Data, in turn, are the concrete manifestations of structures and processes that shape the world. Machine Learning research aims to unlock technologies that can solve

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An Efficient Clustering Algorithm to Simultaneously Detect Multiple Planes in a Point Cloud

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Abstract— **Plane detection in a point cloud is one of the primary step for various applications, such as computer vision, ground plane detection for autonomous navigation, obstacle detection, indoor scene reconstruction, etc. In this paper, a new algorithm for simultaneous detection of multiple planes in a point cloud is proposed. The proposed method is a two-step process. In the first step, the surface normals are automatically clustered into probable plane orientations (angular clusters) within a user specified angle threshold, without a priori knowledge of number of planes. In the second step, the angular clusters are further clustered into separate planes, within a user specified distance threshold, based on the normal distances of the points in an angular cluster. In contrast to popular random sampling based methods, the proposed method uses deterministic approach to simultaneously detect all possible planes and has comparable results with the existing methods and is two times faster. The proposed method is implemented using Open3d point cloud library and evaluated on datasets having variety of indoor scenes.**

Keywords— RGB-D, Plane Detection, Point Cloud, Open3d, Clustering, Surface Normal

I. Introduction

Point cloud is a type of 3D model of a scene consisting of a large number of individual points with their x, y, z values in a coordinate system along with other attributes, such as color, normal. A point cloud model is primarily obtained from sensors, such as Lidar, RGBD camera, Laser scanner, stereo vision system, etc. With the availability of low cost depth cameras (Microsoft Kinnect, Intel RealSence, etc.), uses of point clouds in various applications, such as autonomous mobile robot navigation, obstacle detection, vision based assistance system for blinds and visually impaired persons, etc. have attracted researchers' attention. In these applications, detection of planar surfaces in the given point cloud is the key step. Further, most of the man-made environment and objects primarily consist of planar regions. Plane detection refers to identifying a set of planes that best fits to the given point cloud data. Many methods have been reported in literature for detecting planer regions, such as methods based on: Hough transform [1-2], RANSAC [3] and region growing [4-5]. However, due to presence of noise in the point cloud, accurate and efficient solution is yet to be found.

In this paper, a new method for multiple plane detection simultaneously in a point cloud is proposed. In contrast to hypothesize and verify approach of RANSAC based methods, the proposed method uses a deterministic framework based on systematic auto clustering of surface normals and normal distances of points from origin to efficiently detect all planar surfaces simultaneously and is suitable for parallelization. To identify planar surfaces, the proposed method is a two-step process. In the first step, points with similar normals (within the specified threshold) are automatically grouped together. A group of normals (angular cluster) represents collection of possible probable parallel planes. In the second step, points within each angular cluster are segregated from each other based on the normal distances of points from the origin to segregate various planes. The proposed method is similar to the method proposed in Holz et al. [6]. However, the proposed method differs from Holz et al. [6] as it uses auto clustering of point normals instead of random selection of seed points and region growing strategy.

The remaining part of the paper is organized as follows: Section 2 briefly presents review of the similar and related work. Section 3 describes the proposed method. Implementation and experimental results are reported in section 4. Finally, section 5 concludes the paper.

II. Related Work

With the availability of low cost and fast 3D depth cameras and scanners, 3D point cloud processing to detect the structure of the captured scene is a very active research area in computer and robotic vision. Most of the downline applications, such as detection of ground plane, obstacle detection for autonomous navigation, indoor scene reconstruction etc., require detection of planar surfaces in a point cloud. For plane detection, several approaches have been proposed, such as region growing approaches, RANSAC based approaches, Hough transformed method and surface normal based methods, etc. Region growing based methods first select few seed points and then adds neighboring points, according to some criterion, until no more points can be added. Holz and Behnke [7] segments the range images into planar regions by region growing using local mesh neighbourhood. They used the region growth method for tagging different objects in a scene. The region growing methods are sensitive to the selection of the initial region seeds. Huang et al. [8] improved the choice of the initial seed position by using information of object edges. Instead of randomly selected seed points, Jin et al. [4] proposed an iterative growing process of a plane from a patch based seed selection approach. The method alleviated over growing and under growing problems.

RANSAC based methods tries to fit a plane to a set of inliers that best describes a plane. The RANSAC based methods randomly pick three points and create a plane model and then tries to fit other points to that plane. Out of many such

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Classification of Healthcare Datasets through Supervised Machine Learning Algorithms

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Abstract *The work centered on methodologies based on machine learning to develop applications that are capable of recognizing and disseminating health information. In this paper, a different type of supervised machine learning approach is used for the classification. Analyzing the machine learning algorithms and finding out the most appropriate algorithms for healthcare data. In this study, designed a classification system using a Decision tree, Naïve Bayes Support Vector Machine, and KNN for medical data classification with various numbers of attributes and instances. Its include two type classification namely present or absence data distribution from the Cleveland heart disease data set. The experiment outcomes positively demonstrate that the decision tree classifier is effective in undertaking healthcare data classification tasks.*

Keywords– *Classification, Machine learning, decision tree, naïve Bayes, support vector machine algorithms, heart disease dataset.*

I. INTRODUCTION

Machine Learning is the ability of machines to adopt human behavior, in which a machine composed of different algorithms using these algorithms chooses its own choice and provides the user with the outcome or output. Machine learning is the skill of learning machines, where a machine is designed with certain algorithms from which it can make its own choices and give the user the answer. Machine Learning Algorithms are a step-by-step method for extracting information from the data set without relying on a patch programmer. Such data is useful in predicting the output of a given input. Inside the data collection, i.e. given to it.

Supervised learning algorithms aim to model relationships and dependencies between the output of the goals and the input features so that the output values for new data can be predicted based on certain relationships that have been learned from previous data sets. Healthcare data classification is a challenging task in the field of medical research. Both for a patient and the doctor, the medical record is very useful. The medical record would usually assist the doctor in classifying the illnesses, diagnosing, and treating the patient properly. In recent days, the volume of Healthcare data is huge. Therefore, the seriousness of manual diseases is difficult to identify and understand. This paper describes the classification of heart diseases through supervised machine learning.

1. **Healthcare dataset:** Cleveland's heart disease data set is a multivariate data set. It includes 76 attributes and 303 instances that range from Categorical, Integer, and True. However, the studies suggested involving the use of a subset of 13. The prediction area applies to the patient's existence of heart disease. The prediction field concentrated on simply attempting to distinguish the presence of diseased (value 2) data from non-diseased (value 1).

2. **Decision tree**: train classification decision tree to predict responses to data. Follow the decision of the root tree (beginning) node up to a leaf node to predict the answer. The leaf node contains the response. The value of one predictor (variable) is verified at each stage of a prediction. This tree predicts identifiers based on two predictors, x1 and x2. To predict, start at the top node. Check the values of the predictors in each decision to determine which branch to obey. When a leaf node is reached by the branches, the data is labeled as either form 0 or 1.

3. **Naive Bayes:** Bayes 'theorem (often called Bayes' law after Thomas Bayes), in probability theory, compares the conditional and marginal probabilities of two random events. Often used for calculating subsequent probabilities given observations. A naive classifier of Bayes is a concept that deals with a simple probabilistic classification based on applying the theorem of Bayes. Simply put, A Naïve Bayes classifier assumes that the presence (or absence) of a certain attribute of a class is irrelevant to the presence (or absence) of any other feature.

4. **Support Vector Machine:** Support Vector Machine: By finding the best hyper-plane that separates all data points of one class from those of another class, an SVM classifies information. The support vector machine algorithm performs classification by finding the hyper-plane or classifier which maximizes the margin between two classes. Two groups are divided by Hyper-plane. Classification can be seen as a task of separating classes in the space of features.

A Review on IoT: Protocols, Architecture, Technologies, Application and Research Challenges

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***Abstract* - The Internet of Things (IoT) is a paradigm that is speedily gaining ground in the scenario of modern wireless telecommunications. Using IoT, billions of things get connected and communicate using different protocols and technologies. The expanse of IoT is ever increasing. From home consumers to the industrial one, IoT is becoming part of our everyday life. Individuals, companies and governments are trying to seek real-world IoT solutions which can be economically and technologically viable. In this paper, we have focused on technologies, protocols, applications and future challenges related to IoT. Initially, IoT looks twin to M2M, but in the years to come, it would facilitate real-world objects to communicate, connect and interact with one another in the same way humans do via the web today. Through the paper, we have tried to encapsulate the information regarding the best appropriate protocols, architecture, technologies and usage problems to assist scholars and developers in understanding the various nuances of the Internet of things.**

Keywords: Internet of Things, RFID, Wireless Sensor Networks, Object, Security, Identification

I. INTRODUCTION

Within the two decades of its inception, the Internet of Things has impacted almost every field, and today only the sky is the limit for the opportunities it offers. Before delving into the architecture, technologies and usage problems, let's discuss what do we mean by IoT? Internet is an open resource on which anybody can manipulate data. Data is mostly operated on the Internet by human beings who are systematically slow, inefficient handler of data [6]. Systems could become more efficient and scalable if we connect sensors to real-world objects, and these real-world objects can then connect and inetract with one another in like manner as humans do via the web today. However, then how IoT is different from sensor network" or how is it different from Big Data which handles enormous volumes of data efficiently or how IoT differs from M2M (Machine to Machine) or D2D (device to device) communication? Even Cyber-Physical System which appears the same as IoT as they also interact with the real-world objects through sensors [5]. It is difficult to have an all-encompassing definition of the Internet of things but to define; we can say IoT (Internet of Things) incorporates everything which is connected to the Internet from small sensors to devices to wearable [7]. These connected devices collect data, analyse it and create action. IoT performs of all the actions which other technologies like a sensor network, Big data, M2M or D2D communication do in isolation. Inventors of the traditional Internet would have never imagined that this "networks of networks" will one day make billions of devices to connect and interact with each other like real-world entities. With the burgeoning of IoT, certain aspects have become more relevant than they were with the traditional Internet [6].

Devices Heterogeneity: Today, IoT is useful in essentially every field which employs different devices. These devices use different operating systems, protocols and architecture and have different communication and computational abilities. Thus, it is essential to develop protocols and architecture for IoT, which can make these heterogeneous devices work in collaboration.

Scalability: Unlike the one size fits approach, scalability is the ability of the system to handle data as it grows. With billions of devices to use IoT scalability concerns are there at every stage from naming and addressing to service provisioning and supervision [14].

Energy-optimized solutions: wireless technologies consume more energy than the wired technologies. As per CISCO, there would be 50 billion IoT devices by the end of this decade; thus, energy optimization is a critical aspect of IoT development.

Localization and tracing abilities: Localizations pertains to an object's position, and Tracking is its position over a while. As devices connected through IoT can connect and communicate with one another other, it facilitates localization and Tracking.

Set in security and privacy-preserving devices: Due to the tight entanglement with the physical domain, IoT technology should be protected and privacy-preserving by choice. This suggests that security should be taken as a key system-level property, and be taken under consideration within the proposal of designs and techniques for IoT solutions [23].

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Chapter 20
Security Threats for Time Synchronization Protocols in the Internet of Things

Suresh Kumar Jha, Niranjan Panigrahi and Anil Gupta

Abstract The Internet of Things (IoT) is an emerging field of application includes several technologies such as the Internet, Wireless Sensor Networks (WSN), Radio Frequency Identification (RFID), and communication technology which build a system that connects real and digital worlds. For the consistent working of the IoT ecosystem, the backbone WSN needs time synchronization. In the IoT ecosystem, the sensors are generally located in an unattended environment where may be a high chance of the existence of malicious nodes. In such a scenario, the time synchronization protocols will behave incorrectly which in turn will hamper the normal working of other dependent protocols. This chapter contributes a thorough insight into the possible threats to time synchronization in backbone WSN of IoT, existing security measures with qualitative and quantitative analysis, and their scope and limitations. This will further help the research community to develop light-weight and efficient secured time synchronization protocols for IoT.

Keywords IoT · WSN · Time synchronization · Security threats

20.1 Introduction

In a short time ago, the Internet of Things (IoT) emerged as a new era of application in almost all fields of society and engineering problems. In all applications of IoT, sensors are deployed to form a network to observe the physical or natural condition

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Glioma Tumor Detection Through Faster Region-Based Convolutional Neural Networks Using Transfer Learning.

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Abstract: - Glioma Tumor is generally found in the brain and spinal cord. This tumor begins in glial cells that cover the nerve cells and control the function of that. The Glioma tumor is classified based on glial cells involved in the Glioma tumor formation. The tumor affects the normal activity of the patients such as loss of memory, difficulties in speech, confuse the identification of objects, and also causes difficulties to maintain the balance of the body. The early detection of Glioma tumor helps healthcare practitioners to suggest a suitable treatment for the disease. The detection of a Glioma tumor is a challenging task. Many types of approaches had been proposed by the researchers and academicians for accurately detecting the Glioma tumor. Accurately detecting the brain tumor is still a big challenge. Because of recent advances in image processing and computer vision, healthcare professionals are using sophisticated disease diagnostic tools for disorders/disease prediction. The Neurosurgeons and Neuro-Physicians use the magnetic resonance imaging technique to identify multiple brain tumors. The approaches to computer vision play a significant role in the automated identification of different Brain tumors. This research paper explores the Convolutional neural network-based Faster R-CNN approach for the Glioma tumor detection using four pre-trained deep networks such as Alexnet, Resnet18, Resnet50, and Googlenet. The proposed approach of object detection as compared to other R-CNN approaches is more efficient and accurate having higher precision. The proposed model detects the Glioma tumor with 99.9% accuracy. The pre-trained networks used to train the tumor detection model are Alexnet, Resnet18, and Resnet50, and Googlenet. As compare to Alexnet, resnet18, and Googlenet deep networks, the Resnet50 Pre-trained network performed well with higher accuracy of detection.

Keywords: Glioma Tumor, Magnetic Resonance Imaging, Computer vision, Convolutional Neural networks, Pre-trained networks, Deep learning.

Performance Evaluation of Word Representation Techniques using Deep Learning Methods

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***Abstract*—Word vectors are the real-valued numbers which allow machine learning algorithms to extract the semantic information concern with the words when trained on natural language corpora. The paper explores word representation techniques with evaluation criteria to measure the quality of representation through deep learning models like BERT. The performance of these words vectors can be evaluated using certain measures. Broadly, the two classes of evaluation are intrinsic and extrinsic evaluation. Intrinsic evaluators directly extract syntactic or semantic relationships between the words independent of any language processing task. These evaluators focus on subtasks while extrinsic evaluators consider complete natural language processing task as a measure of performance like chunking, sentiment analysis etc. The experiments have been performed using BOW model, Word2Vec and BERT language model. In this research work word-similarity task is considered for intrinsic evaluation and part-of-speech (POS) tagging task is used as a measure for extrinsic evaluation. The experiments have been performed using python, sklearn machine learning toolkit and keras deep learning framework. BERT language model is used which has recently emerged as the prominent tool for natural language processing. The result obtained from the experiment in this research for word embedding representation techniques are efficient and better compared to other existing traditional models. However, considering large datasets this can be enhanced for better accuracy**

Keywords*— *Word Vector, Word Embedding, Distributed Representation, Intrinsic Evaluators, Extrinsic Evaluators, BOW, Word2Vec, BERT, Pre-trained Embedding.

I. Introduction

The role of natural language processing is to extract information from unstructured text. A natural language processing system allows computers to understand the natural language and perform specific tasks like classification, part-of-speech tagging or sentiment analysis etc. The most significant task is to represent the meaning of words in a computer. The systems should be able to extract the similarity and difference between the words. Generally, the taxonomy like WordNet is used to express the hypernyms and synonyms sets. But this leads to a problem of missing words i.e. the words which are not defined in the corpus cannot be expressed. Word vectors are the real number vectors that encode the notion of similarity and difference between the words. These are the learned representation of the input. For example if there are k-million words in a language, then there exists some k-dimensional space to encode the semantics of the language. Each dimension encodes specific meaning which is transferred during communication. The numbers in the word vector represent the word's distributed weight across dimensions. The numerical weight of the word represents the closeness of the concept [10]. The vector embeds both semantic and syntactic information of the word obtained from the corpus.

The semantic dimension indicate tense (past/present/future tense), number (singular/plural number), gender (masculine/feminine gender) etc. As shown in figure 1, each column represents the dimension which captures defined meaning or some specific concept. The four dimensions are animal, domestic, pet and fluffy respectively. The each weight of the word within the column (dimension) represents its closeness with the concept.

Figure 1: word vector representation with specific dimensions [10].

The dimensions of the vector contain the meaning of the word. Using these continuous vectors space machines can extract similarities between the different words [10]. The words with similar word vectors means they are similar in some context. Word-embedding is a significant tool of natural language processing to learn quality representation for various tasks like semantic analysis, information retrieval, question- answering systems and machine translation etc [1]. The most significant point in the study of distributional semantics is to evaluate the quality of word representation models [15]. There are no clear criteria about the evaluation of these models. Ip engineers evaluate the performance of these models by experimenting on specific tasks like pos tagging, classification etc while computational linguistics perform experimentation using methods of cognitive science.

The paper presents the significance of word representation in natural language processing with various word representation approaches. It explains the comparative analysis of conventional and current word representational techniques for intrinsic and extrinsic evaluation. The paper is organized as follows: The section 1 cover the basic introduction and section 2 shows the related work done in the domain. Section 3 describes various approaches to word representation. The section 4 exposes the two classes of evaluation i.e. Intrinsic and extrinsic evaluation of word representations. The section 5 covers the experimental setup and results regarding performance evaluation of the word representation models. The next section concludes the work with specific points to be considered for further work.

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ORIGINAL RESEARCH

SN

Security Threat Analysis and Countermeasures on Consensus-Based Time Synchronization Algorithms for Wireless Sensor Network

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Abstract

Time synchronization is an indispensable and fundamental requirement for all types of wireless sensor networks (WSNs) protocols and applications. The consistency and correctness of other protocols like localization, routing, etc., are highly dependent on time synchronization. However, due to the hostile deployment of wireless sensor networks, they are prone to cyber-physical attacks that create different threats to time synchronization protocols as well. Recently, consensus-based time synchronization (CTS) algorithms are gaining popularity due to their distributed nature and robustness toward different types of threats such as denial-of-service and node destruction. But, the inherent properties of the consensus-based approach of making in-network averaging make these algorithms vulnerable to message manipulation attacks. In this paper, an in-depth simulation-based analysis is conducted using pymote, a python-based discrete event simulator for WSN, on state-of-the-art CTS algorithms in the presence of message manipulation attacks. A novel and generic algorithm, Message Manipulation Attack Resilient CTS (MMAR-CTS) is proposed embedding which the state-of-the-art algorithms are extensively evaluated based on standard performance metrics, e.g., convergence speed, global synchronization error, and local synchronization error in the presence of the attack, and sufficient observations are derived to show the behavior of these algorithms. The comparison of protocols is validated with simulation results. Simulation results show that MMAR-CTS embedded SATS algorithm is 75% more efficient as compared to other candidate algorithms, measured in terms of convergence speed (number of iterations) and nearly 40% improvement in global and local synchronization error.

Keywords Wireless sensor network · Consensus time synchronization · Message manipulation attack

Introduction

From the last decade, wireless sensor networks (WSNs) have been receiving more attention due to their increasing demand in many applications such as healthcare monitoring, area monitoring, industrial domain, and threat detection. WSNs consist of a huge number of low-cost, battery-operated, and small motes. Time synchronization is a critical requirement among these motes due to its distributed nature and unavailability of a centralized clock. It is required between motes for different applications, such as multi-agent networks, data fusion, moving objects trajectory estimations, and different monitoring systems. It is also a prerequisite for the correctness and consistency functionality of other protocols [1]. Broadly, there are two types of approaches for time synchronization algorithm in WSN, centralized and distributed approach. The centralized algorithms are multi-hop, organized the network in a rooted tree structure, and synchronization is achieved with reference to the root's time. This type of approach has many shortcomings such as root node failure problems and hierarchy or cluster-creation overhead. The recent approach of time synchronization in WSNs is based on distributed consensus theory and based on this, many

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Performance Evaluation of Merging Techniques for Handling Small Size Files in HDFS

Vijay Shankar Sharma and N. C. Barwar

Abstract When dealing with the storage of large files, HDFS is one of the good choices as a distributed storage. Processing a large number of small files results in the performance bottleneck of HDFS. A massive number of small files will produce excessive metadata that leads to inefficient utilization of the Name Node memory, and frequent function calls will consume all over more time to process; therefore, it can be concluded that HDFS degrades when handling with small files. A detailed performance evaluation is being conducted to understand the impact of increasing small files in Hadoop for processing. This paper mainly evaluates sequential files, CombineFileInputFormat, HAR and Hadoop streaming techniques to deal with small file problem in HDFS. Empirical evaluation conducted in this paper shows that HAR and CombineFileInputFormat perform better and have consistent and stable results when increasing number of files for processing.

Keywords Hadoop · MapReduce · HAR · Hadoop streaming · Sequential file · CombineFileInputFormat · Small files · HDFS

1 Introduction

The function of Hadoop is identified by its two major core components, i.e., Hadoop Distributed File System (HDFS) and MapReduce. The HDFS stores huge data into the computing nodes. This huge data cannot be stored directly to the computing nodes; HDFS divides the large file into 128 MB data chunks, and these data chunks

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IMAGE CLASSIFICATION WITH DEEP LEARNING BASED ON DIFFERENT CONVOLUTIONAL LAYERS USING TENSORFLOW

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ABSTRACT

Deep learning is the subfield of machine learning which uses neural networks that inspired by the structure and functioning of the human brain. Deep learning is a new approach for data analysis and prediction; it has become very popular recently. Deep learning has achieved much higher success than machine learning in many applications, one of the reason for this is, that machine learning not able to process large amount of data effectively as well as it also not able to extract the features from the data automatically. Deep learning is being recognized as an essential tool for artificial intelligence research, with various applications in several areas such as speech recognition, object recognition and image classification. In particular, Deep Learning is preferred in the classification of images, because it can provide efficient results. In this paper, a deep learning convolutional neural network based on Tensor Flow and Keras is deployed for 2D Image Classification, using animal dataset. In this study, we used Tensor flow, one of the most popular Python programming language libraries for deep learning to classify Images and sigmoid classifier and Rectified Linear Unit (ReLu) function for deep learning convolutional neural network. At last, the each image features are trained with convolutional neural network for image classification. The proposed approach is compared for one and two convolutional layers on CPU system and finally we conclude that image classification with two convolutional layers gives better validation accuracy.

KEYWORDS–

Deep Learning; Tensorflow; Keras; Conolutional Neural Network; ReLu; Sigmoid Classifier; Image Classification

1.INTRODUCTION

Deep learning is a new approach for data analysis and prediction; it has become very popular recently. Deep learning is being recognized as an essential tool for artificial intelligence research, with various applications in several areas such as speech recognition, object recognition and image classification [3]. For Classification problems, more accurate values can be obtained using Deep Learning instead of Machine Learning.

Deep Learning can be classified into four types: Deep Neural Network (DNN), Convolution Neural Network (CNN), Recurrent Neural Network (RNN) and Q-learning. These Deep Learning types are rapidly evolving, with several software packages including Theano, CuDNN, Caffee, and Keras [3].

By using a Convolutional neural network in deep learning, a model can be created to enable powerful and often correct assumptions by changing various parameters such as activation function and number of convolutional layers. There are several libraries used in deep learning studies [2].

TensorFlow is one of the libraries used for image classification in deep learning. TensorFlow is an open-source software library developed by the Google in 2015 for numerical computation. TensorFlow can deploy RNN, DNN and CNN not only to multi core CPUs, but also to GPUs. It also supports the AdaGrad, Dropout, and ReLu functions, which are very

Chapter 6
A Theoretical Approach to Reinforcement Learning Algorithm and Nash Equilibrium to Maximize the Score in Imperfect Information Game

Ruchi Vyas and Alok Singh Gahlot

Abstract Computers have just overshadowed the degree of human play in imperfect information games like Scrabble, yet there remains an opportunity to get better. Specifically, there is a lot to be acquired about the rival's tiles and moves. Reinforcement learning is one of the parts of Machine Learning. It is tied in with making an appropriate move to increase reward in a specific circumstance. The Nash Equilibrium is a hypothesis in game theory that communicates that a player can achieve the ideal outcome by not wandering from their initial strategy. Reinforcement learning algorithm and game theory would be best technique for training the agent. It will learn from as much as it plays, such that our agent can play and win the game with different persons with their different playing strategy they use for Scrabble game. To do this, our agents need to find out about other players' strategies and win every time they play against the human.

Keywords Reinforcement learning · Nash equilibrium · Decision-making · Machine learning

1 Introduction

Scrabble is an imperfect information game, that is, the current player is unknown of the rack of other player, making it elusive out of the rival's best course of action until the finish of the game. Additionally, there is innate arbitrariness present in Scrabble as arbitrary letters are being chosen from the pack to the current player's rack at each round [1]. Our main motive is to provide training to the agent every time it plays against the human and gets itself skilled and ready for the next game.

In supervised learning, an agent is trained to play by gaining knowledge from the data sets provided by the trainer but in reinforcement learning an agent gets rewards whenever it wins so the main objective of the agent is to maximize its rewards and according to our implementation, the agent will be learning how to win the game

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Performance Evaluation of Word Representation Techniques using Deep Learning Methods

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Abstract*—Word vectors are the real-valued numbers which allow machine learning algorithms to extract the semantic information concern with the words when trained on natural language corpora. The paper explores word representation techniques with evaluation criteria to measure the quality of representation through deep learning models like BERT. The performance of these words vectors can be evaluated using certain measures. Broadly, the two classes of evaluation are intrinsic and extrinsic evaluation. Intrinsic evaluators directly extract syntactic or semantic relationships between the words independent of any language processing task. These evaluators focus on subtasks while extrinsic evaluators consider complete natural language processing task as a measure of performance like chunking, sentiment analysis etc. The experiments have been performed using BOW model, Word2Vec and BERT language model. In this research work word-similarity task is considered for intrinsic evaluation and part-of-speech (POS) tagging task is used as a measure for extrinsic evaluation. The experiments have been performed using python, sklearn machine learning toolkit and keras deep learning framework. BERT language model is used which has recently emerged as the prominent tool for natural language processing. The result obtained from the experiment in this research for word embedding representation techniques are efficient and better compared to other existing traditional models. However, considering large datasets this can be enhanced for better accuracy

Keywords*— *Word Vector, Word Embedding, Distributed Representation, Intrinsic Evaluators, Extrinsic Evaluators, BOW, Word2Vec, BERT, Pre-trained Embedding.

I. INTRODUCTION

The role of natural language processing is to extract information from unstructured text. A natural language processing system allows computers to understand the natural language and perform specific tasks like classification, part-of-speech tagging or sentiment analysis etc. The most significant task is to represent the meaning of words in a computer. The systems should be able to extract the similarity and difference between the words. Generally, the taxonomy like WordNet is used to express the hypernyms and synonyms sets. But this leads to a problem of missing words i.e. the words which are not defined in the corpus cannot be expressed. Word vectors are the real number vectors that encode the notion of similarity and difference between the words. These are the learned representation of the input. For example if there are k-million words in a language, then there exists some k-dimensional space to encode the semantics of the language. Each dimension encodes specific meaning which is transferred during communication. The numbers in the word vector represent the word's distributed weight across dimensions. The numerical weight of the word represents the closeness of the concept [10]. The vector embeds both semantic and syntactic information of the word obtained from the corpus.

The semantic dimension indicate tense (past/present/future tense), number (singular/plural number), gender (masculine/feminine gender) etc. As shown in figure 1, each column represents the dimension which captures defined meaning or some specific concept. The four dimensions are animal, domestic, pet and fluffy respectively. The each weight of the word within the column (dimension) represents its closeness with the concept.

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The paper presents the significance of word representation in natural language processing with various word representation approaches. It explains the comparative analysis of conventional and current word representational techniques for intrinsic and extrinsic evaluation. The paper is organized as follows: The section 1 cover the basic introduction and section 2 shows the related work done in the domain. Section 3 describes various approaches to word representation. The section 4 exposes the two classes of evaluation i.e. Intrinsic and extrinsic evaluation of word representations. The section 5 covers the experimental setup and results regarding performance evaluation of the word representation models. The next section concludes the work with specific points to be considered for further work.

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An Efficient Approach to Enhance the Scalability of the HDFS: Extended Hadoop Archive (EHAR)

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Abstract:- **The Hadoop framework is most popular among data analytics applications. The file system of the Hadoop (HDFS) provides the layered storage facility for the frequent and infrequent data. In HDFS data can be archived using the HAR (Hadoop Archive) technique, but HAR archive are immutable means once the archive created it cannot be modified. One has to rewrite the whole archive if want to append the some new file to the existing archive. This paper introduces extended Hadoop archive (EHAR) that will resolve the scalability issue of the HDFS and also provide the mechanism to append the new files to the existing Hadoop archive. The experimental result shows that the execution time of the proposed approach is 53% to 39% lesser than the native HAR for the different fixed size files and 52% to 38% lesser than the native HAR for the different variable size files.**

Keywords— HDFS, Index Files, HAR, Scalability, B-Tree, NameNode, EHAR, Computation Layer, Archive Layer.

I. INTRODUCTION

In the 21st century the data becomes very important asset for each and every organization and individual. The rate of data production by various direct and indirect platforms is also very fast. The analytics and analysis of this fast growing unstructured data is becoming the popular application domain for the researchers and scientists. There are number of technological issues to handle such fast growing unstructured data i.e. scalability, fault tolerance, etc. Hadoop Distributed File System (HDFS) is the most popular file system to efficiently analyze the large amount of data. HDFS is capable to store and process fast growing unstructured data along with features of data availability and scalability. The fast growing unstructured data is processed on the different storage layers, these layers are defined on the basis of the use of data. The data that is used frequently is stored at the computation layer of storage and the data that is used less frequently is stored at the archive layer. This classification of data will benefit in number of different ways i.e. data stored at the archive layer will require relatively less computation power in comparison to the computation layer and requires high and stable storage capacity, whereas computation layer does not need log term storage facility, it requires high computation capability. The data that needs to be executing faster and frequently are processed at the computation layer and the data for archival purpose and processed less frequently are stored at the archive layer. The benefit of storing the data in different layers is that both layers can grow independently hence provides the scalability and reliability at a great extent.

The HDFS provides the storage layer separation for the frequent and un-frequent data, thus it is suitable for the archival storage. HDFS will be able to store fast growing unstructured data efficiently with the features of the scalability and data availability and data analytics frameworks can directly access the data stored in the archive, there is no need of the data ingestion. HDFS works on the principle of the master-slave architecture, the central node (NameNode) in the HDFS will works as the master node and responsible for the meta-data management. The central level meta-data management at the master node will limit the scalability of the HDFS, because as the number of files increases it will also increase the NameNode memory requirement, thus while dealing with the million number small files the performance of the HDFS degrades. Each file, directory and block in the NameNode is represented as the object and that will occupy approximately 150 bytes of the memory in the NameNode, therefore it comes to the million number of small files, NameNode memory get overloaded and performance of the HDFS degrades, number or researches provide several solutions to overcome from the small file problem of the HDFS. Some researchers suggest increasing the NameNode memory by allowing multiple NameNode (Federated Name Nodes) to store the meta-data; each NameNode is responsible to save the subset of the meta-data. Some researchers proposed that merging the small files can solve the small file problem; the major solutions based on the merging of the small files are sequence file, combinefileinputformat and map file. HDFS also provide a solution to deal with the small file problem that is HAR (Hadoop Archive). In HAR small files are merged and then stored to the HDFS. The process of archiving file using the HAR will be done in two steps; the first step is to merge the small files by writing binary data of the small files to the part files, the second step is updation of the index files, in this step both _index and _masterindex file are updated. With help of theses index files one can access the small file from the archive without any data connector, the small files in the archive are treated as the normal files in the HDFS. The problem with HAR archive is that once the archive

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A Novel Technique for Handling Small File Problem of HDFS: Hash Based Archive File (HBAF)

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Abstract. Now a day's, Data is exponentially increasing with the advancement in the data science. Each and every digital footprint is generating enormous amount of data, which is further used for processing various tasks to generate important information for different end user applications. To handle such enormous amount of data, there are number of technologies available, Hadoop/HDFS is one of the big data handling technology. HDFS can easily handle the large files but when there is the case to deal with massive number of small files, the performance of the HDFS degrades. In this paper we have proposed a novel technique Hash Based Archive File (HBAF) that can solve the small file problem of the HDFS. The proposed technique is capable to read the final index files partly, that will reduce the memory load on the Name Node and offer the file appending capability after creation of the archiv.

Keywords. HDFS, Small File Problem, Meta Data Management, Hash Function, HAR, Map File, SSHF, HT-MMPHF, Merging Technique.

1. Introduction

Hadoop is open-source technology to handle the vast amount of unstructured and big data, which offers the wide range functionality in comparison to the traditional relational data bases. The file system of Hadoop is known as the Hadoop Distributed File System (HDFS) that is based on the master slave architecture. In this architecture there is a Name Node that acts as a master with processing capabilities and stores the meta-data information of the files stored in the file system. There are number of Data Node's that act as the slave means these Data Node's are only used to store the data, no processing is required at the Data Node's. Once a file is stored on the HDFS it is divided in the 128 MB size blocks and then these blocks are stored on the HDFS. The size of the HDFS block is variable means client can configure the size of the HDFS block as per the requirement, by default it is 128 MB. To ensure the availability of the data, HDFS replicate the data blocks on the Data Node's and it will be decided by the replication factor that is by default 3, means each data block is written on the three Data Node's, in case if any one of the Data_Node's gets down then data block can be

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Performance Evaluation of Merging Techniques for Handling Small Size Files in HDFS

Vijay Shankar Sharma and N. C. Barwar

Abstract When dealing with the storage of large files, HDFS is one of the good choices as a distributed storage. Processing a large number of small files results in the performance bottleneck of HDFS. A massive number of small files will produce excessive metadata that leads to inefficient utilization of the Name Node memory, and frequent function calls will consume all over more time to process; therefore, it can be concluded that HDFS degrades when handling with small files. A detailed performance evaluation is being conducted to understand the impact of increasing small files in Hadoop for processing. This paper mainly evaluates sequential files, CombineFileInputFormat, HAR and Hadoop streaming techniques to deal with small file problem in HDFS. Empirical evaluation conducted in this paper shows that HAR and CombineFileInputFormat perform better and have consistent and stable results when increasing number of files for processing.

Keywords Hadoop · MapReduce · HAR · Hadoop streaming · Sequential file · CombineFileInputFormat · Small files · HDFS

1 Introduction

The function of Hadoop is identified by its two major core components, i.e., Hadoop Distributed File System (HDFS) and MapReduce. The HDFS stores huge data into the computing nodes. This huge data cannot be stored directly to the computing nodes; HDFS divides the large file into 128 MB data chunks, and these data chunks

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PATCH BASED STEREO MATCHING USING CONVOLUTIONAL NEURAL NETWORK

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Abstract

The paper presents a new Convolutional Neural Network (CNN) architecture, called stacked stereo CNN, for computing disparity map from stereo images. In stacked stereo CNN, left and right image patches are stacked back-to-back and fed to a single tower CNN. This is in contrast to Siamese network where two towers are used, one for the left patch and other for the right patch. The proposed network is trained on a large set of similar and dissimilar image patches, which are generated from stereo images and their ground truth images from Middlebury stereo datasets. The network returns a dissimilarity score for a pair of image patch which is used to compute the cost volume. The cost volume is further refined using post processing steps before generating the final disparity map. The proposed network is evaluated on Middlebury datasets and achieves comparable results to the state-of-art algorithms.

Keywords:

Stereo Vision, Patch Matching, Disparity Map, CNN

1. INTRODUCTION

Stereo vision is a widely used technique to estimate depth of various scene points from two images of the scene obtained from two slightly different viewpoints. The basic principle of stereo vision is that the depth of a scene point is inversely proportional to its disparity in the left and right images. However, efficient and accurate implementation of this simple principle, specifically calculation of disparity, is eluding researchers for the last three decades due to the presence of occlusion, repetitive patterns, reflections, textureless areas. Thus, the stereo vision is still a very active research area of computer vision. It has many applications, such as 3D scene reconstruction, autonomous driving, obstacle avoidance and robotics.

Over three decades of research in stereo vision, many methods have been reported in literature. These methods can be grouped into two categories: traditional approaches and machine learning based approaches. Traditional disparity estimation methods start by first computing dissimilarity cost at each disparity level for each pixel and generates a cost volume followed by cost volume filtering for smoothing and noise removal and finally, disparity selection by selecting index of the lowest cost. Commonly, some measures of a small window around the pixel of interest in one view, called the reference image, is used to locate the most similar window in the other view called the target image. The commonly used handcrafted similarity measures are: absolute difference or squared difference of pixel intensities, normalized cross-correlation. However, due to occlusion, repetitive patterns, reflections, textureless areas, a large number of wrong matches are generated by direct matching.

To improve the accuracy of the disparity map by traditional methods, a typical pipeline of stereo disparity computation, using other clues from the stereo pair images and neighbourhood continuity, consists of the following steps: (1) matching cost computation, (2) cost aggregation, (3) optimization, and (4) disparity refinement [1]. For more details about these steps, refer [1]. The major drawback of traditional methods is inability of handcrafted similarity measures to generate accurate initial disparity map leading to inaccurate final disparity map, even after applying all the steps of the stereo pipeline.

In machine learning based approaches, neural networks are used in one or more steps of the traditional stereo pipeline. Due to the availability of advanced GPU hardware and deep learning libraries, researchers in stereo vision have reported many deep learning based approaches to calculate disparity maps. These methods outperform traditional methods in terms of accuracy and sometimes speed. Based on how convolutional neural networks (CNN) is used in stereo pipeline, deep learning stereo matching methods are classified into patch based [2][3] or end-to-end [4] [5].

In patch based methods, stereo matching problem can be modelled as a binary or multi class classification problem or a regression problem where a network is trained to categorise similar and dissimilar patches or to generate a similarity/dissimilarity score for the input patches. In a rectified stereo image pair, given a patch from the left (reference) image, the task of the network is to locate the best matching patch in the right (target) image. In patch based methods, the hand crafted feature to generate matching score is replaced by a trained network. Similar to traditional methods, to further refine the disparity map, extensive post processing steps are used. On the other hand, in end-to-end deep learning methods, hourglass shaped deep convolutional neural networks are used to generate the final disparity map in one go and no further post processing steps are used. Currently, the end-to-end networks are capable to handle domain specific problems. Researchers are unable to train a generic stereo matching network due to non-availability of suitable labelled datasets. Further, the end-to-end methods are very expensive in terms of memory requirements.

In this paper, a new CNN architecture, called stacked stereo CNN (SS-CNN), for the patch based stereo matching is proposed. In contrast to commonly used two tower Siamese network [2] [3] for the patch based stereo matching, the proposed network is a single tower CNN where the two input patches are stacked together along the colour plane axis before feeding to the network. The network directly generates the dissimilarity score for the input patches which can be used as dissimilarity cost in downline processing steps. The dataset to train the proposed network is generated automatically from publically available stereo images datasets with ground truth from Middlebury [6]. The raw disparity map obtained from the proposed network is further refined using semi global matching and left-right (LR) consistency check. Further, a new method is proposed to fill inconsistent disparities generated after LR check. Typically, inconsistent disparities are

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Kinetic study and modeling of homogeneous thermocatalytic decomposition of methane over Ni-Cu-Zn/Al2O3 catalyst for production of hydrogen and bamboo-shaped carbon nanotubes

Sushil Kumar Saraswat, Bipul Sinha, Kamal K. Pant, and Ram B. Gupta

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Hierarchical nitrogen-doped porous carbon derived from lecithin for high-performance supercapacitors

Muslum Demir,* Sushil Kumar Saraswat and Ram B. Gupta*

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The development of renewable carbon sources for sustainable energy storage applications is of significance importance. Herein, we report the synthesis of three-dimensional N-doped carbons derived from lecithin *via* a simple route. Hierarchical porous carbons with high surface area (up to 1803 $m^2 g^{-1}$) and nitrogen-doping level (up to 9.2 wt%) were successfully prepared by hydrothermal carbonization and a subsequent thermal annealing. The electrochemical performance of the carbon electrodes was examined with both two and three-electrode cell configurations in 1 M KOH and 1 M H_2SO_4 electrolytes. The as-prepared NC-800 electrode features a large specific capacitance (285 F g^{-1} at 0.5 A g^{-1}), high-rate capacitive behavior, and long-term cycling stability (8% loss after 20 000 cycles). Furthermore, NC-800 exhibits an energy density of 24.7 W h kg^{-1} at a power density of 500 W kg^{-1} in 1 M H_2SO_4. The excellent electrochemical performance of N-doped carbons is attributed to the unique hierarchical porous frameworks along with pseudocapacitive effect. This work opens up a new approach for preparation of hierarchical N-doped porous carbon materials with tailored properties for supercapacitor applications.

1. Introduction

Electrochemical supercapacitors (ESs), also known as electrochemical double layer capacitors have received much attention due to their high power density, fast charge–discharge rate, and long cyclability.[1–3] ESs have been extensively implemented in a variety of applications such as electronic devices, hybrid electric vehicles, memory backup, *etc.*[4] ESs can be classified into two types based on their charge storage mechanism: (a) electric double layer capacitor (EDLC) in which energy is stored by adsorption of ions on the electrode surface and (b) pseudocapacitor (also known as faradaic supercapacitor) in which charge is stored through redox reactions on the electrode material.[5]

The electrode material plays a key role in determining the capacitance of a supercapacitor. To date, porous activated carbons (PACs),[5,6] metal oxides,[7] conductive polymers,[8] graphene[9] and carbon nanotubes[10] have been utilized as potential electrode materials in energy storage technologies.[11,12] Among these, abundant PACs present high surface area, excellent stability, and moderate cost. However, pristine (or bare) PACs suffer from low electron/ion conductivity, lacking of pseudocapacitance contribution but also their mediocre electrochemical performance lead to a poor energy/power density. In order to overcome these issues, pristine PACs have been modified by introducing heteroatoms (such as N, S, P) into their framework to further enhance the electrochemical activity, surface wettability, and electron/electrolyte conductivity through the pseudocapacitive contribution.[13–15] The induced electrochemical activity may arise from shifting of the conjugation electrons between heteroatom (lone-pair) and carbon framework, which causes facilitation of electron transfer.[16] Moreover, the high surface area of PACs is mostly due to their overwhelmingly microporous structure (*i.e.*, micropore distributions ranging from 0.5 to 1.1 nm). These narrow pores do not allow adequate transport of ions which greatly hinder practical applications of PACs as high energy/power density supercapacitors.[17–19] Therefore, it is essential to develop hierarchical porous architectures with abundant micropores (to accumulate charge effectively), interconnected mesopores (to reduce the ion diffusion distance) and appropriate macropores (to serve as the ion-buffering reservoirs for storing electrolyte ions).[20–22] In the last decade, many template-based methods such as using silica oxides or metallic compound have been reported for synthesizing of hierarchical porous carbons.[23,24] However, these methods could not be commercialized due to the consumption of high-cost templates and multistep synthesis process. Thus, it is vital to develop a simple and inexpensive method for fabricating of hierarchical porous carbon. In this work, we utilized a straightforward chemical activation (with KOH) approach which yields a 3D hierarchical porous structures. The successful formation of hierarchical porous carbon using KOH activation

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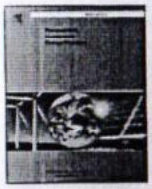

Recent advancements in semiconductor materials for photoelectrochemical water splitting for hydrogen production using visible light

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ABSTRACT

Water splitting technology directly stores solar energy into the chemical bonds of diatomic hydrogen to be used as a clean fuel without producing any unwanted side reactions, byproducts or environmentally polluting compounds. Semiconductor materials are needed for a photoelectrochemical (PEC) device to catalytically convert photons from sunlight into chemical energy. Materials implemented in a device for sustainable hydrogen production are required to be inexpensive, highly photo-active, chemically stable, environmentally sustainable, and have a high solar-to-hydrogen conversion efficiency. Although many semiconductor composites and nanostructures have been examined, thus far, no material satisfies all criteria of an implementable photocatalyst and many materials do not show necessary energy conversion efficiency. Materials that depicted a high efficiency often rely on the ultraviolet portion of the solar spectrum, which does not contain enough energy for the industrial utilization of PEC water splitting technologies. Focusing on the use of the visible spectrum is promising for hydrogen production. Herein, recent advancements in the activity of visible light semiconductors are presented, including both platinum and non-platinum group materials. This review touches on the latest developments in various synthesis schemes capable of achieving suitable water splitting compositions and architectures while highlighting the challenges being faced when designing visible light-active water splitting photocatalysts. Interesting advancements in the use of nanostructures for designing the next generation of catalysts will be discussed. Also, for the proper comparison of catalytic efficiencies, it is important to establish terminology that can compare data across a magnitude of experimental conditions. A notable challenge associated with the catalysis is its stability or photocorrosion, which lacks established protocols. Promising future directions for designing next generation materials are discussed.

1. Introduction

The energy crisis in the mid-1970s triggered a worldwide research enthusiasm for the expansion of renewable energy resources to replace conventional fossil fuels. Recently, increasing CO_2 levels and atmospheric pollution have led to the development of several clean energy resources, including solar, wind, geothermal, tidal, etc. With an increase in the population and industrialization, the global energy demand increases with each passing day, further leading to the depletion of fossil fuels. Simultaneously, the concentration of greenhouse gases in the atmosphere is increasing daily resulting from the burning of fossil fuels to meet ever-growing energy demands. Greenhouse-gas emissions from the energy sector represent roughly two-thirds of all anthropogenic greenhouse-gas emissions, which have steadily risen over the past century. Solar energy via sunlight is one of the most promising alternative energy resources that can replace fossil fuels and fulfill the rising global energy demand. For example, the total energy consumption of the world projected for the entire year of 2020 is approximated to be 663.6 exajoules, equivalent to all of the energy from sunlight striking the Earth for just 90 min (given that the average energy rate of sunlight striking the surface of the Earth is ca. 1,200,000 TW) [1]. However, unlike the reasonably reliable petroleum fuel supply chain, sunlight intensity is intermittent and dependent upon the geographic location, weather forecast, and time of day [2].

Hydrogen production from sunlight and water is being considered as a promising solution to supply sustainable energy; it is environmentally clean and can act as a suitable buffer between energy supply and demand. Based on the solar harvesting technology utilized, solar hydrogen production methods can be generally categorized (Fig. 1) as: (a) *solar photocatalytic water splitting*: utilizes photo-active electrodes, particles, or photovoltaic cells made of semiconductors or semiconductor composites to split water with and without an external

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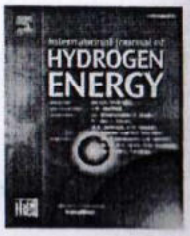

Nitrogen and oxygen dual-doped porous carbons prepared from pea protein as electrode materials for high performance supercapacitors

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ABSTRACT

Porous carbons as electrode materials are highly desired for use in energy storage/conversion devices. Herein, the development of a series of highly porous nitrogen and oxygen co-doped carbons by using pea protein (PP) as a cost-effective, sustainable and nitrogen-rich precursor is reported. Pea protein derived carbons (PPDCs) have been prepared by applying a straightforward two-step synthetic route including pyrolysis and KOH-chemical activation. Potassium hydroxide has been employed to generate porosity and introduce oxygen functionalities into the framework of carbon. The heteroatoms doping content and porosity parameters have been tuned by varying the synthesis temperature and activator to precursor ratio. The carbon obtained with optimal synthetic parameters (T = 800 °C and KOH/Precursor = 4) featured the highest surface area, the maximal pore volume and N-/O doping level of 3500 $m^2 g^{-1}$, 1.76 $cm^3 g^{-1}$, and 2.5-/17.9 at%, respectively. PPDC-4-800 as supercapacitor presented a very high specific capacitance (413 F g^{-1} at 1.0 A g^{-1} in 1 M KOH), remarkable cycling stability (92% retention after 20000 cycles) and outstanding rate capability (210 F g^{-1} at 30 A g^{-1}). The cooperative effects of the well-developed porous architecture and surface modification of PPDCs resulted in enhanced electrochemical performances, suggesting their potential application for energy storage devices.

Introduction

Due to the fast-growing consumption of energy in our industrial society, development of inexpensive and efficient energy storage devices emerges as an absolute necessity [1]. In this regard, batteries and capacitors have gained much attention as two major storages technologies. The electrochemical reaction as the primary storage mechanism in the batteries may hinder their performance. On the contrary, the charge separation mechanism in the supercapacitors (also known as ultracapacitors) does not limit their storage properties. Thus,

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RESEARCH ARTICLE

Lignin-derived heteroatom-doped porous carbons for supercapacitor and CO_2 capture applications

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Summary

The present study reports the economic and sustainable syntheses of functional porous carbons for supercapacitor and CO_2 capture applications. Lignin, a byproduct of pulp and paper industry, was successfully converted into a series of heteroatom-doped porous carbons (LHPCs) through a hydrothermal carbonization followed by a chemical activating treatment. The prepared carbons include in the range of 2.5 to 5.6 wt% nitrogen and 54 wt% oxygen in its structure. All the prepared carbons exhibit micro- and mesoporous structures with a high surface area in the range of 1788 to 2957 $m^2 g^{-1}$. As-prepared LHPCs as an active electrode material and CO_2 adsorbents were investigated for supercapacitor and CO_2 capture applications. Lignin-derived heteroatom-doped porous carbon 850 shows an outstanding gravimetric specific capacitance of 372 F g^{-1} and excellent cyclic stability over 30,000 cycles in 1 M KOH. Lignin-derived heteroatom-doped porous carbon 700 displays a remarkable CO_2 capture capacity of up to 4.8 mmol g^{-1} (1 bar and 298 K). This study illustrates the effective transformation of a sustainable waste product into a highly functional carbon material for energy storage and CO_2 separation applications.

KEYWORDS

biomass, chemical activation, CO_2 separation, heteroatom-doped carbon, hydrothermal carbonization, lignin, supercapacitor

1 | INTRODUCTION

Supercapacitors, also named as electrochemical capacitors, are high-performance energy storage devices. During the last decades, supercapacitors have become very prominent devices because of their excellent cyclability, a high power density, and an excellent charge/ discharge rates.[1] Supercapacitors have been classified as two types based on the charge storage mechanism: first, electric double layer capacitors (EDLCs) and second, pseudo-capacitors (PCs). Electric double layer capacitors store the charge electrostatically within the active material/ electrolyte interface. In contrast to EDLCs, PCs store the charge via reversible redox reaction and fast process.[2-5] To date, carbon-derived electrode materials have been widely used for EDLCs owing to their low cost, excellent

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RESEARCH ARTICLE

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Adsorptive removal of heavy metals from industrial effluents using cow dung as the biosorbent: Kinetic and isotherm modeling

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Abstract

This article investigated an eco-friendly technique for the removal of heavy metals using biosorbent derived from cow dung. Heavy metals bearing wastewater were collected from a common effluent treatment plant located at Sangariya, Jodhpur (Rajasthan, India) to evaluate the removal efficiency of synthesized cow dung–activated carbon. The prepared activated carbon materials have a high surface area in the range of 948–1072 m^2/g and also have significant quantities of micropore and mesopore volumes. Furthermore, pore diameters were in the range of 2.24–2.33 nm. Surface morphology was improved after being treated with NaOH. The adsorbent material was found to be an efficient medium for the removal of Cr(VI) and Cd(II). The results revealed that more than 95.6% of Cr(VI) and 66.88% of Cd(II) were achieved at the optimized condition of pH12.0, initial concentration of heavy metals 10 mg/L, 300 min of contact time, and the dose of 0.2 g/L, whereas only 16.3% removal efficiency was observed for Ni(II). Equilibrium data have been analyzed by Langmuir, Freundlich, Temkin, and Redlich and Peterson (R–P) isotherm models with the help of nonlinear regression analysis. Experimental data were best fitted for Freundlich and R–P isotherms.

KEYWORDS
adsorption, biosorbent, cow dung–activated carbon (CDAC), heavy metal

1 | INTRODUCTION

Pure water, vital for a healthy environment, is a resource that is adversely affected both quantitatively and qualitatively by man-made activities. Rapid industrialization and urbanization have brought a real water crisis. Industries continue to be a major cause of water pollution due to diverse kinds of waste, especially toxic heavy metal ions released in water bodies, without adequate treatment (Nguyen et al., 2013). Water quality changes significantly with the presence of toxic heavy metals (Ni, Cd, Zn, Hg, Cr, Pb, Cu, and As) when the level exceeds prescribed limits. Thus, it becomes potentially harmful to all kinds of life on this planet. Heavy metals in water streams originate from the effluent of smelters, mines, and various industries such as batteries, tanneries, electroplating, steel, refining ores, paint manufacture, pesticides, fertilizers, pigment manufacture, printing, and photographic sectors (Babalola, 2018). The nature and composition of industrial effluents depend mainly on raw materials, process, and treatment methods.

The ingestion of heavy metals via the food chain, in concentrations above the permissible limit, has a detrimental effect on human physiology and other biological systems. Due to their hazardous tendency of accumulation and toxicity, they pose a severe threat to the function of different organs in the human body and aquatic animals (Fu, & Wang, 2011; Rangabhashiyam, Jayabalan, Rajkumar, & Balasubramanian, 2019). Various agencies, viz., the U.S. Environmental Protection Agency (EPA), the Bureau of Indian Standards (BIS), and the Indian Council of Medical Research (ICMR), set regulatory limits for

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Catalytic Cracking of Waste Polypropylene in a Nitrogen Fluidized Bed Reactor

Anil Vyas (articles.aspx?searchcode=Anil++Vyas&searchfield=authors&page=1)[1], Suresh Kumar Singh (articles.aspx?searchcode=Suresh+Kumar++Singh&searchfield=authors&page=1)[2], Komal Sharma (articles.aspx?searchcode=Komal++Sharma&searchfield=authors&page=1)[3], Sukhwant Singh (articles.aspx?searchcode=Sukhwant++Singh&searchfield=authors&page=1)[2]

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Abstract

Polypropylene (PP) is rated first as volume leader in the plastic sector. Its non-biodegradable property poses serious environmental problem in case of disposal. The catalytic cracking of PP was performed with various catalysts i.e. ZSM-5, Zeolite, RB and SPS. The cracking was observed under different feed to catalyst ratio i.e. 1:1 to 5:1. The fluidized bed reactor was fabricated with arrangement to measure the temperature ranging from 100· C to 800· C. The effective of feed to catalyst ratio was found 3:1 at a temperature range of 420· C - 510· C and catalyst ZSM-5 gives maximum liquid conversion of waste PP. Conversion of PP to liquid fuel will not only resolve the problem of disposal of waste polypropylene plastic but also give a value aided product.

Keywords

Waste PP (articles.aspx?searchcode=Waste+PP&searchfield=keyword&page=1&skid=0), Pyrolysis (articles.aspx?searchcode=+Pyrolysis&searchfield=keyword&page=1&skid=0), Catalytic Cracking (articles.aspx?searchcode=+Catalytic+Cracking&searchfield=keyword&page=1&skid=0), ZSM-5 (articles.aspx?searchcode=+ZSM-5&searchfield=keyword&page=1&skid=0), Zeolite (articles.aspx?searchcode=+Zeolite&searchfield=keyword&page=1&skid=0), Liquid Fuel (articles.aspx?searchcode=+Liquid+Fuel&searchfield=keyword&page=1&skid=0)

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ect of Reduction in Peak Expiratory Flow Rate on Blood Pressure of Sand one Mine Workers

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cles.aspx?searchcode=Anil++Vyas&searchfield=authors&page=1)[2], Suresh Kumar Singh
cles.aspx?searchcode=Suresh+Kumar++Singh&searchfield=authors&page=1)[3]

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chfield=affs&page=1).

10.4236/gep.2016.44003 (http://dx.doi.org/10.4236/gep.2016.44003) **PDF (//www.scirp.org/GEP_2016041117030123.pdf)** **HTML (//www.scirp.org/journal/paperinformation.aspx?paperid=65420)** **(//www.scirp.org/xml/65420.xml)** **1,811** Downloads **2,398** Views Citations
ercitationdetails.aspx?paperid=65420&JournalID=2432)

ract

Expiratory Flow Rate (PEFR) measures the airflow through the bronchi and thus the degree of obstruction in the airways. sure to high concentration of respirable suspended particulate matter (RSPM) decreases the PEFR and the decrease nds upon the exposure concentration of particles and exposure duration. The decrease in PEFR is found to be responsible crease in blood pressure (BP). Relationship between increase in BP and reduction in PEFR is not exactly linear but it can nsidered as liner. It is noticed that if PEFR is reduced to about 50% to 60% in that case sudden increase in BP is ded and behaviour of BP rise has complex pattern. It is also an established fact that if PEFR is reduced more than 50 %, treated as severe respiratory problem. There are many factors (i.e. smoking habits, medical treatment, physiology, which may govern the increase of BP in this condition. Estimated relationship is found as: ISBP = 0.213 + 0.263 IPEF, = 0.102 + 0.176 IPEF.

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COMPARATIVE STUDY OF MEMBRANE CAPACITIVE DEIONIZATION TECHNOLOGY AND REVERSE OSMOSIS FOR TOTAL DISSOLVED SOLIDS FROM WATER

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Abstract*—Growing human population, severe neglect and over-exploitation of water resources has made water, a scarce commodity. The wh world is concerned for the availability of clean and potable water. Most of the available water is saline and is not potable. Water supplies are running out of the actual water needs of the society. We are now in need of finding cost competitive newer technologies for reclaiming this valuable life-sustaining liquid. Membrane capacitive deionization is one of those prominent technologies which assure to be more efficient with higher water recovery and less power consumption. This comparative study was done to evaluate the salt removal efficiency of Membrane Capacitive Deionization over reverse osmosis. The pilot plant (CapDI) manufactured by Voltea (Netherland) was provided by InNow India Pvt. Ltd for carrying out this study. It was found that Capacitive deionization technique is very efficient in removal of low salinity feed water sources. Energy consumption is quite low approximately only 20 to 30% of energy utilized by reverse osmosis. And flow recovery rate of CapDI plant is also high than reverse osmosis plant.

***Index Terms*—Electric Conductivity, Membrane Capacitive Deionization, Trace Metals**

I. INTRODUCTION

The desalination of seawater and brackish groundwater to provide fresh drinking water is an established and thriving industry. Desalinisation refers to any of several processes that removes amount of salt and any other minerals present in the saline water. Salt water is desalinated in order to produce fresh water that is suitable for human consumption or irrigation. The most commonly used technologies at present for the desalination process are Thermal Distillation and Reverse Osmosis (RO) filtration.

Rajasthan is the largest state of India, it shares only 1/10 of the average share of water than rest of the country [1]. Water supplies in most of the Indian cities including cities of Rajasthan are not matching the actual water need of the society. Groundwater is the major source of drinking water in some part of the Rajasthan. Presence of higher amount of salts in underground water sources in the western Rajasthan is ncing the less availability of potable water to the population. This study was done to evaluate removal of salts from membrane capacitive deionization.

By definition, Membrane Capacitive Deionization is a combination of conventional Capacitive Deionization with ion-exchang membranes (IEMs) placed in front of the electrodes. Ion exchange membranes can be positioned in front of one or both electrodes. Ion exchange membranes have a high internal charge due to covalently bound groups such as sulfonate or quaternary amines, which allows eas access for one type of ion (the counter ion) and block access for the ion of equal charge sign (the co-ion). Addition of Ion-exchang membranes significantly improves desalination performance of the Capacitive Deionization process, in terms of salt adsorption, charg efficiency and energy consumption. The membranes can be included as stand-alone films of thicknesses between 50 and 200 µm, or can b coated directly on the electrode with a typical coating thickness of 20 µm[2].

MCDI Working

Desalination by MCDI is done by applying constant current with varying voltage , so method is known as constant current(CC).

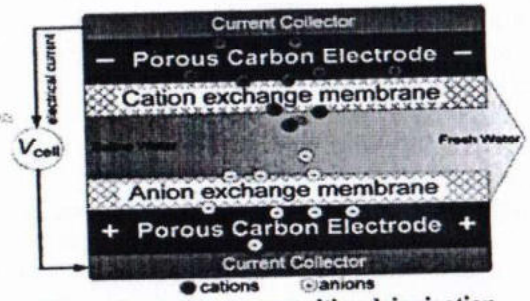

Figure 1 membrane capacitive deionization.

In CC-operation the effluent salt concentration level remains at a fairly constant value, namely at a constant low value during adsorpti and at a constant high value during desorption. Another advantage of CC operation is that one can precisely tune the effluent salt concentrat level by adjusting the electrical current, or water flow rate, as control parameters. CC operation works only in MCDI and not in CDI. Inste

Assessment of Fluoride Contamination on Groundwater Along Jojari River Due to Discharge of Steel Industries Wastewater

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Abstract- *Environmental pollution is placing an ever-increasing load on the various resources of our environment, including soil. Soils polluted with various pollutants can be found near industrial areas, metropolises, along major transportation routes, underground soil, and areas treated with waste-water sludge. but soils can also be polluted geologically. Soils are able to accumulate these ions for many years without the obvious signs of their acute toxic effect. However, the filtering/purifying capacity of soils is finite and, above a certain level, soils are no longer able to absorb these elements and become sources of pollution themselves. Toxic elements are released into water. absorbed by cultivated crops and plants; they are assimilated into vegetative and generative organs, and enter the food-chain where they cause long-term harm. Presence of low or high concentration of certain ions is a major issue as they make the groundwater unsuitable for various purposes. Fluoride is one such ion that causes health problems in people living in more than 25 nations around the world. Waste water from steel industries of Jodhpur is discharged into the Jojari river. Fluoride ions from this wastewater leach into the groundwater and contribute high fluoride concentration in the nearby underground water. Samples of underground water were collected along the Jojririver. Concentration of fluoride in some of the samples was found above the permissible limits. Health impacts like dental fluorosis and skeletal fluorosis are found in many villages of Jodhpur district. Treatment of wastewater, generated in industries is urgent necessary to bring the concentrations under prescribed limits before discharging it into the river Jojri.*

Keywords- Pollution , Fluoride ,TDS, Steel Industry , Ground water

I. INTRODUCTION

Jodhpur is situated in the western part of the Rajasthan. It is the second largest city of Rajasthan after Jaipur. City is well known for its textile and steel industries. . Industries in Jodhpur are mainly located in Industrial Areas developed by RIICO and city is situated on the bank of river Jojari. This river is no more perennial in nature. Fresh water flows into it only in rainy season and in remaining seasons, water in the river contains treated or untreated domestic waste water and treated or untreated industrial waste water.Due to the critical condition of this river it was chosen as the study area. Samples of sludge and ground water were collected from various locations and at various depths. Locations of the sampling point were decided randomly to represent an overall view of the river length.

As wastes from Steel industries is discharged into the river Jojari pollutants are continuously depositing on the river bed. The waste contains large amount of fluoride in the form of HF, it can be harmful to human and crops if the water from tube-wells is used for drinking and irrigation purpose. In the present study, deposited sludge samples from the river bed and water samples from nearby tube well were taken along the river to find out the leaching effect of fluoride from the polluted river water to underground water.

II. OBSERVATIONS & ANALYSIS

Water samples were collected at various depths from investigated sites. 12 samples of underground water and 16 samples of sludge were taken. Before the samples were taken, the water was pumped out for 5-10 minutes until fresh water comes out from deep in the well. New polyethylene sample bottles were taken for sample collection. Two litres of water samples were collected. Grab samples were collected from the tube well and well near Jojari River at all the sampling locations. The sample bottles were soaked in 10% HNO_3 for 24hr and rinsed several times with double distilled water (DW) prior to use. Water samples were collected as per the sampling protocol and tested as per standard method. Water samples were tested for pH, total dissolved solids (TDS) and fluoride.

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Effect of Textile Industry Sludge on River Bed on Under Ground Water near Jojari River

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Abstract *- Jodhpur is one of the most industrialized city of Rajasthan and mainly known for textile industry. This city is situated along the river Jojari in which fresh water flows only in monsoon season and rest of the years only treated and untreated domestic and industrial waste water flows.Effluents from these industries contain lots of heavy metals and salts present in dissolved forms and they are deposited on river bed since many years. And during a course of time, these contaminants infiltrate through the bed to meet with the ground water table. In this study various parameter in water samples sample from various tube-wells located on the bank of the river i.e., pH ,Total Dissolved Solids (TDS), concentration of* Na^+ , Ca^{2+} ,Mg^{2+} ,K^+ ,P^+ *and concentrations of heavy metals like Ni, Pb, Zn, Cr, Cd etc. was determined using Inductive coupled plasma- Optical emission Spectrometer (ICP-OES). Sludge samples from the bed of river Jojari from various places were collected and Ni, Pb, Zn, Cr, Cd were measured. Results indicate that leaching of deposited metals are taking place and is polluting upper level of ground water. Presently leaching effect is not found in deep underground water, it may be because of presence of impermeable layer of soil at certain depth. But if this continues to be same in nearby future then, it may contaminate deep layer of ground water table as well.*

treated and untreated waste from different textile industries flows. This industrial waste water contains various types of heavy metals and these metals are deposited in the river bed. Heavy metals are important environmental pollutants, particularly in areas with high anthropogenic sources [2]. These pollutants are extremely persistent in the environment, nonbiodegradable nonthermodegradable, therefore could readily accumulate to toxic levels [1,3].Heavy metals contribute to environmental pollution because of their unique properties; heavy metals do not leach from the topsoil and have the potential to accumulate in the different organs (such as the kidneys, bones and liver) leading to unwanted side effects [4,5]. Each heavy metal shows specific signs of its toxicity. Some effects of heavy metals could be toxic (acute, chronic or sub-chronic), neurotoxic, or even carcinogenic, mutagenic or teratogenic [5]. Heavy metals can accumulate in the soil at toxic levels due to long-term application of wastewater. Metals can be transferred from soil to the other ecosystem components, such as underground water or crops, and can affect human health through the water supply and food [1,6]. Soils, as filters of toxic chemicals, may adsorb and retain heavy metals from wastewater. The amount of heavy metals mobilized in the soil is a function of pH, clay content, organic matter content, cation exchange capacity and other

AIR QUALITY INDEX DETERMINATION OF COMMERCIAL AREAS OF JODHPUR CITY: A CASE STUDY

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Abstract: *This paper presents a case study of Jodhpur City in which an attempt has been made to prepare an inventory of pollutants (PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO) at regional level to know the current cumulative air pollution load in the study area and thereafter computing Air Quality Index by computing sub index for every pollutant. Monitoring stations were set up at seven different locations and samples have been analysed and subsequently air quality index has been computed. The results reveal that gaseous pollutants such as SO_2, NO_2& CO are within the permissible limits. $PM_{2.5}$ levels exceed the prescribed National Ambient Air Quality standards (NAAQS) and PM_{10} levels also exceeded the prescribed NAAQS during all the monitoring location thus particulate matter is the predominant cause of air pollution in the study area. The AQIs were calculated using IND-AQI procedure. It has been observed that the calculated AQIs value for SO_2 falls under 'good' category. The calculated AQIs values for NO_2 & CO fall under 'good' and 'satisfactory' categories. The calculated AQIs values of PM_{10} fall under 'moderate' and 'poor' categories. The calculated AQIs values of $PM_{2.5}$ fall under 'moderate', 'poor' and also in 'very poor' categories. The overall AQI was found to fall under the category 'Poor' owing to $PM_{2.5}$. Thus it is observed that $PM_{2.5}$ is responsible pollutant at these seven locations in Jodhpur.*

Keywords: *Air quality index, ambient air quality, Jodhpur city, Residential area, PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO.*

I. INTRODUCTION

Today pollution in urban areas especially in commercial areas has become an important issue to all the government. Because of increasing commercial activities, industrial activities and transportation load air quality is continuously deteriorating. The acute health effect of suspended particulate matter (SPM), even at short term low levels exposure; include increased daily mortality and hospital admission rates for exacerbation of respiratory disease. Long term exposure to PM2.5 increases the risk of the non accidental mortality. Living close to busy traffic appears to be associated with elevated risk. The available human clinical results do not establish a mechanistic pathway leading to adverse health impacts for short term NO_2 exposure at present day ambient environment. In all the analytical studies total mortality was directly associated with long term exposure to particulate matter .Each day our lungs are directly exposed to more than 7000 liters of air, which contain varying amount of inorganic, organic particles and various types of gases. Air Quality Index is a medium to communicate the quality of ambient air to common people so it is easy to understand. It transforms the complex data of various air pollutants into a single number which is called index value along with nomenclature and colour.Jodhpur is the second largest city of Rajasthan and is a well-known tourist place. Varieties of pollutants are emitted in ambient air of Jodhpur city but particulate matters primarily dominate. Jodhpur is Rajasthan's most polluted city as per May 2016 report of World Health Organisation. Therefore an attempt was made to present overall air quality in residential areas of Jodhpur city in terms of Air Quality Index & AQI has been calculated as per the guidelines of Central Pollution Control Board of India.

II. MATERIAL AND METHOD

Seven sampling stations were selected for monitoring of air quality in the commercial areas of Jodhpur City for the analysis of air pollution and determination of Air Quality Index i.e. Paota Circle, Jaljog Circle, BasniCircle, Akhaliya Circle, NaiSarak, Ratanada Circle and Near Pungalpada. Five ambient air pollutants (i.e.PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO) were determined using Respirable Dust Sampler, Fine Particulate Sampler, gaseous sampling attachment (EPA modified-West and Gaeke method for $SO_2$and Modified Jacobs Hochheiser method for NO_2) and CO meter respectively. Readings were taken during the months of March to May as per the norms established by Central Pollution Control Board. Particulate matters measured by Cyclonic Flow Technique and Gravimetric method using GF/A filter papers on 8 hourly basis for 24 hours. Size of filter paper for PM_{10} was 20.3 cm × 25.4 cm with a flow rate of 1000 L/min and 47 mm at the rate of 16.7 L/min for $PM_{2.5}$. Gaseous pollutants which were SO_2 and NO_2 were measured using gaseous sampling attachment attached with Rapid Dust Sampler. Carbon Mono-oxide was measured using CO meter at the desired locations instantly.

2.1 Sub-Index calculation

Air Quality index (AQI) is so deigned that any three of the parameters from PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, O_3, Pb, &NH_3, are sufficient to calculate the AQI. Sub-indices of eachselected pollutants were calculated and then highest value from among all the values of sub index was considered as AQI for that area.

The sub-index (I_p) for a given pollutant concentration (C_p) was calculated as,

$$I_P = \left[\left\{\frac{I_{HI} - I_{LO}}{B_{HI} - B_{LO}}\right\} \times (C_P - B_{LO})\right] + I_{LO}$$

Where,

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Determination of Air Quality Index Around a Thermal Power Plant-A Case Study of RWPL at Bhadresh, Barmer

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Abstract: This paper presents a case study on determination of Air Quality Index for a Thermal Power Plant known as Raj West Power Limited (RWPL), situated at Bhadresh in Barmer district of Rajasthan state. Air pollutant concentration were measured in the prevalent windward direction, leeward direction, and in the crosswind directions at both left and right to the prevalent windward direction around the plant. Method for calculation and experimentation was based on the basis of guidelines given by Central Pollution Control Board of India. Five criteria pollutants i.e., PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO were chosen for AQI determination at the given locations. Pollutants concentrations were found different in different directions. Maximum AQI was observed in the windward direction and minimum in leeward direction.

Key words: Air Quality Index, PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO, Thermal Power Plant, Air pollution.

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I. INTRODUCTION

Raj West Power Limited (RWPL) is a part of JSW Group and the project consist of 8x135 MW Thermal Power Plant at village Bhadresh in Barmer District of Rajasthan state. Geographically the Plant is located at 26° 02' 34.7" N Latitude & 71° 15' 24.76" E Longitude having an elevation of ~184 meter above MSL, which is suitable for installation of 8x135MW considering the availability of all the basic requirement. The plant is operational under environmental clearance (EC) granted by Ministry of Environment and Forests and consent to operate (CTO) granted by Rajasthan state pollution control board[9]. Purpose of this study is to measure the Air Quality Index in surrounding area of Thermal Power Plant as many villages are situated in its nearby areas. Thermal power plants are well known for its pollutant emissions like oxides of sulfur, nitrogen and carbon along with particulate matters[7]. Sulphur dioxide pollution, which takes a major toll on public health, including by contributing to the formation of small acidic particulates that can penetrate into human lungs and be absorbed by the bloodstream. SO_2 also

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Case Study

AIR QUALITY INDEX DETERMINATION OF RESIDENTIAL AREAS OF JODHPUR CITY: A CASE STUDY

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Air quality index, ambient air quality, Jodhpurcity, Residential area, PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO.

ABSTRACT

This paper presents a case study of Jodhpur City in which residential areas have been analysed for their ambient air quality analysis. Whole experimental and calculative procedure was based on the guidelines of Central Pollution Control Board of India. 24 hourly average concentrations of five criteria pollutants i.e., PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO were selected for the study for the year 2016 at five different locations of residential areas in Jodhpur city. Observations were taken twice in a week for three months. Results revealed that SO_2 and NO_2 concentrations were within prescribed limit of standard norms. CO concentration was also within permissible limit except few areas. Only particulate matters were crossing the standard limit and specially PM_{10}. Overall AQI was falling under the category of Good to moderatecategory. Thus, it can be concluded from the study that major pollutionin the residential areas of Jodhpur was due to particulate matters.

INTRODUCTION

Today pollution in urban areas especially in residential areas as become an important issue to all the government. Because of increasing commercialactivities, industrial activities and transportation load air quality is continuously deteriorating. The acute health effect of suspended particulate matter (SPM), even at short term low levels exposure; include increased daily mortality and hospital admission rates for exacerbation of respiratory disease[6]. Long term exposure to PM2.5 increases the risk of the non accidental mortality. Living close to busy traffic appears to be associated with elevated risk[1]. The available human clinical results do not establish a mechanistic pathway leading to adverse health impacts for short term NO_2 exposure at present day ambient environment[2]. In all the analytical studies total mortality was directly associated with long term exposure to particulate matter [5]. Each day our lungs are directly exposed to more than 7000 liters of air, which contain varying amount of inorganic, organic particles and various types of gases[3]. Air Quality Index is a medium to communicate the quality of ambient air to common people so it is easy to understand. It transforms the complex data of various air pollutants into a single number which is called index value along with nomenclature and colour.Jodhpur is the second largest city of Rajasthan and is a well-known tourist place. There are more than 3 lakh registered vehicles ir Jodhpur city and also this city has desert like climatic and soi structure which in overall contribute more to air pollution Varieties of pollutants are emitted in ambient air of Jodhpu city but particulate matters primarily dominate. Jodhpur i Rajasthan's most polluted city as per May 2016 report c World Health Organisation[7]. Therefore an attempt was mad to present overall air quality in residential areas of Jodhpur cit in terms of Air Quality Index & AQI has been calculated a per the guidelines of Central Pollution Control Board of India

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MATERIAL AND METHOD

Monitoring has been carried out at five different locations residential areas of Jodhpur city i.e., Chaupasani Housi Board Sector-10, Shastri Nagar, Sector-G, Saraswati Nag Golf Course and Nehru Park. Five ambient air pollutar (i.e.PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO) were determined usi Respirable Dust Sampler, Fine Particulate Sampler, gaseo sampling attachment (EPA modified-West and Gaeke meth for $SO_2$and Modified Jacobs Hochheiser method for NO_2) a CO meter respectively. Readings were taken for twice ir week during the months of March to May as per the nor established by Central Pollution Control Board. Particul matters measured by Cyclonic Flow Technique Gravimetric method using GF/A filter papers on 8 hourly b for 24 hours. Size of filter paper for PM_{10} was 20.3 cm×2

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Assessment Of Fluoride Removal By Membrane Capacitive Deionization

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ABSTRACT: *Water is the symbol of existence of life. In the modern industrial era, we have used water so careJlessly. To complicate matters, increasing groundwater extraction around the globe results in progressive salt water ingress in wells and aquifers. Potable water as well as water for agriculture and industry has become critical. Rajasthan is the largest state, which covers 10% of the country area but receives only 1/100 of the total rains. It shares only 1/10 of the average share of water than rest of the country. The geographical and geological setup leads to deterioration of water quality. Therefore, state faces acute water crisis making Groundwater a centralized source of drinking water for millions of rural and urban families in Rajasthan. Unfortunately, Groundwater is deeper and contains high minerals and concentrated chemicals, making the water unfit to drink. Water quality standards are not meeting the prescribed Indian standards. Underground water of twenty three districts of Rajasthan contain high fluoride, which causes adverse health effects i.e. Dental fluorosis, skeletal fluorosis, nonskeletal manifestation etc. Many reverse osmosis plants have been installed in Rajasthan for removal of fluoride from ground watJer. But, due to high power consumption, scaling and fouling of membranes, reduced water recovery and poor maintenance, most of the RO plants are not working properly. Thus, alternative technology is required with low power consumption and maintenance cost for the treatment of underground water. The study was carried out to evaluate efficiency of membrane capacitive deionization for removal of fluoride from underground water with elevated electric conductivity in the western Rajasthan. Accordingly, certain areas of Jodhpur and Jaisalmer districts were selected as the study area. The pilot plant (CapDI) manufactured by Voltea (Netherland) was provided by InNow India Pvt. Ltd for carrying out this study. It is found that MCDI technology is very effective in fluoride removal if total dissolved solids concentration is less than 5000 mg/ lt and percentage reduction of fluoride by MCDI technology is almost same as of by reverse osmosis technology. It was found that MCDI technology requires less power &gives more water recovery with low maintenance cost. Therefore it can be said MCDI technology is better than reverse osmosis technology.*

Keywords: *Fluoride, Membrane capacitive deionization (MCDI), Water Recovery, Reverse osmosis*

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I. INTRODUCTION

Inadequate rainfall and Inattentive use of Water has resulted in critical water scarcity. Rajasthan is the largest state, which covers 10% of the country area but receives only 1/100 of the total rains. It shares only 1/10 of the average share of water than rest of the country [1]. Groundwater is the principal source of drinking water in rural and urban Rajasthan. Due to careless use, continuous groundwater extraction, reduced rainfall and geographical setup, groundwater contains much elevated amount of salts making water unfit for not only drinking but also for other purposes. As far as Fluoride is concerned, Ground water fluoride contents in high levels are present in all 33 districts and have become a serious health related issue in 23 districts of Rajasthan [2]. Higher concentration of fluoride in water causes adverse health effects i.e. Dental fluorosis, skeletal fluorosis, nonskeletal manifestation etc. Many reverse osmosis (RO) plants have been installed in Rajasthan for removal of fluoride from ground water. But, due to high power consumption, scaling and fouling of membranes, reduced water recovery and low maintenance, most of the RO Plants are not working properly. Thus, alternative technology is required with low power consumption and maintenance cost for the treatment of underground water. Membrane capacitive deionization is the emerging technology which provides higher percentage of salt removal with lower power consumption. The energy efficiency of Membrane Capacitive Deionization M(CDI)

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Interference Study of Pollutants Released from Various Industrial Areas in a Region: A Case Study

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Abstract Jodhpur is well known city of Rajasthan state in India and is a tourist place. Jodhpur is surrounded by industrial areas and defence installations. Air pollution is now becoming a challenge to the administration of a city because of its adverse effects on human beings. In this study four monitoring stations were selected to find pollution level in the ambient air. Air Quality Index was calculated by considering five pollutant parameters i.e. SO_2, NO_2, PM_{10}, $PM_{2.5}$, CO at all monitoring stations. Minimum, average and maximum air quality index were calculated at each industrial area monitoring stations. It was observed that PM_{10} and $PM_{2.5}$ are responsible air pollutants which governs the air quality index. In this study duration weather was clear and wind direction was either from North direction or from North-East direction. SCREEN3 Air Dispersion Model was used to find the pollutant concentration with increasing distances from area sources. Modelled AQI was also calculated before and after overlapping zone using SCREEN3 Air Dispersion Model. It was observed that air pollution from one industrial area is interfering the AQI of other industrial area.

Keywords: *Air pollution, Industrial area, PM_{10}, $PM_{2.5}$, AQI, Air dispersion model*

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1. Introduction

Jodhpur is well known city of Rajasthan state in India and is a tourist place. Jodhpur is surrounded by industrial areas and defence installations. Jodhpur city has major four industrial areas. Basni industrial area has mainly textile / timber / Guar gum industrial units. Boranada industrial area has mainly Metal and Wooden Handicrafts industrial units, Mandore industrial area has oil mills/Guar gum/ textile / Stone Processing industrial units. Kankani industrial area has mainly handicraft / plastic industrial units. Air pollution is now becoming a challenge to the administration of a city because of its adverse effects on human beings. The acute health effect of suspended particulate matter (SPM), even at short term low levels exposure; include increased daily mortality and hospital admission rates for exacerbation of respiratory disease [1]. Long term exposure to PM2.5 increases the risk of the non accidental mortality. Living close to busy traffic appears to be associated with elevated risk [2]. The available human clinical results do not establish a mechanistic pathway leading to adverse health impacts for short term NO2 exposure at present day ambient environment [3]. In all the analytical studies total mortality was directly associated with long term exposure to particulate matter [4]. Therefore it is now essential to have knowledge about the AQI in various reasons because of industrial areas and effects of one industrial area on other. The AQI was divided in six categories considering five pollutants (PM_{10}, $PM_{2.5}$, NO_2, SO_2, and CO) as per the norms given by Central Pollution Control Board (CPCB) of India. Air quality index values are typically grouped into various ranges [5] and is given in Figure 1 and breakpoint concentration for various pollutants are given in Table 1 [6].

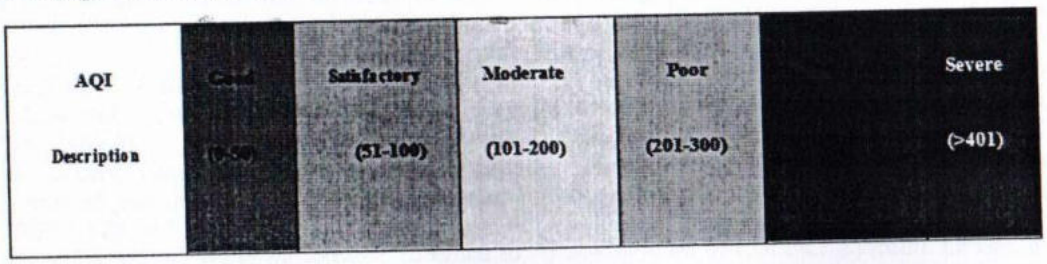

Figure 1. Overall AQI Systems [5]

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RESEARCH ARTICLE OPEN ACCESS

Street Level Modeling of Pollutants for Residential Areas

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ABSTRACT:
An effort has been done here to model the pollutants concentration using a software i.e., COPERT STREET LEVEL. This software is a Microsoft windows based software and calculates emission on street basis. Working of this model is limited to calculation of pollutants up to street level only. Area under consideration is taken from streets of Jodhpur city which are basically residential areas. Six residential areas have been considered. Pollutants are modelled considering Indian environmental conditions and compared with the actual possible data of streets. Overall analysis shows the slight variations in pollutant concentration from actual conditions. It may be due to dust storms and heating effects which are highly prevalent due to geographical conditions of Jodhpur. Pollution estimations are represented in their standard units which are further converted into Air Quality Index. This Air Quality Index is calculated from the year 2016 to 2025 in alternate year. Pollutants which are calculated using this model are carbon monoxide, oxides of nitrogen and particulate matters. This model doesn't differentiate between PM_{10} and $PM_{2.5}$. Model results shows that pollutant concentrations are increasing if number of vehicles keeps on increasing and other street characteristics remains unchanged. Most dominating pollutant was observed to be carbon monoxide.
Key words: modeling of pollutants, COPERT STREET LEVEL, air quality index, residential area pollutant estimation, carbon monoxide, oxides of nitrogen, particulate matters.

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I. INTRODUCTION

Jodhpur, popularly known as Blue City of Rajasthan is the second largest city of state. Climate of Jodhpur is generally very hot due to its nearby desert areas. Temperature variations may occur from 45°C in summer to 0°C in winter. Hence it faces extreme weather conditions. This geographical condition changes the environmental nature of this city. As it is fastest upcoming state of Rajasthan, it is now witnessing the large number of human population and also enormous increase in vehicular numbers. It has led to increase in vehicular pollution to a very large extent. As per the latest WHO report, Jodhpur is the most polluted city of Rajasthan and grabbed 30th position in global ranking. It is followed by Jaipur at 33rd, Kota at 58th and Udaipur at 59th position. Such a high level of pollution is not only limited to industrial or commercial areas but also it can be found in residential areas also. Air pollution modeling is a method of determining the concentration of different air pollutants at different locations and different time period mathematically either manually or with the help of some software based on certain mathematical formulae.To calculate the level of pollution in the streets of such areas, COPERT STREET LEVEL model has been used. It is a standalone MS Windows software designed to calculate emissions on a street basis. It is structured in such a way as to work alongside traffic analysis tools. It is assumed during uses of this model that environmental conditions of India have been taken nearest to matching country. But do not correspond to exact environmental conditions of Jodhpur city as this city comprises lots of dust storms and heat waves. All these values were calculated at all monitoring stations of Jodhpur.

II. MATERIAL AND METHODOLOGY

This model uses the all characteristics of streets i.e., street length, time, number and type of vehicles, average speed of vehicles, emission and geographical characteristics and passenger car equivalents etc. pollutants estimated for measurement of quality of ambient air are carbon monoxide, oxides of nitrogen and particulate matters. These pollutants can help to predict future Air Quality Index of monitored streets. These values are inserted in an excel sheet first as shown in fig. 3.1and then uploaded in this software. After uploading, an input is given for passenger car unit (PCU). PCU's of different vehicles are given in table 3.1. As this model is country specific hence, in this case, country chosen was Turkey among the entire possible available list of COPERT STREET LEVEL as India

DETERMINATION OF AIR QUALITY INDEX OVER TSDF-A CASE STUDY OF UDAIPUR

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Abstract*—Udaipur is well known tourist place in India and is known as "Lake City". A hazardous waste disposal site was constructed in Udaipur for disposal of hazardous waste generated by the various industrial and commercial activities in the state of Rajasthan. The purpose of this paper is to discuss the analysis of the ambient air quality over TSDF site of Udaipur city in terms of air quality index (AQI). The 24-hourly average concentrations of five major criteria pollutants, viz. Particulate matter PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Ammonia(NH_3) at three different locations in TSDF site were measured as per guidelines of CPCB of India. Selected stations were near store Room, security Room roof top and secured landfill. The AQIs were calculated using IND-AQI procedure. Concentration of PM_{10} and PM_{205} was found above the prescribed limit whereas concentration of SO_2, NO_2 and NH_3 was found below the prescribed limits laid down by CPCB of India at all considered sampling points. From the analysis of AQI it is concluded that PM_{10} is governing factor for determination of AQI at all the sampling station. According to AQI over TSDF, this site falls in the category of moderate type. Therefore now it is time to reduce the PM_{10} and$PM_{2.5}$ concentration at site by plantation and or by other means so that air quality is maintained in the nearby area of TSDF.

***Index Terms*— Air quality index (AQI), PM_{10}, $PM_{2.5}$, CPCB, TSDF**

I. INTRODUCTION

Computation of the AQI requires an air pollutant concentration over a specified averaging period, obtained from an air monitor or model. Taken together, concentration and time represent the dose of the air pollutant. Health effects corresponding to a given dose are established by epidemiological research1.Air pollutants vary in potency, and the function used to convert from air pollutant concentration to AQI varies by pollutant. Air quality index values are typically grouped into ranges. Each range is assigned a descriptor, a color code, and a standardized public health advisory. The AQI can increase due to an increase of air emissions (for example, during rush hour traffic or when there is an upwind forest fire) or from a lack of dilution of air pollutants. Stagnant air, often caused by an anticyclone, temperature inversion, or low wind speeds lets air pollution remain in a local area, leading to high concentrations of pollutants, chemical reactions between air contaminants and hazy conditions. On a day when the AQI is predicted to be elevated due to fine particle pollution, an agency or public health organization might advise sensitive groups, such as the elderly, children, and those with respiratory or cardiovascular problems to avoid outdoor exertion. Declare an "action day" to encourage voluntary measures to reduce air emissions, such as using public transportation [2]. Recommend the use of masks to keep fine particles from entering the lungs [4]. During a period of very poor air quality, such as an air pollution episode, when the AQI indicates that acute exposure may cause significant harm to the public health, agencies may invoke emergency plans that allow them to order major emitters (such as coal burning industries) to curtail emissions until the hazardous conditions abate [5]. Most air contaminants do not have an associated AQI [6]. Many countries monitor ground-level ozone, particulates, sulfur dioxide, carbon monoxide and nitrogen dioxide, and calculate air quality indices for these pollutants [7]. The definition of the AQI in a particular nation reflects the discourse surrounding the development of national air quality standards in that nation [8]. Website allowing government agencies anywhere in the world to submit their real-time air monitoring data for display using a common definition of the air quality index has recently become available [9].

Central Pollution Control Board (CPCB) of India has formulated guidelines to calculate AQI and can be calculated as discussed below:

An air quality index is defined as an overall scheme that transforms the weighed values of individual air pollution related parameters (pollutant concentrations) into a single number or set of numbers. The result is a set of rules (i.e. set of equations) that translate parameter values into a more simple form by means of numerical manipulation .If actual concentrations are reported in $\mu g/m^3$ or ppm (parts per million) along with standards, then it cannot be considered as an index. At the very last step, an index in any system is to group specific concentration ranges into air quality descriptor categories. Primarily two steps are involved in formulating an AQI:

(i) Formation of sub-indices (for each pollutant) and

(ii) Aggregation of sub-indices to get an overall AQI.

Formation of sub-indices (I_1, I_2 ... I_n) for n pollutant variables (X_1, X_2,...X_n) is carried out using sub index functions that are based on air quality standards and health effects, Mathematically;

$$I_i = f(X_i), \quad i = 1, 2, \ldots n \qquad [1]$$

Each sub-index represents a relationship between pollutant concentrations and health effects.

Aggregation of sub-indices, Ii is carried out with some mathematical function (described below) to obtain the overall index (I), referred to as AQI.

$$I = F(I_1, I_2, \ldots, I_n) \qquad [2]$$

The aggregation function usually is a summation or multiplication operation or simply a maximum operator.

Sub-indices (Step 1)-Sub-index function represents the relationship between pollutant concentration Xi and corresponding sub-index Ii. It is an attempt to reflect environmental consequences as the concentration of specific pollutant changes. It may take a variety of forms such as linear, non-linear and segmented linear [10]

Typically, the I-X relationship is represented as follows:

$$I = \alpha X + \beta \qquad [3]$$

REVIEW ON EFFECTS OF SOME HEAVY METALS ON PLANTS AND HUMAN HEALTH

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Abstract*—Wastes are the major source of soil pollution, originating from mining, chemical, metal processing industries and other allied industries. These wastes include many chemicals like heavy metals, phenolic, organic, non-metals etc. Heavy metals are the intrinsic components of the environment, with essential and non-essential both types. Heavy metal accumulation in soil is major concern in agricultural production due to its adverse effect on food safety, marketability and crop growth and also due to phyto-toxic effects and environment health of soil organism .The toxic effect of heavy metals, even though they do not have any biological role, remain present in some or the other form harmful for human body and its person functioning . Metal toxicity depends upon the absorbed dose, the route of exposure and duration of exposure, acute or chronic .This can lead to various disorder and can also result in excessive damage due to oxidative stress induced by free radical formation. This review paper details about some heavy metals and their toxicity mechanism along with their health effect. Heavy metals exhibit toxic effects towards soil by affecting key microbial process and decrease the number and activity of soil micro-organism. Even low concentration of heavy metal in plants and subsequent accumulation along the food chain is potential threat to human health

***Index Terms*—Heavy metals, Effects on Human health, Toxicity, Effects on plants**

I. INTRODUCTION

Metallic elements are intrinsic components of the environments. Heavy metals or toxic metals when present in excess of required concentration or is unwanted which were found naturally on the earth , and become concentrated as a result of human caused activities , enter in plants , animal and human tissues via inhalation, diet and manual handling can bind to, and interfere with the functioning of vital cellular components1. Heavy metals are significant environment pollutants and their toxicity is a problem of increasing significance for ecological, evolutionary, nutritional and environmental reason .They are group of metals and metalloids with atomic density greater than 4g\cm^3 or those which are 5 times or more, greater than water, including copper, manganese, lead, cadmium, nickel, cobalt, iron, zinc, chromium, silver. Uptake of heavy metals by plants and subsequent accumulation along the food chain is a potential threat to human health. Adverse health effects of heavy metals have been known for a long time. Exposure to heavy metals continues and is even increasing in some areas. For example mercury is still used in gold mining in many part of Latin America. Arsenic is still common in wood preservatives, and tetraethyl lead remain a common additive to petrol, although this use has decreased dramatically in the developed countries. This paper briefly describes the nature and properties of heavy metal and its effect on the plants and human health.

II. SOURCE AND EMISSION

Toxic metals, to a large extent, are dispersed in the environment through industrial effluents, organic wastes, refuse burning and transport and power generation. They can be carried to places many miles away from the sources by wind, depending upon weather. They are found in gaseous form or as particulates.

Table 1 List of Metals

Metals	*Manufacturing Industry*
Arsenic	Paints and Textile
cadmium-	Electronics and pigments
chromium	Metal plating
copper	Plating
lead	Plating
zinc	Galvanizing, plating iron

III. EFFECTS ON PLANTS

The heavy metals available for plant uptake are those present as soluble components in the soil solution or those soluble by root exudates 8. Plants require certain heavy metals for their growth and upkeep, but excessive amounts of these metals can become toxic to plants. The ability of plants to accumulate essential metals equally enables them to acquire other non-essential metals 9. They adversely affect the plant both directly and indirectly. Some of the direct toxic effects caused by high metal concentration include inhibition of cytoplasmic enzymes and damage to cell structure due to oxidative stress10. Indirect toxic effect includes replacement of essential nutrients at cation exchange sites of plants11. The negative influence of heavy metals on the growth and activities of soil microorganisms also indirectly affect the growth of plants. Reduction in the number of beneficial soil microorganisms due to high metal concentration may lead to decrease in organic matter

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EFFECTIVENESS STUDY OF MEMBRANE CAPACITIVE DEIONIZATION TECHNOLOGY IN TRACE METAL REMOVAL FROM WATER

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Abstract:
Increasing environment protection awareness made the availability of clean water, technological, social and economical challenge of the 21st century. Water, is a scarce amenity not only in India but in the whole world. Most of the available water is saline and is not potable. Water supplies are not matching the actual water needs of the society. We have been squandering and polluting water resources since ages and are now in need of finding cost competitive newer technologies for reclaiming this valuable life-sustaining liquid. Membrane capacitive deionization is one of those prominent technologies which assure to be more efficient with higher water recovery and less power consumption.
In this study concentration of trace metals viz. Barium, Arsenic, Lead, Chromium, Cadmium, Nickel and Boron in ground water samples from western Rajasthan were determined using Inductive coupled plasma- Optical emission Spectrometer (ICP-OES). These metals have toxic effects on the human health; most of them are carcinogenic and can cause fatal effects if consumed in fewer amounts continuously for long duration. This study has also been done to assess the removal of trace metals by membrane capacitive deionization process. Electrical conductivity of water was assessed to compare the results with trace metals. Certain areas of Jodhpur and Jaisalmer districts of Rajasthan state in India were selected as the study area. The pilot plant (CapDI) manufactured by Voltea (Netherland) was provided by InNow India Pvt. Ltd for carrying out this study. The maximum EC was reduced by 98 %, whereas the trace metals Barium, Cadmium, Chromium and Boron were removed by 57%, 70%, 50%, and 74% respectively. Thus it can be interpreted from the study that Membrane Capacitive Deionization Technology can remove the Heavy and Toxic metals up to a certain limit effectively with low power consumption.

Keywords: *Chromium, Electric conductivity, Lead, Membrane capacitive deionization, Trace Metals, Water Recovery.*

I. INTRODUCTION

Potable Water is a scarce source. . Rajasthan is the largest state of India, Rajasthan shares only 1/10 of the average share of water than rest of the country [1]. Water supplies in most of the Indian cities including cities of Rajasthan are not matching the actual water need of the society. Groundwater is the major source of drinking water in some part of the Rajasthan. Presence of higher amount of salts and trace metals in underground water sources in the western Rajasthan is enhancing the less availability of potable water to the population. Trace metals removal from water in field is difficult. These are carcinogenic and can cause fatal effects if consumed in less amount for long duration. This study was done to evaluate removal of trace metals from membrane capacitive deionization.

By definition, Membrane Capacitive Deionization is a combination of conventional Capacitive Deionization with ion-exchange membranes (IEMs) placed in front of the electrodes. Ion exchange membranes can be positioned in front of one or both electrodes. Ion-exchange membranes have a high internal charge due to covalently bound groups such as sulfonate or quaternary amines, which allows easy access for one type of ion (the counter ion) and block access for the ion of equal charge sign (the co-ion). Addition of Ion-exchange membranes significantly improves desalination performance of the Capacitive Deionization process, in terms of salt adsorption, charge efficiency and energy consumption. The membranes can be included as stand-alone films of thicknesses between 50 and 200 μm, or can be coated directly on the electrode with a typical coating thickness of 20 μm[2].

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Air Quality Index Assessment of Industrial Areas of Jodhpur City

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Abstract: *Jodhpur district is centrally situated in Western region of Rajasthan state. In this study four monitoring stations were established to find pollution level in the ambient air of various industrial areas situated around the city. Four industrial areas where samplings were done are Basni industrial area, Boranada industrial area, kankani industrial area and Mandore industrial area. Air Quality Index has been calculated by considering five pollutant parameters i.e. SO_2, NO_2, PM_{10}, $PM_{2.5}$ and CO. Minimum, average and maximum air quality index were calculated for every industrial area. It was found after analysis that air quality index of Basni and Mandore industrial falls under Poor category, while other industrial area falls in Moderate category. In the analysis, it was also observed that PM_{10} and $PM_{2.5}$ were responsible air pollutants for maximum sub-index as well as air quality index. Hence it is the time to plan activities in industrial areas to control air pollution emissions otherwise in future problem may aggravate and create a serious condition.*

Keywords: *Air pollution, AQI, industrial area, PM_{10}, $PM_{2.5}$.*

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I. Introduction

The 'Surya Nagari' Jodhpur is the second largest city of Rajasthan and the gateway of famous 'Thar Desert'. Air pollution of a city mainly depends upon the pollution from industrial areas, pollution from transportation; fuel burning and house hold activities. Pollution due to industrial areas around city significantly affects air quality of city if city lies on the downwind direction.

Air pollution is physical or chemical changes brought about by natural processes or human activities that result in air quality degradation[1]. Air is invariably impure and is always contaminated with gases like CO, NO_2, SO_2, and others (which are poisonous in nature) and finely divided solid and liquid particles and smog. Air becomes polluted due to the presence of the above contaminants. The presence of these contaminants in the air is called air pollution and the materials which pollute the air are called air pollutants[2]. As the population increased, people began to congregate and establish cities. The release of large amounts of smoke and other forms of waste into the air caused an unhealthy condition because the pollutants were released faster than they could be absorbed and dispersed by the atmosphere[3]. "More than 2 million premature deaths each year can be attributed to the effects of urban outdoor air pollution and indoor air pollution .More than half of this disease burden is borne by the populations of developing countries. Heart attacks, respiratory diseases, and lung cancer are all significantly higher in people who breathe dirty air compared to matching groups in cleaner environments[1]. The acute health effect of suspended particulate matter (SPM), even at short term low levels exposure; include increased daily mortality and hospital admission rates for exacerbation of respiratory disease[4]. Living close to busy traffic appears to be associated with elevated risk[5]. The available human clinical results do not establish a mechanistic pathway leading to adverse health impacts for short term NO_2 exposure at present day ambient environment[6].Each day our lungs are directly exposed to more than 7000 liters of air, which contain varying amount of inorganic, organic particles and various types of gases[7]. Hence it is now time to assess the air quality of the area in terms of pollutant concentration. Basni industrial area has mainly textile / timber / Guar gum industrial units. Boranada industrial area has mainly Metal and Wooden Handicrafts industrial units, Mandore industrial area has handicrafts/ oil mills/ Guar gum/ textile / Stone Processing industrial units. Kankani industrial area has mainly handicraft / plastic industrial units[8].

II. Methodology, Observations, Calculations and Analysis

Monitoring was carried out in all the four industrial areas as per central pollution control board (CPCB) of India guidelines. Five pollutants (SO_2, NO_2, PM_{10}, $PM_{2.5}$ and CO) were measured to calculate AQI of a particular area. AQI has been developed and used effectively in many industrialized countries to represent

FECT OF AIR POLLUTION ON VEGETATION: A REVIEW

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BSTRACT: An environment plays a vital role for the sustainability of life on our planet. Environmental comprises some very basic ar[illegible]ters on which earth's life is very much dependent i.e. air, water and soil etc. Every parameter has got its own importance but air and vate[illegible] are two such thing without which human life can never be imagined .Further, water can be made usable by providing some degree of eatment but if air gets polluted to alarming level then ,it will not be so easy to adverse this effect. Air pollution receives one of the prime oncern in India, primarily due to rapid economic growth, industrialization and urbanization with associatedincrease in energy demands. acks of implementation of environmental regulations are contributing to the bad air quality of most of the Indian cities. Air pollutants roduced in any air shed are not completely confined, but at time trespassing all the geographical boundaries, hence do not remain only a roblem of urban centres, but spread and affect remote rural areas supporting large productive agricultural land. Air pollutants pose risks on ield of crops depending on the emission pattern, atmospheric transport, leaf uptake and have a deleterious effect on a variety of biochemical nd physiological processes and on structural organization within the cells.

ir pollutants have been shown to reduce the growth and yield before any visible symptoms appeared. It is now commonly believed that jury initially takes place at the biochemical level (interference with photosynthesis, respiration, lipid and protein biosynthesis, etc.), ubsequently progressing to the ultrastructural level (disorganization of cellular membranes), and then to the cellular level (cell-wall, esophyll, and nuclear breakdown). Finally, visible symptoms develop (chlorosis and necrosis of foliar tissues). An adverse effect caused by r pollutants depends not only upon its concentration, but also on the duration and combination of air pollutants. Biochemical injury results hen the concentration of the pollutant exceeds the capacity of the tissues to detoxify it through their normal metabolism. The subtle and aried nature of the biochemical and physiological effects produced by air pollutants suggest that reduction in plant growth and yield.

eywords: Air pollution, injury, SO_2, NO_2, CO, plant physiology.

INTRODUCTION

ir pollution is a major problem today not only in india but in the whole world. Air pollution adversaly affecting the various constituent of e environment. The main air pollutants are represented by gases forms, particles in suspension, different ionizing radiation. The gases forms e: oxidized and reduced forms of carbon (CO_2, CO, CH_4), of nitrogen (NO_2, NO, N_2O_4, NH_3, NH_4^+), SO_2, O_3, C_6H_6 vapours, Hg, volatile ienols, Cl_2, etc. The particulate forms are: PM10 and PM2.5 particulate matter, heavy metals with toxic effect (Pb, Ni, Cd, As), PAHs(olycyclic aromatic hydrocarbons) etc.

ir pollution was earlier considered as a local problem around large point sources. But due to use of tall stacks and long range transport of ollutants, it has become a regional problem. The transboundary nature of pollutants was clearly evident when areas remote from sources of r pollution also showed higher concentrations of air pollutants. Uncontrolled use of fossil fuels in industries and transport sectors has led to e increase in concentrations of gaseous pollutants such as SO_2, NOx, etc.

ffects of different kinds of pollution can be determined by the nature of pollutants, their concentration and the period of exposure. Under posure to high concentration, plants suffer acute injury with externally visible symptoms, such as chlorosis, discolouration, necrosis and ath of entire plant. Besides morphological changes, chemical, biochemical, physiological and fine structural changes also occur in plants. ir pollution decreases the yield of all crops by affecting their photosynthetic activity and growth. Pollution damage can also be recognized r the accumulation of toxic material in the plant, changes in pH followed by solubilization of toxic salts of metals like aluminum, reduced increased activity of certain enzymes, increase in compounds with SH groups and phenols, lowered ascorbic acid level in the leaves, pression of photosynthesis, stimulation of respiration, low dry matter production, changes in permeability, disturbances in water balance d reduced fertility under prolonged exposure. Plants show reduced productivity and yield and quality is lowered and ultimately they die. ie symptoms of pollution affected plants are varied and unspecific. A particular pollutant affects different plants in very different ways and particular symptom can be produced by a variety of substances. The development and severity of the injury depends not only on the ncentration of the particular pollutant, but also on a number of other factors. These include the length of exposure to the pollutant, the fluence of external factors (pollutants) on plants depends upon the species, stage of development and the organ and tissue involved as well the environmental factors conducive to a build-up of the pollutant and to the preconditioning of the plant, which make it either susceptible resistant to injury. Morphological alteration of a plant and floristic composition of a plant community are commonly used to indicate

NASA/ADS

Inter-state Mobility of Pesticide Leachate in Underground Water

Show affiliations

Singh, S. ; Singh, S. K. ; Chaubey, J. ; Arora, H. ; Bhandari, K. ; Vyas, A.

Pesticide usage has become an integral part of modern agriculture; excessive and injudicious usage of which generally leads to groundwater pollution. Assessment of pesticide impact on groundwater, employing certain tools and available dataset, is a foremost step towards the preparation of regulatory policies that governs the application of pesticides to agricultural fields. In this study, the impact of pesticide usage is assessed for an agricultural area lying in North-western India employing a model named Pesticide Impact Rating Index (PIRI). Four pesticides viz. Atrazine, Chlorophyrifos, Phorate and Monocrotophos, were selected and a relationship is established between their usage and their impact on the quality of groundwater (by employing PIRI) for the study area consisting of seven farms lying in Nakodar tehsil of Punjab state in India. Groundwater sampling was conducted for these locations and samples were analyzed for observed values of pesticide residues. Furthermore, these observed values were compared with the PIRI model estimates and results showed that though the observed values were higher corresponding to the estimated values, but the ratio seemed to be fluctuating within consistent range. Therefore, the evaluation of PIRI model for the study area resulted in promising results subject to the introduction of multiplicative correction factors for the model estimates so as to predict realistic pesticide residues in the area corresponding to local conditions and considered time frame of analysis. The study is further extended to observe the occurrence of the pesticides in the downstream side of the study area. The same pesticides have been detected in underground water available in desert of Jaisalmer district of Rajasthan which is about 700 km away from the area where these pesticides are used. It indicates inter-state pollution and contamination of underground water, the remediation of which is of utmost importance for the study area and is recommended for a sustainable future.

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R. Arun Karthick[1], Ketan Jangir[2] and Pradipta Chattopadhyay[1]

Foaming and Cleaning Performance Comparison of Liquid Detergent Formulations using Mixtures of Anionic and Nonionic Surfactants

Modern detergents are typically appreciated for their cleaning performance rather than foaming characteristics. The aim of the current study was to compare the foaming and cleaning abilities of liquid detergents, built from a combination of surfactants, to be applied for household laundry purpose. A total of eighteen different liquid detergent formulations containing mixtures of important anionic, nonionic surfactants, and other additives were prepared. The first set of nine new detergent formulations (S1) was prepared using the surfactants sodium lauryl sulfate (SLS), Tween-20 and Tween-80. Another set of nine new detergent formulations (S2) was prepared using surfactants SLS, Triton X-100 and alkyl polyglucoside (APG). The impact of water quality (RO, hypersaline or hard water) on the foam properties of the detergent formulation sets (S1 and S2) was systematically examined. The second set of detergent formulations (S2) showed a better performance in terms of foamability and foam stability, regardless of the water quality. Also, the surface tension of the detergent formulation set S2 was found to be lower and it showed a higher detergency for both cotton and woolen fabrics. The detergency of the formulation no S2.9 (in set S2) was the maximum amongst all the detergent formulations. The surface morphology of the cotton and woolen fabrics, washed with liquid detergent formulation no S2.9, displayed the removal of oily soil and grease from the surface of the fabrics, without affecting the quality of the fabrics.

Key words: Detergent formulation, non-ionic surfactants, application of surfactants, anionic surfactants

Vergleich der Schaum- und Reinigungsleistung von flüssigen Waschmittelformulierungen unter Verwendung von Mischungen aus anionischen und nichtionischen Tensiden. Moderne Waschmittel werden typischerweise eher für ihre Reinigungsleistung als für ihre Schaumbildungseigenschaften geschätzt. Das Ziel der vorliegenden Studie war es, die Schaum- und Reinigungsleistung von Flüssigwaschmitteln zu vergleichen, die aus einer Kombination von Tensiden bestehen und für die Haushaltswäsche verwendet werden. Insgesamt wurden achtzehn verschiedene flüssige Waschmittelformulierungen hergestellt, die Mischungen von wichtigen anionischen, nichtionischen Tensiden und anderen Additiven enthielten. Der erste Satz von neun neuen Waschmittelformulierungen (S1) enthielt die Tenside Natriumlaurylsulfat (SLS), Tween-20 und Tween-80. Ein weiterer Satz von neun neuen Waschmittelformulierungen (S2) wurde unter Verwendung der Tenside SLS, Triton X-100 und Alkylpolyglucosid (APG) hergestellt. Die Auswirkung der Wasserqualität (RO, stark salzhaltiges oder hartes Wasser) auf die Schaumeigenschaften der Waschmittelformulierungssets S1 und S2 wurde systematisch untersucht. Das zweite Waschmittelformulierungset S2 zeigte unabhängig von der Wasserqualität eine bessere Leistung hinsichtlich der Schaumentstehung und Schaumstabilität. Auch wurde gefunden, dass die Oberflächenspannung des Waschmittelformulierungssets S2 niedriger war und eine höhere Waschleistung sowohl für Baumwolle als auch für Wollgewebe hatte. Die Formulierung Nr. S2.9 (in Satz S2) hatte die höchste Waschleistung unter allen Waschmittelformulierungen. Die Oberflächenmorphologie der mit der flüssigen Waschmittelformulierung Nr. S2.9 gewaschen Baumwoll- und Wollgewebe zeigte, dass öliger Schmutz und Fett von der Gewebeoberfläche entfernt werden konnten, ohne die Qualität der Gewebe zu beeinflussen.

Stichwörter: Waschmittelformulierung, nichtionische Tenside, Tensideinsatz, anionische Tenside

1 Introduction

A detergent product is a composition of various chemicals namely surfactants, filler, builders and solubilizers. Surfactants, being the primary component, resemble the major influencing factor in formulating an effective detergent product [1]. The detergency is the measure of surface cleaning by any detergent formulation [2]. The surfactant is a major component affecting the detergency of any laundry product. Since detergency is the prime factor in measuring the cleaning efficiency, the choice of selecting a surfactant in preparing a detergent formulation is important [3]. The selection of additives is also a prime factor in the formulation of a well-balanced detergent. The major additives used in the detergent formulation include builders, solubilizers, and polymers. Each of these components contributes to the improvement of detergent performance [4]. For instance, the presence of a water soluble polymer in the detergent formulation helps in preventing the redeposition of oily soil on the fabric after being removed by the detergent action [5, 6]. Builders used in the detergent mixture to eliminate the water hardness thereby increasing the performance of the detergent [7]. Enzymes have been incorporated in modern detergents so as to remove any organic compound such as fat, oil secretions, and protein which are insoluble in water [8]. The use of environmental friendly surfactants and other additives prepared from biodegradable products have been pursued producing detergent formulations in the last decade. Detergents prepared with a mixture of surfactants have a greater impact in the removal of soil from fabrics. Nonionic surfactants such as alkyl polyglucoside show a sy-

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Identification of psychological factors associated with car ownership decisions of young adults: Case study of Jodhpur city, India

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ABSTRACT

In the context of a developing country, not many studies have attempted to examine the attitudinal factors that influence the car ownership decisions of young adults. The present study aims to identify the pertinent psychological factors and their effects, along with demographic variables, upon car ownership decisions. The study used 813 individuals' responses to employ a principal component analysis and subsequent binary logit model to determine the future car ownership decisions. The major findings show that the individuals who are status seekers, image-conscious, passionate for cars, obsessed with cars, and influenced by peers/external factors are more likely to buy a car in the near future. However, those who are conscious about paying high taxes, environmental sustainability and traffic problems are less likely to buy a car in the near future. The results of this study can help transport planners and policymakers to develop and implement transport policies that could potentially discourage the use and ownership of cars in order to develop sustainable mobility patterns in the future.

1. Introduction

1.1. Background and need of the study

Cars are the most important matter of concern for transportation planners because their growth and use in cities cause serious environmental and urban problems like congestion, air pollution, accidents, etc. (Newman and Kenworthy 1999; Gärling and Schuitema 2007; Tao et al., 2019) and leads towards unsustainable development. Car ownership and their uses are increasing in developing countries (like India) due to rising income levels (Belgiawan et al., 2014). As the income increases, those who already have a car, tend to buy a second or a third. As per report of Niti Aayog, in 2018, India had 22 cars per 1000 population and by 2025 the number of cars is likely to be 35 cars per 1000 population (Ghate and Sundar 2014) and it is expected to increase about 175 cars per 1000 population by 2040 (IEA 2015). It is to be noted that, these numbers are the ratio of expected total cars to the expected total population of India. In 2017, the developed countries like New Zealand, USA, Australia, Canada, Japan, etc. have car-ownership levels above 450 cars per 1000 persons. As per MoRTH report (MoRTH 2012), developed cities of India like Delhi have 157 cars, Chennai 127 cars, Pune 92 cars, Bangalore 85 cars, Hyderabad 72 cars per 1000 population. These cities of India may also follow the same trend (as of developed countries) if corrective steps are not taken today to reduce the growth of car ownership and their uses.

The growth in car ownership and uses are influenced by various factors like socio-demographic variables like income, age, gender, etc. (Bergstad et al., 2011; Dargay and Hanly 2007; Delbosc and Currie 2014; Verma et al. 2016, 2017), quality attributes of public transport (Beirão and Sarsfield 2007; Cullinane 2002; Ibrahim 2005; Redman et al., 2013), cost of buying and running cars, journey requirements (work or non-work) (Banister and Button 1993) and psychological factors like status, comfort, independence, intension, aspiration, happiness, pro-sustainability, etc. (Belgiawan et al. 2011, 2014, 2016; Ghate and Sundar 2014; Setiawan et al., 2015; Steg et al., 2001; Steg 2005; Verma et al. 2016, 2017; WU et al., 1999; Zhu et al., 2012). As most of the studies pointed out, that psychological factors are affecting car ownership and their uses majorly but these studies are mostly done in developed countries. A comprehensive study related to psychological behavior, regarding car ownership decisions, for developing countries has been found to be very limited in the existing literature. This study tries to identify the psychological factors and their effects, along with demographic variables on car ownership decisions of young Indian adults, in near future. This study mainly focusses on young adults because they will be the future decision-makers of their family. The results of the study will help transport planners and policymakers to develop

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sustainable transportation policies to reduce the ownership and usage of cars.

The next section of the paper deals with the literature review of research work done previously on car-ownership decisions followed by sections on the study area, research methodology, demographic characteristics of the respondents, model structure and results, estimation of coefficient of binary logit model and validation of binary logit model. The last section includes key findings and policy recommendations from the study.

1.2. Previous research on factors associated with car ownership decisions

One of the recent studies on car ownership decisions was done by Verma et al. (2016) in Bangalore city, India. They analyzed that the factors responsible for increase in car ownership in India are low-interest rates on the car loan. People who come from car-owning household and qualified at or above post-graduation level are feeling safe and comfortable in cars as compared to other modes of transport, while the availability of good public transport came out to be a major factor in deterring car use but the overall scores on the service quality dimensions show that the user expectations is not met by urban bus transport service. Cullinane (2002) suggested that if the quality of public transport service is good and cheap, it can suppress the demand for the car. Car usage is not only popular because of its instrumental factors such as its speed, convenience and flexibility but other factors also seem to play an important role, such as arousal, feelings of sensation, power and superiority (Belgiawan et al. 2011, 2016; Steg 2005). Easy finance schemes or low-interest rates on car loans have played an significant role in growing car ownership among youngsters in India. Also the use of a car is more for personal use rather than official use, especially for social and recreational trips (Verma et al., 2016). According to Ghate and Sundar (2014) owning a car is not always about essential requirement but many times, it is for aspiration and status symbol also.

Two different scenarios can be seen in developed countries like Germany, France, Great Britain, etc. and developing countries like China, Malaysia, and India. Young people are becoming increasingly less likely to obtain a car driving license in Australia, North America, and most of the Europe. Delbosc and Currie (2014) investigated the demographic and structural justification for these trends. They documented that in both the regional and metropolitan groups, cars were described with reference to providing freedom and control over their time and activities. Cars are referred to as an achievement, a symbol of maturity, adulthood, and expression for freedom. The ownership of car did not appear to infer the status of symbol and luxury, but owning an expensive car gives higher social status than an inexpensive or old car. Belgiawan et al. (2014) analyze undergraduate student's (age cohort until 30) motivation regarding car ownership in developing countries like China, Indonesia, Lebanon and developed countries like Japan, Taiwan, Netherlands, and the USA. They found that in developed countries, students have less desire to buy a car in the near future, in comparison to developing countries. Expectations of others seem to be an important factor affecting buying intentions whereas symbol, affection of cars and income are less correlated with Intentions. Zhu et al. (2012) identifies that Chinese college students have a strong, planned intention for car ownership. Like Hong Kong students, they also perceived that cars provide comfort, save time, help to travel to more desired places, and as a success symbol. Belgiawan et al. (2011); Belgiawan et al. (2016) analyze the physiological factors for car ownership decisions in Bandung, Indonesia using binary logistic regression analysis and they found that convenience, social orderliness, and arrogant prestige are significant determinants for future car-ownership decisions. Pojani et al. (2018) analyzed the mobility intentions of young university students in Tirana, Albania using Structural equation Modelling. They found that individuals who do not like cars and driving, want to buy cars and drive in the future. This Pro-car attitude indicates that cars will remain a strong status symbol. Steg (2005) examined various motives of car use in Netherlands and results revealed affective and symbolic factors positively affecting the utility of driving. The existence of three groups was suggested by Sigurdardottir et al. (2014) while narratively analyzing the intention behind the car and driving license ownership among Danish young adults groups. The first group have car-oriented social networks, perceive cars with high symbolic, affective, instrumental, and relational values and visualize a car-oriented lifestyle in the future; the second group associated with high relational and instrumental values of cars, perceive the cost of running and maintenance as a strong barrier and visualize a car-oriented lifestyle in the future; the third group, have a low interest in cars and visualize a cycling-oriented future. Steg et al. (2001) tried to identify the relative importance of symbolic and affective factors to the instrumental and reasoned motives for car use and they found that instrumental, reasoned, symbolic and affective factors of the cars are significantly contributing towards ever increasing use of car. At the earlier stage of motorization, household vehicle ownership was influenced by economic, sociological, and psychological factors (WU et al., 1999). People were of the opinion that expensive vehicles give more symbolic meaning and the effect of the economic factor in the symbolic utility of a vehicle tends to diminish. Setiawan et al. (2015) explored university student car commuting behavior in Surabaya, Indonesia. The result revealed that the actual behavior of using cars is influenced by their habit and intention to use car for traveling in campus. Young people's travel behavior and intentions are influenced by identity, social recognition, self-image and desire to drive a car (Line et al., 2010). Although they are aware of climate changes but their understanding of the link between transport and climate change is weak. There is always a scope to reduce the intention to drive cars by motivating towards environment sustainable modes before they develop driving habits. Awareness program concentrating on the consequence of cars and ascription of responsibility, had a positive impact on the personal norm and intension to reduce car-transport (Liu et al., 2017). A significant influence of the parents on the attitude of the children toward the cars was observed by Nishihara et al. (2017) in a study performed on young adults across Japan. Young adults are more aware of the environmental and urban problems and the fact that the car is not environmental friendly. However, majority of them say that it is very difficult to take away cars because of their usefulness.

To summarize it all, there is growing study on young people's travel mode choices and many studies explaining their travel behavior. The trend of driving license and car ownership is reduced in the developed countries but enthusiasm can be seen in developing countries. Table 1 shows the summary of key factors behind this fascination to car ownership, which are independence, status symbol, comfort, and freedom. Few studies have also addressed the environmental attitudes of young people, but the concern for the environment does not affect much until youth is made aware of the repercussions of excessive use of vehicle on environment. It is noticeable that most of the existing studies are concentrated on developed countries only. Very few researches had their focus on developing countries. For fast-growing countries like India, it is necessary to have knowledge about the travel trends among youth population for transport planning and future development.

2. Study area and methodology

2.1. Study area

The study is conducted in Jodhpur city of India. Jodhpur is the second-largest city of Rajasthan and it is one of the famous tourist destinations of India. It is also known as the "Sun City" because of its sunny and bright weather. Jodhpur metropolitan region has a population of

Table 1
Summary of literature review of psychological factors associated with car ownership decisions.

Authors	Study Area	Sample Size	Psychological factors considered in the study
WU et al. (1999)	Xi'an City, China	2703	Symbolic utility, Use-value Attitude, Sign-value Attitude and Ostentation desire
Steg et al. (2001)	Groningen and Rotterdam, Netherlands	185	Instrumental-reasoned and symbolic-affective functions
Cullinane (2002)	Hong Kong	389	Image and symbol
Steg (2005)	Rotterdam, Netherlands	113	Independence, instrumental, symbolic and affective
Zhu et al. (2012)	Shanghai and Zhenjiang, China	963	Symbol of success, In control of life, Future necessity and Symbol of modern life
Belgiawan et al. (2014)	China, Indonesia, Japan, Lebanon, Netherlands, Taiwan, and USA	China (167), Indonesia (200), Japan (142), Lebanon (271), Netherlands (84), Taiwan (139), and USA (226) Total = 1229	Symbolic affective, independent, negative aspects, social orderliness, safety and reliability, and convenience
Delbosc and Currie (2014)	Regional Victoria and Metropolitan Melbourne, Australia	100	Social status and environmental attitude
Sigurdardottir et al. (2014)	Denmark	–	Symbolic, affective, instrumental, and relational values
Belgiawan et al. (2011); Belgiawan et al. (2016)	Bandung, Indonesia	500	Symbolic/Affective, arrogant prestige, Convenience, comfort, and social orderliness.
Liu et al. (2017)	China	600	Ascription, Intention
Nishihara et al. (2017)	Japan	300	Usefulness, Image, Environmental/Safety
Verma et al. (2016)	Bangalore, India	646	Pro-sustainability, status-seeker, tax-conscious, happiness-oriented, comfort-oriented and city conscious
Verma et al. (2017)	Bangalore, India	750	Enjoyment and image, happiness, like driving vehicles, city conscious, congestion influence, comfort oriented, opportunity/ image conscious, tax and environment conscious, societal image seeker, pro-sustainability, peer/external influences and status.

nearly 1.138 million as per the census population data (Census, 2018). It is one of the fastest-growing cities of India with an average annual growth of 3% which is slightly more than the country urban growth. In addition to the local population of Jodhpur city, an average of 4000 tourists visit the city every day (Jodhpur Development Authority 2010). According to the Government of India, people aged between 15 and 29 years are considered as a youth (Central Statistics Office Ministry of Statistics and Programme Implementation 2017). As per this report, the youth population of India is nearly 19.10% of the total population. The growth of the population has not been matched by investment in transportation infrastructure, especially in public transportation. As a result, the proportion of people traveling by private mode of transport has been increasing due to which overcrowding and congestion on limited infrastructures such as on roads and parking facilities increased. The public transport buses in the city are inadequate and often overcrowded and because of this, private mode share has increased. According to Regional Transport Authority (RTO) in the period from 2003 to 2011 the registration of new motorcycles have grown at an annual average growth of about 18% while cars have grown at about 14% which indicates greater private vehicle population in future (Asian Development Bank 2012). As of now, the bus (minibus and semi low-floor bus) is the only main public transport of the city. There are two types of buses, minibus, and semi low-floor bus. Mini Buses are operated by a majorly private operator under contract to Jodhpur City Transport Services Ltd (JCTS) which was set up as a joint venture of Jodhpur Municipal Corporation and the Urban Improvement Trust, Jodhpur and semi-low floor buses are operated by Jodhpur Municipal Corporation itself. The bus system, both government or privately operated is inadequate in terms of comfort and frequency and most of the time they are operated in crush capacity (Jodhpur Development Authority 2010). These factors contributes in psychological perception and affects car ownership decisions. Motorized three-wheelers (Auto-rickshaw) and taxi are the most common Intermediate public transport modes. Nearly 45% of peak hour trips are non-motorized trips out of which 38% are walk trips. There is significant usage of cycle rickshaws and bicycles in the city especially near the city center area and rest 55% of motorized peak hour trips are made by two-wheelers (46%), car (19%), auto-rickshaw (25%), taxi (1%), and public transport (8%) respectively (Jodhpur Development Authority 2010).

2.2. Study methodology

The overall framework of study methodology adopted for this study is shown in Fig. 1. A set of questionnaire was prepared to analyze the perception of young adults related to car-ownership decisions. As mentioned earlier, this study mainly concentrates on young adult's (which is the future) travel behavior because they are going to become decision-makers in the near future and it is very important to analyze their psychological perception related to car-ownership decisions to develop future policies related to transportation. The questionnaire recorded socio-demographic information (like age, gender, income, education qualification, occupation, number of two-wheelers and four-wheelers owned by the family, number of members in the family, possession of a driving license), frequency of using public transport and perception related questions on Likert scale (strongly agree = 5; agree = 4; neutral = 3; disagree = 2 and strongly disagree = 1) about future car ownership, growth of cars in India, car-related individual image, peer-influence, social status, and transport policy.

A manual pen and paper method of data collection was adopted for the present study. The questionnaire is only meant for young adults (age

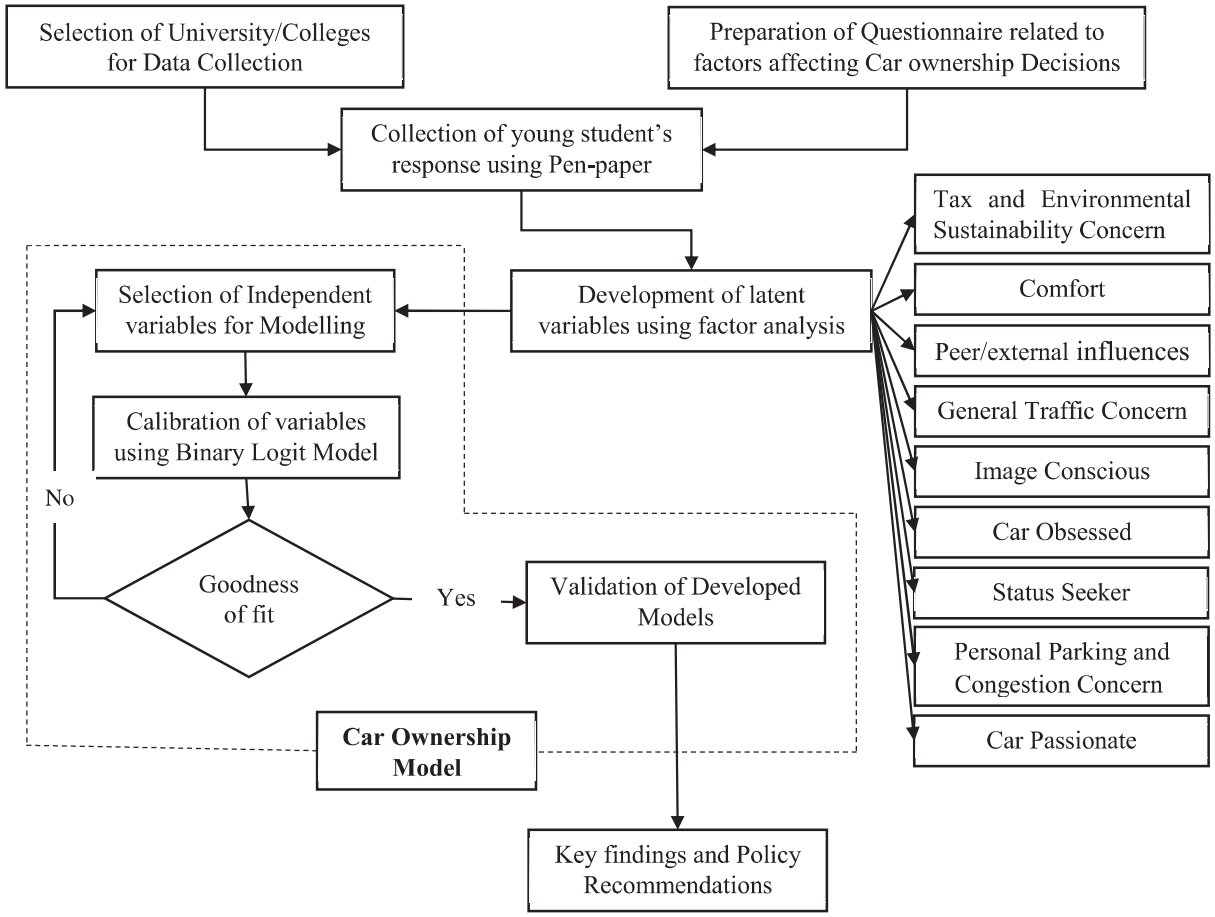

Fig. 1. Framework of study methodology.

group 15–29 years), therefore, to make the data collection process convenient, responses were collected from the randomly selected colleges and universities of Jodhpur. Permissions were obtained from various administration authorities to conduct the survey inside colleges and universities. For some college/university which did not permit to conduct a survey inside their campus, the survey was conducted outside their jurisdiction area. One drawback of this adopted survey methodology is that since the dataset consists of students from colleges and universities only, a generalization to the larger younger-adult population is limited.

A total of 1130 data samples were collected from November to December 2019, out of which 956 data samples are considered valid after removing incomplete or erroneous observations. The socio-demographic information of the respondent is shown in Table 2. This study developed the nine latent variables (shown in Table 3) using principal component analysis (PCA) in SPSS software for the development of a binary logit model. 85% of the randomly selected data samples i.e. 813 samples is used for the model calibration and remaining 143 samples are used for the validation of calibrated model. The binary logit is calibrated considering socio-demographic and psychological factors and validated in N-Logit software. The developed model is then verified in terms of the logical signs and the significance level of each variable (checked using p-values). For the overall goodness-of-fit of the models, parameters like McFadden's rho-squared value and prediction success rate (validation) of the models are taken into consideration. Once the developed model is validated, the key findings are observed from the results and that will help in policy recommendations for future transport planning.

2.3. *Demographic characteristics of the respondents*

This section broadly summarizes the demographic characteristics of the collected data samples. The collected data shows that a higher percentage of males (71.34%) participated in the questionnaire survey than females (28.66%), reflecting the gender ratios (in general more male candidates than females) in colleges. The average age of the participants is 21.06, also everyone has at least 4–5 members in the family.

Most of the respondents are under-graduate and from the engineering background, may be because of large samples from engineering students only. Only 40% of the participants have household car ownership. Almost 40% of participants have possession of their own driving license and only 30% of the respondents live with their family. About 45% of the participants never travel through public transport.

2.4. *Estimation of psychological factors*

The various psychological variables considered for the model estimation are given in Table 3. Since the questions on the survey form are the attitudinal type and their responses are based on the Likert scales. The factor analysis approach is used to reduce the number of explanatory variables. A total of 813 data samples are selected for final analysis after data cleaning and the value of Cronbach's alpha reliability coefficient for Likert scale is 0.89, which is satisfying the minimum acceptance limit of 0.7 (Churchill 1979).

The sample adequacy measures such as Kaiser-Meyer-Olkin value (0.864) and Bartlett's test of sphericity (approximate chi-square is

Table 2
Respondent demographics.

Characteristics	Number	Share
Categorical Variables		
Gender		
Male	682	71.34%
Female	274	28.66%
Degree		
Under-Graduation	828	86.61%
Post-Graduation	128	13.39%
Course Pursuing		
Engineering	832	87.03%
Others (Medical, science, management, etc.)	124	12.97%
Household Car Ownership		
Yes	398	41.63%
No	558	58.37%
Possession of own driving license		
Yes	376	39.33%
No	580	60.67%
Living with family		
Yes	290	30.33%
No	666	69.67%
Uses of Public Transport		
At least once in a week	168	17.57%
At least once in a month	116	12.13%
Very Occasionally	248	25.94%
Never	424	44.35%
Quantitative Variables		
Age of the Respondent		
15–18 years	78	8.16%
19–21 years	554	57.95%
22–25 years	286	29.92%
26–29 years	38	3.97%
Average	21.07 (2.05)[a]	–
Numbers of members in the family		
≤2	10	1.05%
3	74	7.74%
4	392	41.0%
5	254	26.57%
6+	226	23.64%
Average	4.96 (1.68)[a]	–

[a] Value in parentheses shows the standard deviation.

15,457.333, a degree of freedom is 820, and significance is 0.000) indicates that collected data is fit for factor analysis. Principal component analysis (PCA) along with the varimax rotation method with Kaiser Normalization is used for extracting factors, and total 9 factors are retained on the basis of eigenvalues and variance explained by the variables. Eigenvalue shows the total variance explained by each factor. Generally, all the factors with eigenvalues of more than 1 should be extracted. Thus, total 9 factors are extracted which explained 61.48 percent of the total variance. A factor loading of '0.3' has been set as the benchmark for identifying each factor. The name of the factors, variable labels, and factor loadings are summarized in Table 3.

The factors are named on the basis of factor loadings which describe the correlation between the underlying factors and the statements. Factor scores are then derived from the extracted factors for evaluating the relative significance of perceptions and attitude in the car ownership behavior of young adults. The factor scores for each of the observations are deduced from the factor loadings and the Likert-type Scale responses for each observation in the sample. These factor scores are used for the analysis of car ownership decisions of young adults in the near future.

3. Model structure and results

The aim of this study is to analyze the car-ownership propensity of young Indian students. A Binary Logit Model (BNL) was used to calibrate the parameters of the utility equations associated with each individual i and alternative j. In the binary case, only two alternatives are available to each decision-maker. Therefore the decision to buy a car in the near future is considered as a dependent variable (binary variable, 1 = if going to buy a car in near future or 0 = not buying a car) and demographic, psychological factors considered as an independent variable for model development. The probability function of the Binary logit model is derived as the following:

Utility equation for individual i and alternative j (here j = buying a car, not buying a car in the near future) is:

$$U_{ij} = \beta_J^{'} x_{ij} + \varepsilon_{ij} \tag{1}$$

The vector x_{ij} includes socio-economic, socio-demographic characteristics and attitudinal perception factors regarding car-ownership decisions. The coefficient of utilities, which is calibrated from observed data is represented by $\beta_J^{'}$. The random term represents the latent (i.e. unobserved) variables that drive the choice process of an individual. It was assumed that ε_{ij} is not correlated with x_{ij} (i.e. x_{ij} is exogenous in the random utility function) and normally distributed.

$$U_{i1} = \beta_1^{'} x_{i1} + \varepsilon_{i1} \tag{2}$$

$$U_{i0} = \beta_0^{'} x_{i0} + \varepsilon_{i0} \tag{3}$$

Where, U_{i1} represents the utility of buying the car in the near future and U_{i0} represents the utility of not buying a car in the near future. We assume that the utility of the second alternative (not buying a car) is zero.

$$U_{i0} = 0 \tag{4}$$

The probability of choosing alternative 1 (buying a car in the near future) is:

$$Prob(U_{i1} > 0) = Prob\left(\beta_1^{'} x_{i1} + \varepsilon_{i1}\right) > 0 \tag{5}$$

$$Prob(U_{i1} > 0) = \frac{exp\left(\beta_1^{'} x_{i1} + \varepsilon_{i1}\right)}{exp(\beta_1^{'} x_{i1} + \varepsilon_{i1}) + exp(\beta_0^{'} x_{i0} + \varepsilon_{i0})} > 0 \tag{6}$$

Table 4 presents the results of the binary logit model after trying different combinations of demographic and psychological variables. To examine the presence of multi-collinearity before model calibration, Pearson's correlation coefficients are reported in Appendix A. Since, multi-collinearity is indicated when the correlation coefficient of independent variables is 0.90 and higher (Pallant 2010). None of the socio-demographic and psychological variables in this sample show collinearity problem. NLOGIT 5 econometric software is used for the calibration of the model. The dependent variable is the decision to buy a car in the near future (Yes > 0; No ≤ 0). The results of the developed model show that respondents whose education qualification is higher than the post-graduation level are more likely to buy a car with 99% confidence level than the respondent who is qualified below this level. It may be because these people are going to get a high paid job and have the confidence to afford a car in the near future. The individuals whose educational background is related to engineering are more likely to buy a car compared to medical, science, management students etc. at 99% of confidence level. It may be because of data samples having a large percentage of engineering students' responses. Further studies are required to understand the impact of educational background on car-ownership decisions. As expected, Individuals having a four-wheeler driving license and car in their household have a positive effect on car-buying decisions than those who do not have a car in their household with 95% of confidence level. This implies that an individual wants to buy his/her own vehicle instead of depending upon the common household vehicle. It is interesting to observe that the number of members in the family have a positive impact on car buying decisions with 95%

Table 3
Factor loadings from principal component analysis with varimax rotation with kaiser normalization (N = 813).

Factor Name	Statements	Factor Loading
Factor 1: Tax and Environmental Sustainability Concern	I will not use a car if parking charges are high	0.843
Eigen Value: 4.122	I will not use a car if fuel taxes are high	0.806
% of Variance: 10.05	I will not buy a car if car ownership and additional taxes are high	0.760
Reliability: 0.868	I will sacrifice traveling by car for sustainable environment and better future	0.673
	Does advertisement related to Impact of car usage on the environment, will reduce the car ownership	0.647
	I will not use a car if bicycle infrastructure is appropriate	0.590
	I will not use a car if public transport is appropriate	0.561
	I will not use a car if I get a Job near my house (within 1 km)	0.476
Factor 2: Comfort	I enjoy traveling by or driving a car	0.791
Eigen Value: 4.045	Car is the best mode for leisure activity travel	0.773
% of Variance: 9.867	Car is the safest mode of transportation	0.711
Reliability: 0.839	Traveling by car is less stressful	0.701
	Car is more comfortable than public transportation	0.688
	I would be happier if I had a car	0.431
Factor 3: Peer/external influences	I should own a car when my relative have it	0.848
Eigen Value: 3.854	I should own a car when my friend have it	0.844
% of Variance: 9.401	I should take a car when my family purchase for me (If I'm not able to afford it in the future)	0.655
Reliability: 0.831	If car loans are easily available then I will buy a car next day or within a month	0.626
	I will buy things because of their attractive advertisement (In the future when you have enough money do you buy a car based upon an attractive advertisement)	0.618
	Car will improve my career opportunities	0.541
	Car will improve my social image	0.360
Factor 4: General Traffic Concern	Major traffic problems like congestion can be reduced by discoursing the use of cars.	0.785
Eigen Value: 3.078	Major cause of environmental air pollution can be attributed to car fumes	0.752
% of Variance: 7.507	Cars are more involved in fatal accident	0.734
Reliability: 0.816	Traffic by cars is increasing so fast that the existing roads network not able to manage increased traffic by the year 2025	0.685
Factor 5: Image Conscious	People will not give me importance, if I use Public Transport for daily travel	0.766
Eigen Value: 2.959	People will give me more importance, if I have a car	0.742
% of Variance: 7.217	People without car suffers more, because modern life favors car	0.729
Reliability: 0.766	Coming a college by a car is considered as a cool person	0.635
	In India, owning car is essential after Job	0.383
Factor 6: Car Obsessed	In future, I don't want to see myself to commute my daily travel by walking or cycling	0.736
Eigen Value: 2.179	In future, I don't want to see myself riding on a public transport bus or an auto-rickshaw to commute my daily travel	0.674
% of Variance: 5.314		
Reliability: 0.647	Car will improve more my personal life with respect to Public Transport	0.531
	Coming to a college by a bicycle or walk is unfashionable	0.373
Factor 7: Status seeker	I will buy a car because it is a symbol of status	0.658
Eigen Value: 1.788	Car is a success symbol for me	0.658
% of Variance: 4.360		
Reliability: 0.795		
Factor 8: Personal Parking and Congestion Concern	I want to buy a car, but driving on the road is too difficult because of heavy traffic	0.839
Eigen Value: 1.734	I want to buy a car, but parking is very difficult	0.838
% of Variance: 4.230		
Reliability: 0.748		
Factor 9: Car Passionate	Buying a new car is a dream for me	0.487
Eigen Value: 1.449	I will buy a car as soon as I am able to afford it	0.451
% of Variance: 3.534	Growth of cars in country is a sign of developing nation and it should be encouraged	0.361
Reliability: 0.160		

Total Variance explained: 61.48%.
Method of Extraction: Principal Component Analysis.
Method of Rotation: Varimax with Kaiser Normalization (Rotation converged in 9 iterations).
Note: Loadings less than 0.30 are omitted.

confidence level, which is logically obvious, i.e. if the number of people in the family increases, then the demand for vehicles will be increased for daily travel. Those who are staying with family are less likely to buy a car in the near future at 90% confidence level. Expectedly, an individual's propensity of using public transport have a negative coefficient with 95% confidence level. Those who are using public transport at least once in a week are less likely to buy a car in comparison to those who are using it once in a month, occasionally and never. This suggests that, if the use and serviceability of public transport will improve, that could make a significant impact on the car buying behavior of young adults.

Various psychological variables are also found significant in the above utility equation of buying a car in the near future. Those who have a "Tax and Environmental Sustainability concern" are less likely to buy a car in the near future with 90% of confidence level (Verma et al. 2016, 2017) and those individuals whose decisions are influenced by peer/-external factors (like advertisements or inspired by relatives) are more likely to buy a car with 99% of confidence level. As per the model, individuals concerned with general traffic-related issues like accidents, pollution, congestion, and parking etc. are less likely to buy a car at 99% of confidence level. Those who are image-conscious and passionate about

Table 4
Results of binary logit model for car ownership decisions in the near future.

Variable	Coefficient	t-value
Constant	−0.82223**	−2.09
Education Qualification (If qualification ≥ P.G. level = 1, otherwise 0)	0.67483***	2.92
Course Pursuing (If course related to Engineering = 1, otherwise 0)	0.70173***	3.00
Household car ownership (yes = 1, otherwise 0)	0.38287**	2.33
Possession of Car Driving License (yes = 1, otherwise 0)	1.65785**	2.08
Number of members in the family	0.09073**	1.96
Living with family (yes = 1, otherwise 0)	-0.28,512*	1.71
Uses of public transport (If, use at least once in a week = 1, at least once in a month = 2, very occasionally = 3, never = 4)	−0.15182**	−2.16
Factor 1: Tax and Environmental sustainability concern	−0.13053*	−1.68
Factor 3: Peer/external influences	0.27368***	3.85
Factor 4: General traffic concern	−0.25293***	−3.26
Factor 5: Image conscious	0.15698**	2.21
Factor 6: Car obsessed	0.21453***	2.90
Factor 7: Status seeker	0.21877***	3.07
Factor 8: Personal parking and congestion concern	−0.21587***	−2.83
Factor 9: Car passionate	0.14078**	2.07
Goodness-of-fit measures:		
Log-likelihood function: LL(β)	−418.084	
Log-likelihood at constant only: LL(0)	−559.684	
McFadden's Rho-squared (ρ2)	0.253	

Note: ***, **, * = => Significance at 1%, 5%, and 10% level.
Likert Scale: (strongly agree = 5; agree = 4; neutral = 3; disagree = 2 and strongly disagree = 1).

cars are more likely to buy a car in the near future with 95% of confidence level. Another interesting finding is that those who are status seekers (Ghate and Sundar 2014; Pojani 2018) and obsessed with the car are likely to buy a car in the near future with 99% of confidence level.

Effect of the gender (1 if male, 0 if female), age of respondent (absolute value between 15 and 29) and comfort (as a psychological variable) was also examined on the decision to buy a car in the near future of young adults; however, these variables were found to be insignificant in the developed model. The binary logit model is developed using 15 variables and the value of log-likelihood at function is −418.084 and the value of log-likelihood at a constant is −559.684. The goodness-of-fit for the calibrated model is analyzed by finding out the McFadden's Rho-squared (ρ2) value given by equation (7),

$$Rho - squared = 1 - \frac{Log\ likelihood\ at\ function}{Log\ likelihood\ at\ constant} \quad (7)$$

$$= 1 - \frac{(-418.084)}{(-559.684)} = 0.253$$The rho-square value (0.253) of developed model is lies between 0.2 and 0.4. It shows that the developed model is good fit (Hensher et al., 2016).

3.1. Validation of the binary logit model

The prediction success table is the cross-classification between observed and predicted choices of decision makers. As mentioned earlier, 143 randomly selected data sample were used for the validation of calibrated model. The prediction success table of the developed binary logit model for validation is shown in Table 5. The overall prediction success rate is found to be more than 81%, which shows that the developed model is reasonably good.

4. Key findings and policy recommendations

This study aims to identify the psychological/attitudinal factors along with demographic variables and their effects on car ownership decisions of young adults (future decision maker of their family). The questionnaire comprising of demographic characteristics, frequency of using public transport and attitudinal behavior-related questions on future car ownership decisions is conducted in the Jodhpur city of India and responses from 813 individuals (age group 15–29 years) are used in this study. The study employed a principal component analysis, and a subsequent binary logit model to determine the young Indian adults' perception towards car ownership decisions in the near future. This study gives many insights about car-ownership decisions. The major findings of the study are:

1. Gender of the respondent had no significant role in car ownership decisions.
2. Individuals whose educational qualification is higher than the post-graduation level and have educational background related to engineering are more likely to buy a car in the near future.
3. Individuals having a four-wheeler driving license and the car in their household have a higher tendency to buy a car than those who do not have a car in their household.

Table 5
Prediction success table.

Observed Choices of Individual	Predicted Choices of Individual		Row Totals	Observed Share (%)
	Buying a car	Not buying a car		
Buying a car	57	11	68	47.55
Not buying a car	16	59	75	52.45
Column Totals	73	70	143	100
Predicted Share (%)	51.05	48.95	100	
% Correctly Predicted	78.08	84.29	**81.12**	

4. Frequency of using public transport, have a considerable impact on attitudinal behavior regarding car-ownership decisions.
5. Those who are conscious about environmental sustainability, paying high taxes, and general traffic problems (like congestion, parking, accidents, etc.) are less likely to buy a car in the near future.
6. Individuals whose decisions are influenced by peer/external factors (like advertisements or inspired by relatives) have a higher tendency to buy a car.
7. Respondents who are passionate about cars, obsessed with cars, image-conscious and status seekers are more likely to buy a car in the near future.

From a broad viewpoint, this study recommends some policies to reduce the growth of new cars in developing countries like India:

1. The awareness programs/campaigns concentrating on the effect of cars on environmental sustainability and imposing high taxes on the purchase of new cars and fuels may decline the growth of new cars in developing countries.
2. Implementing road pricing in the form of per kilometer charge will be a much effective incentive in congested areas. It will force people to get out from their cars. Then provide education and information about other forms of sustainable transport (Kroesen 2020).
3. The external factors like advertisements related to consequence of cars in daily life, environments, etc. can alter or affect the growth of cars.
4. The quality of public transportation (comfort, fare, speed, safety, frequency, and reliability, etc.) influences use and car-owning behavior (He and Thøgersen, 2017). Hence, by improving the quality of public transport (as per user expectations) would increase the attractiveness of public transport with respect to car driving.
5. Like other developing countries (ex. China), Indian government should develop and implement transport policies that could potentially discourage use and owning a car without necessity purpose (like for status/image purpose) in order to ensure better sustainable mobility patterns in the future (Gärling and Loukopoulos 2008).
6. Policies that make the acquisition and driving a car more expensive on roads (by increasing toll taxes and fuel prices) would help to decline the growth of cars.

This study is highly relevant for transport planners, policy and decision-makers. The results of this study could be improved by considering larger sample sizes of young adults' across India (as this study only concentrates on the college/university young adults) and by incorporating various variables like age, gender, working employee, job seeker, perception about electric cars, frequency and use of other modes of transportation in the model.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Pearson's correlations among demographic and psychological (n = 813)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. PG	1																	
2. Engg	−0.126	1																
3. Gender	0.007	0.195	1															
4. Age	0.509	−0.040	0.055	1														
5. LWF	0.011	−0.168	−0.154	0.012	1													
6. NMF	−0.032	−0.051	−0.022	−0.101	−0.064	1												
7. NOCF	0.009	−0.078	−0.180	−0.012	0.128	0.040	1											
8. DL	0.117	−0.023	0.146	0.239	0.150	−0.094	0.311	1										
9. UPT	0.046	0.179	0.025	0.016	−0.182	0.001	−0.020	0.044	1									
10. FAC1	−0.128	−0.019	0.046	−0.019	0.035	−0.031	−0.033	−0.117	−0.113	1								
11. FAC2	0.008	0.013	−0.031	0.008	0.012	−0.011	−0.010	−0.106	−0.125	0.285	1							
12. FAC3	0.062	0.031	−0.094	0.030	0.023	−0.109	0.090	0.076	0.028	0.013	0.249	1						
13. FAC4	−0.078	−0.040	0.008	−0.090	0.014	−0.061	−0.012	−0.117	−0.083	0.418	0.287	−0.045	1					
14. FAC5	−0.008	0.037	−0.122	−0.002	0.107	−0.097	0.112	0.063	−0.034	0.094	0.365	0.437	0.205	1				
15. FAC6	0.108	0.028	0.008	0.122	0.041	−0.009	0.043	−0.010	−0.087	0.056	0.532	0.392	0.000	0.356	1			
16. FAC7	0.081	0.060	−0.028	0.090	−0.011	−0.055	0.035	0.058	−0.024	0.076	0.418	0.495	0.068	0.462	0.471	1		
17. FAC8	−0.093	0.047	0.014	−0.082	−0.073	0.016	0.004	−0.029	−0.039	0.248	0.072	0.105	0.229	0.104	−0.039	0.053	1	
18. FAC9	0.147	0.037	0.054	0.061	−0.006	−0.070	−0.066	−0.033	−0.035	−0.150	0.223	0.128	−0.012	0.159	0.265	0.215	−0.148	1

Note: PG = Education Qualification (If qualification ≥ P.G. level = 1, otherwise 0); Engg = Course Pursuing (If course related to Engineering = 1, otherwise 0); Gender = 1 for male & 0 for female; Age = Age of the respondent; LWF = Living with family (yes = 1, otherwise 0); NMF = Number of members in the family; NOCF = Household car ownership (yes = 1, otherwise 0); DL = Possession of Car Driving License (yes = 1, otherwise 0); UPT = Uses of public transport (If, use at least once in a week = 1, at least once in a month = 2, very occasionally = 3, never = 4); FAC1 = Tax and Environmental Sustainability Concern; FAC2 = Comfort; FAC3 = Peer/external influences; FAC4 = General Traffic Concern; FAC5 = Image Conscious; FAC6 = Car Obsessed; FAC7 = Status seeker; FAC8 = Personal Parking and Congestion Concern; FAC9 = Car Passionate.

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Protection of Distribution Feeder Using Stockwell Transform Supported Voltage Features

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***Abstract*— This paper presents a research work focussed on the identification of faults on the distribution feeder supported by Stockwell transform based summing of absolute values and median features using the voltage signals. A fault index is proposed which is obtained by the multiplication of H-index (obtained summation of absolute values S-matrix evaluated by ST supported decomposition of voltage) and VS-index (obtained median of absolute values S-matrix evaluated by ST supported decomposition of voltage). Classification of faults is achieved using decision rules. Investigated faults include phase to ground, fault between two phases, two phases to ground fault and fault involving all three phases and ground. Performance of algorithm is tested on high fault impedance and fault incidence angle. Proposed study is performed using MATLAB software in Simulink environment.**

Keywords*— *Distribution Feeder Fault, Hilbert transform, protection, Stockwell Transform, voltage.

I. INTRODUCTION

Feeders used to transform power from grid substations (GSS) to the consumer ends are normally known as power distribution lines. These are exposed to different various natures of failures which are commonly not expected due to involvement of the random causes. These failures adversely affect the availability as well as reliability of the network. Accurate detection and identification of type of fault on these distribution feeders help to restore the power supply timely and also avoid the severe damage to the power system equipments [1]. Many schemes have been reported in last decades for the recognition of faults to design protection scheme for the radial distribution feeders. Signal processing methods have played a significant role for the identification of the faults. Signal analysis approaches like Wavelet transform (WT), Fourier transform (FT), Short time Fourier transform (STFT), fast Fourier transform (FFT), Stockwell transform (ST), Gabor transform (GT) etc. are reported for identification of faults [2]. Mahela et al. [3], introduced an approach using Stockwell transform for identification of faults on the transmission line in the presence of Thyristor switched capacitor (TSC). An intelligent scheme for identification of HIF on distribution network based on a combination of probabilistic neural network (PNN) and adaptive extended Kalman filter (AEKF) is found in [8]. AEKF is implemented for estimation of separate components of harmonic in HIF as well as no-fault (NF) associated with the current signals in the presence of non-linear loads. These harmonic components have been used utilized for training and testing of PNN which helps for classification of HIF from NF accurately. In [9], authors introduced an approach for location of fault in network of power system based on the processing of voltage signals. Voltage signals are converted into absolute values of phasor of complex valued which indicate travelling waves associated with the faults. This has been processed further for localization of faults using Hilbert–Huang transform (HHT). Results are validated on in mixed feeder for all types of faults including HIF of arcing. In [10], authors presented modelling of HIF on distribution feeder. Proposed model uses resistance of non-linear nature which represents high impedance path in the faulty event. Performance analysis of various parameters which are electric in nature and pertains to the fault of high impedance has been evaluated. In [11], a methodology for detection of HIF in distribution feeder of power network using Mathematical Morphology (MM) is proposed. Current signals are utilized for detection of HIF faults. MM is implemented for extraction of the features (in time domain) and a classification of HIF faults has been achieved using the rule supported algorithm. Data has been collected on network of power distribution utility. Low impedance faults (LIF) and switching transients have been simulated in MATLAB. It is established that proposed method is effective in detection and differentiation of HIF from switching transients. This is achieved is time lesser compared to that utilized by different approaches maintaining high security as well as dependability. Performance of introduced algorithm is independent on location of fault, time of fault inception, and fault type. Following is the main contribution of the paper:-

- An algorithm supported by Stockwell transform using voltage signals for identification of faults on the distribution feeder is proposed.
- Classification of faults is achieved using decision rules.
- Performance of algorithm is tested on high fault impedance and fault incidence angle.

II. PROPOSED DISTRIBUTION TEST SYSTEM

Proposed study related to fault identification and classification associated with distribution feeder is performed with the help of IEEE-13 bus distribution network. IEEE-13

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Information Processing in Extended Hodgkin-Huxley Neuron Model

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***Abstract*— Models of a variety of neurons share the same form as the Hodgkin-Huxley (HH) neuron and evidence suggests that single-compartment models can capture the key properties of in vivo and in vitro neurons. In this paper we are going to discuss about how the conductance of the excitatory and inhibitory synapse vary when the pre synaptic action potential arrived at the synapse and how this synaptic conductance affects the information transfer in the single neuron. In our model the injected current is replaced with the synaptic current in the HH model. In order to validate the impact of excitatory and inhibitory synapse in the generation of action potential, the extended HH model is examined with various synaptic inputs.**

***Index Terms*— HH Model, Mean Firing Rate, Entropy, Synaptic Conductance, Spike Train.**

I. INTRODUCTION

Many models of brain function have been built; they differ in their objectives, requirements and limitations. Based on the questions what, how and why that a model can answer, the models can be classified as conceptual/phenomenological/black box type, mechanistic type/realistic or interpretive type models respectively. Hodgkin & Huxley model is a biological model which is accurately designed to describe and predict the behaviour of the neuron .Izhikevich[6] in his paper reviewed neuro-computational features of various spiking models and ranked the models based upon the neuro-computational behaviour, their implementation efficiency, etc. HH model is the only biological model which finds its way to achieve the complete fit of data which Izhievich have discussed.

II. HODGKIN &HUXLEY MODEL

Intracellular recordings of the neuron state that the action potential is characterized as the sudden increase in the membrane potential (depolarization) followed by a slow sharp decrease towards the resting potential. This may be followed by a fall below the resting potential due to the fall in membrane potential below the resting potential called after hyperpolarisation phase. Hodgkin and Huxley (partly in collaboration with Katz) were the first to describe the active mechanisms quantitatively [5].The final paper of Hodgkin and Huxley [5] shows the complete expression for the three ionic currents. The description of how the membrane potential changes in time is explained in the equation

$$C_m \frac{dV}{dt} = -\bar{g}_{Na} m^3 h(V - E_{Na}) - \bar{g}_K n^4 (V - E_K) - \bar{g}_L (V - E_L) + I_{inj} \quad (1)$$

The HH model is stimulated by the external injected current. Similar to real neuron this model generates repetitive firing and the greater the input current, the faster the firing rate. However the real single neuron firing traces show high variability, for instance, the coefficient of variation in the spike interval (ISI) of neuron firing in response to the stimulus for a period of several seconds is approximately equal to 1 as expected from the Poisson process[4].Furthermore, the neuron receives inputs from several other neurons. The current generated by these neurons may be from the excitatory or from inhibitory, which are approximately balanced to each other [10].To study this behaviour, the original HH model described in the equation 1.1 is extended by adding additional synaptic currents. Simulations based upon applying Poisson distributed excitatory and inhibitory inputs demonstrate that the neuronal firing output shows considerable variability in the ISI. Depolarizing with balanced synaptic current reduces the membrane time constant and also affects the information processing in several aspects[1-2],[7-9].

In this paper the extended HH model is modelled with the network consisting of 1000 excitatory and 200 inhibitory synapses. The excitatory and inhibitory synapses are activated by the spike train generated by a Poisson process of various rates f_{ex},f_{in} respectively [3].The behaviour of the membrane potential is approximated using the conductance-based relationship is now given below by (2).

$$C_m \frac{dV}{dt} = -\bar{g}_{Na} m^3 h(V - E_{Na}) - \bar{g}_K n^4 (V - E_K) - \bar{g}_L (V - E_L) + I_{syn} \quad (2)$$

where, I_{syn} is the synaptic current and the synaptic current is given by (3).

$$I_{syn} = -\bar{g}_{exe}(V - E_{Na}) - \bar{g}_{in}(V - E_K) \quad (3)$$

The time course of synaptic input can de described by a simple decaying exponential function. The synaptic conductance [4], [11] is calculated as given below in (4).

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Convolutional Neural Networks with Transfer Learning for Recognition of COVID-19: A Comparative Study of Different Approaches

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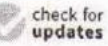

Abstract: To judge the ability of convolutional neural networks (CNNs) to effectively and efficiently transfer image representations learned on the ImageNet dataset to the task of recognizing COVID-19 in this work, we propose and analyze four approaches. For this purpose, we use VGG16, ResNetV2, InceptionResNetV2, DenseNet121, and MobileNetV2 CNN models pre-trained on ImageNet dataset to extract features from X-ray images of COVID and Non-COVID patients. Simulations study performed by us reveal that these pre-trained models have a different level of ability to transfer image representation. We find that in the approaches that we have proposed, if we use either ResNetV2 or DenseNet121 to extract features, then the performance of these approaches to detect COVID-19 is better. One of the important findings of our study is that the use of principal component analysis for feature selection improves efficiency. The approach using the fusion of features outperforms all the other approaches, and with this approach, we could achieve an accuracy of 0.94 for a three-class classification problem. This work will not only be useful for COVID-19 detection but also for any domain with small datasets.

Keywords: convolutional neural networks; transfer learning; K-means clustering; principal component analysis

1. Introduction

COVID-19, a global pandemic, is still spreading in many parts of the world since its identification in late December 2019. In these nine to ten months, this disease has become one of the most significant public health emergencies requiring remedial measures and early diagnosis. In many countries till recently, reverse transcription-polymerase chain reaction (RT-PCR) tests are the most popular diagnostic method for detecting COVID-19. Although popular, this method suffers from limitations in its long wait time and low sensitivity. Therefore, for the early diagnosis of COVID-19, many have started using molecular tests to determine the coronavirus. For example, many existing machines like Genmark's ePlex Respiratory Pathogen instrument or Abbott's ID, etc., have a COVID-19 feature for testing, which takes much less time [1,2]. The other advantage is that the sensitivity of these molecular tests is around 90% better than the RT-PCR method having a sensitivity of about 70%. However, both the RT-PCR method or molecular testing approach need expensive equipment and trained professionals. Further, the availability of these methods is limited in remote areas and low and middle-income

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Convolutional Neural Networks with Transfer Learning for Recognition of COVID-19: A Comparative Study of Different Approaches

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Voltage-Based Hybrid Algorithm Using Parameter Variations and Stockwell Transform for Islanding Detection in Utility Grids

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Abstract: This paper has introduced an algorithm for the identification of islanding events in the remotely located distribution grid with renewable energy (RE) sources using the voltage signals. Voltage signal is processed using Stockwell transform (ST) to compute the median-based islanding recognition factor (MIRF). The rate of change in the root mean square (RMS) voltage is computed by differentiating the RMS voltage with respect to time to compute the voltage rate of change in islanding recognition factor (VRCIRF). The proposed voltage-based islanding recognition factor (IRFV) is computed by multiplying the MIRF and VRCIRF element to element. The islanding event is discriminated from the faulty and operational events using the simple decision rules using the peak magnitude of IRFV by comparing peak magnitude of IRFV with pre-set threshold values. The proposed islanding detection method (IDM) effectively identified the islanding events in the presence of solar energy, wind energy and simultaneous presence of both wind and solar energy at a fast rate in a time period of less than 0.05 cycles compared to the voltage change rate (ROCOV) and frequency change rate (ROCOF) IDM that detects the islanding event in a time period of 0.25 to 0.5 cycles. This IDM provides a minimum non-detection zone (NDZ). This IDM efficiently discriminated the islanding events from the faulty and switching events. The proposed study is performed on an IEEE-13 bus test system interfaced with renewable energy (RE) generators in a MATLAB/Simulink environment. The performance of the proposed IDM is better compared to methods based on the use of ROCOV, ROCOF and discrete wavelet transform (DWT).

Keywords: distribution grid; islanding event; renewable energy; Stockwell transform

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1. Introduction

Renewable energy (RE) provides clean energy to the consumers and reduces transmission losses when integrated to the grid in large quantum near-load centers. The structure of the conventional power network has been modified, and the power network is smarter and more efficient. In addition, problems arise because of grid convergence that urgently needs to be solved. Unintentional islanding is an important problem that can lead to poor quality of power (PQ), frequency instability and a risk to the personal safety of the consumer. Hence, it becomes essential for detecting this scenario accurately and reliably to isolate islanded network immediately [1]. According to the IEEE Std. 1547, the islanding event should be identified within 2 s after it has an incident on the network. The methods of islanding detection (IDMs) are graded into passive IDM, active IDM and hybrid IDM [2]. For identification of the islanding, passive IDMs use under/over voltage, under/over frequency,

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A Fusion-Based Hybrid-Feature Approach for Recognition of Unconstrained Offline Handwritten Hindi Characters

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Abstract: Hindi is the official language of India and used by a large population for several public services like postal, bank, judiciary, and public surveys. Efficient management of these services needs language-based automation. The proposed model addresses the problem of handwritten Hindi character recognition using a machine learning approach. The pre-trained DCNN models namely; InceptionV3-Net, VGG19-Net, and ResNet50 were used for the extraction of salient features from the characters' images. A novel approach of fusion is adopted in the proposed work; the DCNN-based features are fused with the handcrafted features received from Bi-orthogonal discrete wavelet transform. The feature size was reduced by the Principal Component Analysis method. The hybrid features were examined with popular classifiers namely; Multi-Layer Perceptron (MLP) and Support Vector Machine (SVM). The recognition cost was reduced by 84.37%. The model achieved significant scores of precision, recall, and F1-measure—98.78%, 98.67%, and 98.69%—with overall recognition accuracy of 98.73%.

Keywords: Bi-orthogonal; DCNN; DWT; Hindi characters; hybrid-features; fusion; MLP; PCA; SVM; transfer learning

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1. Introduction

The increasing demand for the automation of language-based systems is high due to the associated vast application field. It includes digitalization and preservation of the manuscripts of historic significance, computerized editing of handwritten documents, automatic processing of cheques in the bank, recognition of postal address written on mails, parcels, etc. and their address-wise sorting through computer vision, translation of road safety-instructions written in the local language on roadside boards, computerized recognition of medical-aids as mentioned in handwritten prescription, and many more related applications. The machine-based recognition of handwritten scripts is much more difficult than that of printed ones due to inherent unconditional variation in shape, size, skewness, and degree of connectedness between various characters. Countries like India, China, Saudi Arabia, and the United Arab Emirates are developing automation systems in country-specific languages to serve its advantage to the mass of the people as large populations of these countries have not adopted English as their first language.

Many advancements have been reported for English language-based automation systems due to their global acceptance. Extra attention is needed for systems based on languages like Hindi (Devnagari), Chinese, Urdu, Farsi, etc., as they are in a developing

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Design and Performance Analysis of Hybrid Battery and Ultracapacitor Energy Storage System for Electrical Vehicle Active Power Management

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Abstract: The electrical energy storage system faces numerous obstacles as green energy usage rises. The demand for electric vehicles (EVs) is growing in tandem with the technological advance of EV range on a single charge. To tackle the low-range EV problem, an effective electrical energy storage device is necessary. Traditionally, electric vehicles have been powered by a single source of power, which is insufficient to handle the EV's dynamic demand. As a result, a unique storage medium is necessary to meet the EV load characteristics of high-energy density and high-power density. This EV storage system is made up of two complementing sources: chemical batteries and ultracapacitors/supercapacitors. The benefits of using ultracapacitors in a hybrid energy storage system (HESS) to meet the low-power electric car dynamic load are explored in this study. In this paper, a HESS technique for regulating the active power of low-powered EV simulations was tested in a MATLAB/Simulink environment with various dynamic loading situations. The feature of this design, as noted from the simulation results, is that it efficiently regulates the DC link voltage of an EV with a hybrid source while putting minimal load stress on the battery, resulting in longer battery life, lower costs, and increased vehicle range.

Keywords: electric vehicles; battery; ultracapacitors; energy storage system

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1. Introduction

Electric cars (EVs) are becoming more popular as a result of environmental concerns and rising gasoline prices. When compared to gasoline-based internal combustion engine (ICE) vehicles, EVs have superior fuel economy and adhere to modern world pollution requirements. Standard EVs are available on the market as a power source. It is worth noting that EVs are subjected to a variety of time-varying power needs, such as abrupt acceleration and deceleration (regeneration period). This acceleration and regeneration period is analogous to pulse load changes, and the battery must absorb a huge transient charging current at this time, negatively impacting the battery's performance. A supplementary energy storage technology (ultracapacitor) is occasionally used to mitigate this negative effect on the battery [1].

By incorporating diverse topologies of ultracapacitor connection, the influence of the battery's performance on abrupt charging and draining can be mitigated. An ultracapacitor

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Estimation of Faults in Grid Connected Solar Photovoltaic Farm Using Voltage Based Median and Summing Values Features of Stockwell Transform Based Algorithm

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***Abstract*—Research work under taken in this paper is concentrated to design an algorithm using Stockwell Transform for estimation of faults in grid integrated solar PV farm. An algorithm based on Features such as median and summing absolute values of Stockwell Transform using the voltage signal has been presented in this manuscript. Proposed algorithm can be utilized in protection schemes of the transmission and distribution feeders in the grid integrated solar PV farms. Algorithm has been tested for the estimation of the faults such as phase to ground, phase to phase, two phases to ground and three phases to ground fault on the AC side of the grid. Algorithm is also tested for estimation of faults on the DC bus of the solar PV farms. Study is carried out using MATLAB software.**

***Keywords*—AC grid; DC bus; fault; Solar PV farm; Stockwell Transform.**

I. INTRODUCTION

Power utility network is complex in nature which may be considered as spatial and temporal complexity. This network is also nonlinear and non-stationary in nature which includes many uncertainties at different levels of generation, transmission and distribution of electrical power. Transmission lines are constructed with long distances in different geographical regions having variable nature like deserts, plains and hills. These lines are used to transfer power in bulk quantity from generator station to centres of loads over long distances. Hence, possibility fault occurrence on the transmission lines is very in comparison to other components of the utility power network. Frequently observed faults on the transmission line may be included in the categories such as line to ground (LG) fault, double line (LL) fault, double line to ground (LLG) fault, three phase (LLL) fault, three-phase to ground (LLLG) fault and faults of nature inter circuits [1]. Long distance transmission lines are essential requirement of the electric power utility grid to transfer bulk power over long distances from generators to load centres. This includes multiple sending end generators and the multiple receiving load centres. In recent years the power system network transmission system deployed the high voltage direct current (HVDC), ultra high voltage DC (UHVDC), multi-terminal DC (MTDC) and multi-terminal AC for transmission of bulk power from one point to the other [2]. Power transfer capability of the existing corridors of the transmission lines have been increased by the use of the compensations devices like series and shunt. In addition of power transfer capability of transmission lines, these compensations also help to increase the voltage profile and improve the transient stability of the system. However, presence of renewable power generation creates additional problems related to protection due to the uncertain in nature of RE sources. The issues observed due to deployment of compensation devices include [3] as detailed.

- Sudden change impedance of line at compensation point
- Inversion of current and voltage
- Frequency components other than the power frequency are introduced in voltage and current signals.

When the solar PV farms are integrated with network of distribution part of the power system, protective devices faces change in behaviour due to fact related to flexibility of changes in number of solar PV plant units. Further, these units are spread over the large area and power output of these units may change due to the variation in solar insolation and wind speed. The solar energy source production capacity is low in terms of volume. It has low operational cost compared to the large sized generators and power plants. Also integration of these units to distribution and transmission networks has been gaining interests due to the economic issues associated with the development of the power plants, reduced environmental pollution, increased power generation efficiency, improved quality of power supplied to customers, reduced losses in power network, improved voltage profile, and liberalized network capacity [4].

Time frequency methods play important role on the detection of transmission line faults to design the efficient

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Recognition of Islanding and Operational Events in Power System With Renewable Energy Penetration Using a Stockwell Transform-Based Method

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***Abstract*—Integration of RE sources to the utility grid offers technical and operational challenges causing problems of PQ, stability, identification of operational events, etc. This article presents an algorithm to identify events including islanding, grid integration, and outage of the solar PV and WG plants in grid using a ST. Islanding event may occur in the presence of any kind of plant. Processing of negative sequence component of voltage is performed by utilizing ST based multiresolution analysis at the test node and the output matrix is evaluated. The features (F1–F4), VI and STD indexes are obtained from this matrix. These features are utilized for identifying the events and transient phenomenon. The VI and STD indexes are used to recognize the type of RE source present during the islanding and outage events. Moreover, for recognizing the type of RE source at the time of synchronization event, an SI is proposed. This is computed by the ST depended processing of voltage signals. Performance of the algorithm is found satisfactory for all incidence angles and complete voltage cycle under the noisy conditions of 10 dB SNR. As compared to the time–frequency transform based coefficients of the voltage signal, the proposed technique is found to be superior in terms of small NDZ and low computation time and least affected by noise. Further, the developed technique is also efficient to detect various events stated above and the type of RE source. Study is performed using MATLAB/Simulink software and validated in real time using RTDS.**

***Index Terms*—Grid synchronization event, islanding event, outage event, power system network, renewable energy (RE), Stockwell transform (S-transform), transient phenomenon.**

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NOMENCLATURE

AC	Alternating current.
ACSR	Aluminum conductor steel reinforced.
AI	Artificial intelligence.
ANFIS	Adaptive neuro-fuzzy inference system.
DC	Direct current.
CWT	Continuous wavelet transform.
DFIG	Double fed induction generator.
DG	Distributed generation.
FT	Fourier transform.
HID	Human interface device.
IDI	Islanding detection index.
IEEE	Institute of Electrical and Electronics Engineers.
IID	Island interconnection device.
MGP	Multigene genetic programming.
NDZ	Nondetection zone.
NSC	Negative sequence component.
PHEV	Plug-in hybrid electric vehicle.
PQ	Power quality.
PV	Photovoltaic.
RE	Renewable energy.
RTDS	Real-time digital simulator.
SAM	Sum absolute magnitude.
SAV	Sum absolute values.
SI	Synchronization index.
SNR	Signal to noise ratio.
SPS	System protection schemes.
STD	Standard deviation.
ST	Stockwell transform.
STA	Absolute values matrix of ST-matrix.
STFT	Short time Fourier transform.
SVM	Support vector machine.
VI	Variance index.
WG	Wind generator.
WT	Wavelet transform.
kW	Kilowatt.
kVAr	Kilovolt ampere reactive.
kV	Kilovolt.
MVA	Megavolt ampere.
MW	Megawatt.
Ω	Ohm.

Combined Stockwell and Hilbert Transforms Based Technique for the Detection of Islanding Events in Hybrid Power System

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***Abstract*—This paper presents a technique using hybrid features extracted from current signals using Stockwell and Hilbert Transforms for detecting the islanding events and operational events of renewable energy generators and loads. The study is performed on a hybrid power system test network incorporating wind and solar power generators. Results are computed using MATLAB/Simulink software for a variety of case studies. Through the applied technique islanding events are successfully identified and discriminated from operational events.**

***Keywords*—Hybrid power system; wind energy; Hilbert Transform; solar energy; Stockwell Transform.**

I. INTRODUCTION

Integration of the Renewable Energy (RE) to grid is being continuously increasing due to the requirement of pollution free energy all around the world [1, 2]. However, the use of renewable energy as green energy has imposed many challenges to the utilities in terms of power quality, power system protection; and reliability [3]. This has caused due to the uncertain nature of the renewable power generation. This has also caused unwanted tripping of the power system equipments and generators. Sometimes, this may also disconnect a section of energy network from the rest of the supply network, and this isolated part of the network would operate in an isolated mode and known as islanding operation of the power system operation. In this mode, the load demand is met by the local generators. Islanding takes place when a distributed generation (DG) and connected load are disconnected, and these DG sources supply power to the loads in isolated mode. Islanding poses many challenges for the power system network. The existing standards do not permit the DGs to operate in islanded mode. Hence, there is a need to detect the islanded operation of the power system network and discriminate the same from the other operational events. The operational events with renewable energy (RE) sources sceanrios like outage of RE plants, grid synchronization of RE plants and islanding of test grid also affects quality of the power. Techniques of signal processing have played important roles in the detection of islanding events [4]. However, available techniques use only the single signal processing methods, where the efficiency is quite low [5-10]. The use of combined features of more than two methods may improve the efficiency of islanding detection. In [5], the authors proposed an algorithm for anti-islanding, which is passive in nature and can be used for the inverter, based distributed generation (DG) units as well as synchronous machine supported DG units. At the moment when mismatches between the active power and reactive power approach near to null value, most of the anti-islanding techniques, which are passive in nature, cannot be effective for the detection of the islanding phenomenon with good accuracy. In [6], an algorithm was introduced for the identification of islanding of wind turbine based power system network. Applications of trajectory based on state variables and wavelet transform (WT) have been tested in a micro-grid system. Relays are used for the estimation of variations in the energy state of coefficients of time-frequency transform of signals recorded in two-dimensional space [6]. Performance of relay has been improved with the help of selection of signals supported method and using the correlating islanding as well as non-islanding phenomena [6]. In [7], a method is proposed for the detection of islanding, which inserts sufficient and variable impedance on low voltage part of the grid. Identification of islanding will be affected by intelligent agents inserted in a central switch of the micro-grid. It is converted to a hybrid automatic transfer switch (HATS). HATS agent is effective in identification of operational mode of the micro-grid supported by measuring the local parameters and supervising the grid status. In [8], a detailed comprehensive review on Islanding detection methods is presented aiming to aid the design efforts of islanding identification methods and standards of anti-islanding. In [9], a detailed study is presented, which is related to islanding identification scheme that can be implemented in remote areas for the hybrid power plant based on the wind and solar PV systems. Method has also been implemented based on the solution reached using the classification supported by the currents. The proposed techniques are effective in monitoring

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RESEARCH ARTICLE OPEN ACCESS

Effect of Irradiance on Performance for Poly-Crystalline Photo-voltaic Cell

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Abstract:

In this paper, simulation of 60 Cells Eldora Ultima Silver 1500 V Series by Vikram Solar Panel using Matlab Simulink approach is presented. The method is used to determine the PV & I-V characteristics of proposed module in various conditions especially in different levels of irradiation. In addition, all results from Matlab Simulink are verified with the data sheet of Eldora Ultima Silver 1500 V Series by Vikram Solar Panel.

Keywords — **Solar photovoltaic cell, mathematical model, modeling, PV module, standard test condition (STC), PV characteristic; simulink/matlab.**

I. INTRODUCTION

Studies of polycrystalline silicon are numerous especially through the technical development of characterization methods in order to raise the performance of solar cells made of this material document is a template. The polycrystalline PV cell (solar cell) converts the sunlight into the electrical energy by the photovoltaic effect. Energy from PV modules offers several advantages, such as, requirement of little maintenance and no environmental pollution. The polycrystalline PV module typically consists of a number of PV cells in series. The conventional technique to model a PV cell is to study the p-n junction physics. The polycrystalline PV cell has a non-linear voltage-current (*V-I*) characteristic which can be modelled using current sources, diode(s) and resistors. Single-diode and double-diode models are widely used to simulate PV characteristics. The single-diode model emulates the PV characteristics fairly and accurately. The manufacturer provides information about the electrical characteristics of PV by specifying certain points in its *V-I* characteristics which are called remarkable points.

In this paper, a simplified polycrystalline PV equivalent circuit with a diode (The single-diode model) equivalent as model is proposed. The main contribution of this work is the implementation of a generalized polycrystalline PV model with Matlab/simulation.

II. A MATHEMATICAL MODEL OF PHOTOVOLTAIC MODULE

A solar cell is basically a p-n junction fabricated in a thin wafer of semiconductor. The electromagnetic radiation of solar energy can be directly converted to electricity through photovoltaic effect. Being exposed to the sunlight, photons with energy greater than the band-gap energy of the semiconductor creates some electron-hole pairs proportional to the incident irradiation. The equivalent circuit of a Poly-Crystalline PV Cell is shown in figure 1.This model is known as a single diode model of solar cell. The current source I_{ph} represents the cell photo-current. R_{Sh} and R_S are the intrinsic shunt and series resistances of the cell respectively. Usually the value of R_{Sh} is very large and R_S is very small, hence shunt resistor may be neglected to simplify the analysis. The poly-crystalline PV panel can be modelled mathematically with the equations [(1) to (4)] given below:

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Investigation of Complex Power Quality Disturbances using Discrete Wavelet Transform

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Abstract – *This research work aims to investigate power quality disturbances using discrete wavelet transform technique. MATLAB is used for generation of power quality disturbances using mathematical relations as per IEEE Standard-1159. The investigated power quality disturbances are single stage as well as complex power quality disturbances. These power quality signals are decomposed using discrete wavelet transform with db4 as mother wavelet up to level 4 of decomposition. The plots related to detail coefficients and approximation coefficients are analyzed for detection of PQ disturbances. Power quality disturbance present in the signals are detected and classified using the features of these plots.*

Key Words: **IEEE, Single Stage Power Quality disturbances, Complex power quality disturbance, discrete wavelet transform, power quality.**

1. INTRODUCTION

The considerable changes in a business environment have increased the use of sensitive electronic components, computers, programmable logic controllers, protection and relaying equipments, which have increased the power consumption [1]. The simultaneous occurrence of two or more than two of these disturbances is known as complex power quality disturbance. These disturbances causes the problems such as failure of equipments, short life time of the equipments, malfunction of equipments, instability of the system, reduced efficiency of equipments etc. [2]. Increasing consumer expectation with the requirement of green supply around the globe, where integration of renewable energy sources to the distribution grid is the focus area of smart grid, Electrical Power Systems are expected to deliver power supply continuously at high quality to the consumers. Economy of ant country suffers with huge losses when there are voltage or current abnormalities present in the power delivery. Any deviation / disturbance manifested in the voltage, current and frequency from the standard rating is treated as power quality (PQ) problem that results in failure or malfunctioning of electrical/electronic equipments [3]. Power quality disturbances and resulting problems are due to increasing use of the solid state switching devices, power electronically switched loads, non-linear loads, lighting controls, unbalanced power systems, industrial plant rectifiers and inverters as well as data processing equipments [4]. Therefore, power quality needs to be monitored and improved. The advanced signal processing and Artificial Intelligence techniques are proposed for recognition of Power Quality Disturbances [5]. The mathematical and signal processing techniques have been utilized for the detection and classification of single stage as well as complex PQ disturbances. An approach for the recognition of PQ disturbances in the power system using wavelet transform and radial basis function neural network (RBFNN) has been reported in [6]. Mahela *et al.* [7], presented a comprehensive review of various signal processing and artificial intelligent techniques utilized for the automatic recognition of PQ disturbances as well as effect of noise on the detection and classification of these events. Commonly used PQ detection techniques include Fourier transform, Kalman filter, wavelet transform, S-transform, Hilbert Huang transform, Gabor transforms etc. The artificial intelligent tools used for the classification of PQ disturbances are support vector machine, artificial neural network, expert systems, Fuzzy logic, k-nearest neighbor etc. [8]. One variant of Fourier Transform, the Short Time Fourier Transform (STFT) divides the signal into small segments, where these signal segments can be assumed to be stationary and utilized for detection of PQ disturbance [9].

2. SIGNALS GENERATION OF PQ DISTURBANCES

The single stage power quality disturbances are generated using the mathematical relations reported in [10]. The generated single stage power quality disturbances include pure sine wave, voltage sag, voltage swell, momentary interruption, oscillatory transient, impulsive transient and notch. The discrete wavelet transform based plots of pure sine wave are used as the reference curves for the detection of PQ disturbance present in the signal. Single stage Power Quality Disturbances has been investigated in [11] & [12]. The complex power quality disturbances are generated using the various combinations of the above mentioned single stage PQ disturbances. The generated complex power quality disturbances include (voltage sag + harmonics), (voltage swell + harmonics), (momentary interruption + harmonics), (oscillatory transient + voltage sag), (impulsive transient + voltage sag), (oscillatory transient + voltage sag + harmonics), (impulsive transient + voltage sag + harmonics), and (Oscillatory Transient + Impulsive Transient + Voltage sag + Harmonics). The discrete wavelet transform based

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Analysis of Modelling of Double Diode PV Panel and Effects of Various Parameters and Its Efficiency

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Abstract –*This paper presents P-V characteristics and efficiency of double diode model equivalent circuit for modeling of photovoltaic cell using MATLAB program. The main work of this simulation is to observe effect of variations in solar cell parameters on output power and efficiency. Since simulation with double diode model require extra equations but due to using efficient iterative method it reduced and less equation for faster calculation. This simulation is based on data provided by solar panel manufacturer.*

Key Words: **P-V Characteristics, Double Diode, Irradiation, Temperature, No. of Cells, Ideality Factor, Parasitic Resistance**

1. INTRODUCTION

Today most of the country use fossil fuel to run vehicles, airplanes, and to power houses and industries but this fossil fuel is limited on earth and will get empty in few decades. [1] To extend this time renewable source of energy is available sun is the great example of renewable source of energy for millions of year as long as the life of sun will give energy. [1][2] Solar gives solar energy in abundant amount of energy in the form of light and various energy, some are harmful like UV some are useful like irradiation and sunlight used by plants and irradiation to heat water, cooking and to generate electricity. [2][3]

Due to blackbody effect almost all material absorbs solar radiation for example a red plate absorbs all visible light 250nm to 2500nm wavelength except 700nm which is red colour's wavelength which is reflected. This absorbed energy heat up the surface, this same pheromone is done with irradiation whose wavelength starts from 700 to make electrical energy with solar cell which captures photons which convert to electrons in junction point and semiconductor will try to make balance between electrons and holes which produce potential across terminals. The energy is very dense in radiation as $1.75W/m^2/nm$ for 500nm wavelength however after $1.5W/m^2/nm$ it starts decreasing near to 0.1 for irradiation. Single layer solar cell is not efficient to collect this amount of densed energy, for higher efficiency multilayer solar panel is used. [4][5][6]

PV technology is getting popular among the world due to it generates energy from free source of energy sun and require less maintenance. Electrical power is generated by a plate of semiconductor its same as other diode with p-n junction where electron-holes pair is generated by collision of sunlight (photons) with atom which release electrons and a hole is left behind this imbalance produces potential across terminals. A single solar cell produce 0.5 to 0.7 V and 0.1 to 0.3A current, which means it requires large array to produce required power this further require large area of land which is an drawback of using solar energy the solution is to increase efficiency of absorption of irradiation, this can be achieve by research in photovoltaic technology which is done by simulation of solar cell. [7]

Researchers use simulation software like matlab and spice for solar cell many pv model is available for an ideal pvcell ideal diode model is used with 3 parameter, single diode model with parasitic resistance with 5 parameters and double diode model with 7-8 parameters and three diode model with 9 parameters.[2][6][7]

In this paper double diode is chosen because this model gives higher accuracy for simulation of solar cell, to reduce simulation time 8 parameter is reduced to seven this result in reduction in no. of equations by the help of efficient iterative method and simulation is done on 7 selected parameter (irradiation, temperature, parasitic resistances, and no. of series and parallel cells and ideality factor) for wide observation on P-V characteristics and their effect on performance & efficiency.

2. Equivalent circuit with double diode model

For mathematical expression of solar cell an equivalent electrical circuit is required as shown in fig 1 which is a double diode model with an current source(Iph) which represent current generated by photons, an ideal diode (D1) in parallel to source whose ideality factor is 1, another diode (D2) in parallel with known ideality factor, series and parallel resistance which represent internal resistance of solar cell , Id1 and Id2 is diode leakage current and I is the output current get by removing all losses from Iph. By efficient iterative method ideality factor, series & parallel resistance and saturation current is obtained. [14] The simulation is based on real model data provided by manufacturer of adani eternal series (300wp) whose specifications are shown in Table 1.

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Assessment of impact of relaxation in lockdown and forecast of preparation for combating COVID-19 pandemic in India using Group Method of Data Handling

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ABSTRACT

Ever since the outbreak of novel coronavirus in December 2019, lockdown has been identified as the only effective measure across the world to stop the community spread of this pandemic. India implemented a complete shutdown across the nation from March 25, 2020 as lockdown I and went on to extend it by giving timely partial relaxations in the form of lockdown II, III & IV. This paper statistically analyses the impact of relaxation during Lockdown III and IV on coronavirus disease (COVID) spread in India using the Group Method of Data Handling (GMDH) to forecast the number of active cases using time series analysis and hence the required medical infrastructure for the period of next six months. The Group Method of Data Handling is a novel self organized data mining technique with data driven adaptive learning capability which grasps the auto correlative relations between the samples and gives a high forecasting accuracy irrespective of the length and stochasticity of a time series. The GMDH model has been first validated and standardized by forecasting the number of active and confirmed cases during lockdown III-IV with an accuracy of 2.58% and 2.00% respectively. Thereafter, the number of active cases has been forecasted for the rest of 2020 to predict the impact of lockdown relaxation on spread of COVID-19 and indicate preparatory measures necessary to counter it.

1. Introduction

Human civilizations have been periodically challenged by the onset of infectious diseases. In the realm of infectious diseases, a pandemic is the worst case scenario. The latest one in the series of pandemics has been caused by the family of corona viruses. Corona viruses are pleomorphic, single stranded ribonucleic acid (RNA) viruses. The "novel" coronavirus is a new strain that has not been previously identified in humans. The name derives from the crown like appearance produced by the club shaped projections that stud the viral envelope. The 21st century saw its first pandemic in 2002 as Severe Acute Respiratory Syndrome or SARS followed by Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) [1]. Today the world is fighting another pandemic known as Coronavirus disease 2019 abbreviated as COVID-19. The initial cases of COVID-19 were reported on 8 December 2019 in Wuhan, Hubei province, China. Cases were reported after exposure to the local Hunan South China seafood market that sells a variety of wild animals, suggesting that the zoonotic Coronavirus crossed the barrier from animal to human at this market [2]. The COVID-19 is said to be caused by 2019-nCoV (Novel Coronavirus 2019, 2020) termed by World Health Organization (WHO) or SARS-CoV-2(Severe Acute Respiratory Syndrome Coronavirus 2) as termed by the International Committee on Taxonomy of Viruses. COVID-19 virus is categorized by WHO as β-CoV of group 2B [3]. The genome of this virus is identified and it resembles the SARS-CoV (80% similarity) and MERS-CoV (50% similarity) [4,5]. As of 30/06/2020, the world has registered 1,01,85,374 confirmed cases and 5,03,862 deaths due to COVID-19. With nearly 25% of total cases in world, USA has been the most effected country followed by Brazil, Russia, and India. The first confirmed case of novel coronavirus in India was reported on 30 January 2020, in the state of Kerala. As of today, India has reported 5,66,840 confirmed cases and 16,893 deaths due to COVID-19 [6,7].

The spread of coronavirus is by sneezing, cough droplets and contact. This virus tends to enter the body through the mouth, nose, and eyes [8]. It is speculated that the virus may infect a person at a distance of about 6 ft (1.8 m) radius. The virus can sur-

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Automatic Generation Control for Three Area System Using Improved Bacteria Foraging Optimization Algorithm (IBFOA)

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Abstract— **Simultaneous optimization of certain parameters like Ki, Ri and Bi has been done which grants not only the best dynamic response for the system but also permits us to use quiet larger values of Ri than put into practice. This will help the industries concerning power for simpler as well as cheaper realization of the governor. The performance of IBFOA is also investigated through the convergence characteristics which reveal that that the Bacteria Foraging Algorithm is relatively faster in optimization such that there is drop in the computational load and also minimum use of computer resource utilization.**

Keywords—(IBFOA-Improved Bacteria Foraging Optimization Algorithm)

I. INTRODUCTION

Power systems are very large and complex electrical networks consisting of generation networks, transmission networks and distribution networks along with loads which are being disturbed throughout the network over a large geographical area. The rapid growth of industries has further lead to the increased complexity of the power system. The successful operation of interconnected power system requires the matching of total generation with total demand and associated system losses [1][2]. With time, the operating point of a power system changes, and hence, these systems may experience deviations in nominal system frequency and scheduled power exchanges to other areas, which may yield undesirable effects. In actual power system operations, the load is changing continuously and randomly. The ability of the generation side to track the changing load is limited due to physical/technical consideration, causing imbalance between the actual and scheduled generation quantities. This action leads to a frequency variation. The difference between the actual and the synchronous frequency causes mal operation of sophisticated equipment like power converters by producing harmonics [3].

In the power system, the system load keeps changing from time to time according to the needs of the consumers. Changes in real power affect mainly the system frequency, while reactive power is less sensitive to changes in frequency and is mainly dependant on changes in voltage magnitude. Thus active and reactive powers are controlled separately. The Load Frequency Control (LFC) loop controls the real power & frequency and Automatic Voltage Regulator (AVR) loop regulates reactive power & voltage magnitude. Load frequency control has gained in importance with the growth of interconnected systems and has made the operation of interconnected systems possible [4].

Since, frequency is greatly depends on active power and voltage greatly depends on reactive power, so the control difficulty in the power system may be divided into two parts. One is related to the control of active power along with frequency and the other is related to the control of reactive power along with voltage regulation. The active power control and the frequency control are generally known as the Automatic Load Frequency Control (ALFC) [4].The major objectives of AGC are

- To take care of the required MW power output of a generator matching with the changing load.
- To take care of the appropriate value of exchange of power linking control areas.
- To facilitate control of frequency for larger interconnections.

II. CHARACTERISTICS OF PROPERLY DEGINED POWER SYSTEM

A properly designed power system should respond to the changes in the load smoothly and it should maintain the balance between the powers generated and demanded. Further, the power system should have the following characteristics:

- It should supply power wherever demanded by the costumer.
- It should supply uninterrupted power to the consumer.
- The power system should be capable of meeting the changing load demands.
- The supplied power should be of good quality.
- The power system should supply power at economic rate.
- The necessary safety requirements should be satisfied.

The power delivered must satisfy certain minimal necessities with regard to the quality of supply. The quality of the power system is considered superior if the system frequency is kept around the specified value i. e. 50 Hz and the magnitude of the bus voltage is maintained within the prescribed limits around the normal value. Voltage and

Effect of Solar Radiation on the Thermal Performance of Power Transformer and its Life Estimation

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***Abstract*—With the continuous rise in the load demand at consumer end, the performance of the existing operating electrical machines gets affected. The increasing temperature of earth's surface due to solar radiation is another reason of the rise in the temperature of the electrical machines. Power transformers are one of the electrical machines whose performance is directly affected by its inner and outer temperature values as they are generally installed outdoors. The life of the power transformer reduces gradually with the time and sometimes the severe outdoors surface temperatures may lead to sudden explosions that also obstruct the operation of the other associated machines as well. Therefore, thermal modeling of outdoor power transformers should include the consideration of variation in environmental temperature. This is expected to create an opportunity for the research in this field. This includes developing computational thermal models simulation using appropriate software tools. These models can be employed to evaluate the actual operational age of power transformers by estimating equivalent life at the reference temperature on the basis of the time period of the estimated temperature cycle causing acceleration of aging. This paper presents a MATLAB/ Simulink based thermal model determining temperature in increasing the aging acceleration factor, which has been used for estimation of the loss of life of the transformer. Further, the effect of outdoors surface temperature due to the influence of solar radiation for increasing the loss of life of power transformer has also been studied and verified by using the thermal model. The proposed model has been validated using real time data gathered from the power transformer in operation at 220kV GSS, Jhalamand, Jodhpur.**

Keywords*—*life of power transformers, solar radiation, thermal modeling, aging acceleration factor, loss of life.

I. INTRODUCTION

Power transformers are one of the main electrical machines in any electrical substation whose functioning directly governs the operational efficiency and the economic capability of the power system. The reliability of any electrical substation is directly affected by the performance of the constituent power transformers. Any kind of failure in the power transformer normally occurs due to the failure of inner insulation materials caused by high stress, under abnormal or critical operating conditions. The most challenging problem in every power transformers is heat dissipation. Greater the heat accumulated without being dissipated, lesser is the life of the power transformer. Although, the design concept of the power transformers include a robust cooling arrangement system, still the changing environmental conditions outside the power transformers always affect its thermal performance. The inner temperature of the power transformer is directly affected by its inside as well as outside conditions.

The inside conditions include the increase in the power losses of the windings and the core which rises the temperature of the power transformer drastically. This generally happen due to the increase in the load of the power transformers. The insulating oil circulating inside the power transformer absorbs heat from the interior of transformer windings and core through conduction. This heat must be transferred to the transformer oil by convection and further, from the oil to the cooling medium via a heat exchanger.

The outside surrounding conditions that impact on the heat dissipation process may include natural conditions as well as built in conditions. The natural conditions include the effect of solar radiation, wind, rain, dust, natural landscape and humidity. Likewise, the built in condition includes transformer external layout, sheds, buildings, abstractions and design of enclosures, etc. The IEEE loading guides and IEC standard documents of the oil- immersed power transformers provide no such information regarding the above surrounding effects and their impact on the thermal performance of power transformer. By doing the thorough study of the above mentioned environmental conditions, it was found that all those factors have different level of harshness which affects the safe and reliable operation of the power transformers.

This paper presents a technique for estimating the loss of life of power transformer with the help of computational thermal model and employing it to calculate the accelerated aging. Further, the proposed thermal model is modified by incorporating the effect of solar radiation on the surface of power transformer. The most important factor while determining the accelerated aging is the hot spot temperature (HST), which is a major reason for the loss of life of transformer. The HST of a transformer primarily depends on the ambient temperature, the rise in the top oil temperature (TOT) over the ambient temperature and the rise in the winding HST over the top oil temperature. HST values for different load conditions can be estimated with the help of these thermal models on the basis of the thermal characteristics of the power transformer and the cooling system.

The proposed thermal model has been used to predict the loss of life of a 160MVA power transformer in operation at 220kV GSS, Jhalamand, Jodhpur (Rajasthan, India). After Introduction section, the paper includes four more sections that present the state of art, proposed methodology, MATLAB/ Simulink model, results and discussion.

II. STATE OF ART

The research work in the field of thermal modeling of power transformers is having some commonly accepted procedures that primarily come under either IEEE or IEC guidelines. IEEE Guide for Loading Mineral Oil-Immersed Transformers [1] is applicable to oil- immersed distribution and power transformers, with different types of constructions, along with

3.4.5

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Free vibration analysis of rotating laminated composite plate type blades with variable thickness

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ABSTRACT

The dynamic behaviour of rotating flexible bodies, such as turbine blades/exhaust fan blades are significantly different from those of stationary bodies as centrifugal force come into effect in addition to gravity. Such rotating blades may be modelled as cantilever beam / plate / panel. A finite element formulation for vibration analysis of rotating laminated composite panels is employed in this article; based on the first order shear deformation theory, an accurate relationship between strains and displacements of pre-twisted panels are derived. The governing equations of motion are derived considering centrifugal force. Here studied the effect of rotation speed (ω), setting angle (α), twist angle (ψ), fibre orientation angle (θ) and variable thickness of panels on the vibration behaviour of cantilever composite panels. Also noticed the loci veering and loci crossing phenomena occurs between symmetric and skew-symmetric modes, respectively at different rotation speeds.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Advanced Materials Behavior and Characterization.

1. Introduction

Structural components, such as cantilever panels having variable thickness along span wise / chord wise / both span-chord wise, are used in several applications for example: balconies, bridges, multi-story buildings, radio towers, chimneys, air craft wings, marine hulls to design light weight and more efficient structures. The variable thickness of panels can also modify the resonant frequency. Hence, the vibration analysis of the plates with variable thickness is an important matter of concern for the researchers.

Many researchers analysed the free vibration behaviour of square and rectangular isotropic plates [1–6]; orthotropic and laminated composite plates [7–12] with linearly and parabolically variable thickness using analytical and numerical methods, considering the various combinations of boundary conditions (*SSSS, CSCS, CSSS, SSSF, SCSC, SSCF, SSCC, SSFF, SSCS, CCCC, CCCS, CCCF, SSSC, CSSC, SCCS, CCSS, CCSC, SCCC, CSCC, FSCS, FSFS, FSSS, CSCF, CSSF, CCSF, SCSS*, here *S*-simply supported, *C*-clamped, *F*-free along edge *x*-axis and *y*-axis).

[13,14] investigated the free transverse vibratory response of symmetric and un-symmetric trapezoidal plates of variable thickness using the variational principle of a minimum energy functional and the Ritz method with the *pb*-2 global shape functions, respectively. The vibration characteristic of cantilever plates with linearly variable thickness in one coordinate direction using finite element method based on the classical plate theory [15,16] and first order shear deformation theory [17] has been studied and validated with experimental results. Sakiyama and Huang [18] presented the natural frequencies and mode shapes for thin and moderately thick linearly tapered plates based on an approximate method using the Green function. Shufrin and Eisenberger [19] analysed the free vibrations of rectangular thick plates using both first-order shear deformation theory and higher order shear deformation theory, considering linear and parabolic thickness variations with various (*SSSS, SSFF, CCCC, CFFF* and *CFCF*) combinations of boundary conditions. Manna [20] carried out the free vibration analysis of isotropic rectangular plates with linearly varying thickness in one direction using the first order shear deformation theory considering a higher-order triangular element. The effects of variable thickness and curvature on the vibrations of blades were reported by Lee *et al.* [21] using shallow shell theory. Budak [22] studied the vibration behaviour of shallow cylindrical shells and rectangular plates of varying thickness using a spline-approximation method, and examined the effects of the curvature of the mid-surface on the natural frequencies. Chen and Li [23] used the Rayleigh-Ritz method to study the vibration behaviour of laminated pre-twisted rotating plates. Authors formulated the

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Buckling analysis of folded structures

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ABSTRACT

Stability characteristics of folded structures has been investigated here using finite element based commercial software ANSYS considering shell element. In this communication authors considered the flat panel, I-section, C-section, rectangular or square c-section of structure and analysed the buckling behaviour of these under compression, shear and combination of both with various boundary conditions. The critical buckling load of open and close box structures with mode shapes under various loading conditions (pure compression, shear on two edges, shear on one edge, shear on four edges, pure shear on four edges) is presented here. It is noticed that, stability of various sections is increased with the increase in flange width; whereas critical buckling load of closed box is more than the open box under similar conditions due to the cover plate. Moreover, the post-buckling path of cantilever flat panel and the box structure are given to design the thin-walled structures. Present results will enhance understanding of engineers and researchers on the local buckling characteristics of the built-up members, and will be useful for designers those are working on the built-up sections.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Advanced Materials Behavior and Characterization.

1. Main text

Folded structures and box sections are commonly used in civil, mechanical, automobile, marine and aerospace structures. Hence, the buckling behavior of such thin walled structures, made of flat panels is one of the major concerns in several fields of engineering applications. A few analytical investigations [1–4] on the buckling load of rectangular thin-walled boxes are reported based on the hypothesis of assuming that "joints of assembled plates will offer restraints equivalent to simply supported boundary condition for individual plates". However, [5] studied the limitations of the above assumptions considering the cases of symmetric and unsymmetric buckling modes of individual plates of a rectangular hollow tube. The authors concluded that the critical buckling loads of tubes and simply supported plates are nearly equal only for limiting case of thin plate. Hence, a thorough analysis of assembled plate structure is essential for better understanding of the stability characteristics of such tubes.

Even though a significant amount of research has been devoted to investigate the global bending and buckling behaviors of long tubes using one-dimensional beam theory [6–11]. The buckling analysis of composite thin walled beams, both open and close cross-sectioned with initial stresses was carried out by [6–7] and proposed a theoretical model considering the shear flexibility due to warping and bending and obtaining the equations by Hellinger-Reissner formulation of composite shells. They presented the analytical solutions for simply supported thin-walled beams using the proposed model for the free vibration and buckling analysis of considered structures. [8–9] studied the buckling behavior of thin walled laminated composites box-beams subject to axial loading. They developed a model based on classical lamination theory which was applicable for flexural, torsional and flexural–torsional buckling of thin-walled axially loaded composite box-beam. In order to predict critical loads and buckling modes in case of thin-walled composite bar they developed a displacement based one- dimensional FE model, deriving the governing equations from the principle of the stationary value of total potential energy. [10] developed a general theory based on the semi tangential moments and semi tangential rotations for coupled buckling analysis of thin-walled composite box beams subjected to eccentric constant axial force, end moments and linearly varying axial force. [11] carried out coupled flexural, torsional and buckling analyses of thin walled laminated composite box beams by developing a general analytical model considering structural couplings from material anisotropy and shear deformation effects. They used

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Performance of Different Implicit Time Integration Techniques for Nonlinear Structural Dynamic Analysis

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Abstract: **The efficiency of different implicit time integration techniques for the nonlinear transient dynamic analysis of isotropic and laminated composite plates and panels is examined here by employing a shear deformable finite element method based on first order shear deformation theory. The time integration techniques considered here are (a) Newmark's average acceleration scheme, (b) multi-step trapezoidal rule, (c) energy and momentum conserving two-step and (d) three-step time integration techniques. The numerical dissipation (period elongation and amplitude decay) of the above implicit time integration techniques is compared to the dynamic response (displacement, velocity, acceleration and total energy) of plates and spherical panels with initial perturbation and under sinusoidal step loading.**

Keywords: *Time integration techniques, nonlinear dynamic analysis, period elongation, plates and panels*

1. Introduction

The large amplitude vibration behavior of thin-walled structural components under different dynamic loads is an important problem to be investigated for their effective and safe design. Generally, the equations of motion for the nonlinear forced vibration of structures is discretized in space domain by the finite element method and the nonlinear differential equation is solved in time domain with the specified initial condition to obtain the transient dynamic response of the structure. The direct integration method has the ability to analyze realistic problems and get accurate predictions. For nonlinear transient dynamic analysis, the accuracy of the predictions significantly depends on the adopted time integration scheme.

Different time integration techniques are employed in the literature (Center difference, Houbolt, Wilson- θ method, HHT-α method, WBT-α method and Newmak-β method) for the solution of the nonlinear initial value problem. A general procedure for the solution of nonlinear problems in structural dynamics considering any type of loading is Newmark's time integration method proposed by Newmark [1959]. The Newmark method is the most commonly used methods for solving the nonlinear second order differential equations. Dahlequist [1963] proved that the constant average acceleration method is the most accurate unconditionally stable method. The main disadvantage of the method is that it does not possess numerical damping. Wilson *et al.* [1973] introduced Wilson-Δ method that is based on the basic assumption that the acceleration varies linearly during the time interval t to $t + \theta\Delta t$ where $\theta \leq 1$. Hilber *et al.* [1977] proposed the HHT-α method that is unconditionally stable one-step method by introducing an additional parameter for controlling the damping properties of Newmark's algorithm. Further, Wood *et al.* [1980] introduced WBZ-Δ method by replacing α parameter of HHT-Δ method with Bossak-parameter.

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CFD Analysis in Solar Air Heater for Heat Transfer Enhancement: A Review

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Abstract

The solar strength performs a chief position in contributing closer to the overall boom in sustainable power. For utilising this strength solar Air heaters are used as they may be low value and more generally used collector machines and extensively utilized in lots of programs at low and slight temperatures. Many sun warmers were devised in beyond however the essential issue diagnosed in its miles the lack of thermal strength which did no longer get applied well. that is specially because of a lack of heat transfer the absorber plate's coefficient. With the help of CFD, (Computational Fluid Dynamics), the heat switch fee could be increased by means of incorporating synthetic roughness within the solar heater's absorber plate and their efficacy can be stepped forward through simulations. With growth in temperature of air intake and exhaust by way of addition of absorber plate in duct of air heater advanced temperature levels of sun heaters.

Keywords Solar energy;Solar air heaters,Computational Fluid dyanamics;Absorber plates,Artificial roughness

1. Introduction

The capacity of solar strength is considerable for numerous applications since the centuries, particularly northwest of Rajasthan location easily on hand and substantial. A solar air heater is a specific framework that manages the drying technique and protects the products from dust, rain or insect damage[1]. The consistency of drying products obtained by sun drying is better than that of solar drying [2].sun air heater is an equipment for growing air temperatures using solar powered warmth. it is a form of square conduit encapsulating an absorber, top platform, a returned panel, an enclosed wall below the rear panel, a pitcher cowl over the exposed solar-radiation surface, and a area among the bottom plate and air-pace absorber [3].it's miles indoors surface can be artificially roughened through adding irregularities [4,5]. They can be classified as lively or passive based totally on how sun absorbs and

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CFD Analysis on Solar Air Heater to Enhance the Heat Transfer - A Review

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Abstract
The solar air heaters are extensively brought in use for converting solar energy into thermal energy. There are various applications of these solar air heaters such as process heating, space heating and drying the agriculture products. For enhancing the capability of solar air heater in transferring the heat, powerful computers as well as mathematical model are used to perform "computational fluid dynamics (CFD) simulation". The simulation made from CFD is capable of predicting the transfer of momentum, heat and mass in several processes of fluid flow and heat transfer. This work constitutes of reviews of various researchers made in relation of enhancing the performances of the solar air heater. The presented literature reviews contains both numerical as well as experimental analysis conducted by bringing the Roughness geometries fitted on the flow side of absorber plate in use.
Key Points: CFD, Solar Air Heater, SAH.

I. Introduction

For various applications, solar energy is widely used as it is easy to access and present abundantly in various tropical countries like India. Solar energy is a sustainable form of energy. The weakness of direct drying is overcome by solar drying which helps in eliminating the contaminants such as animals, birds, insects etc. In comparison with the normal convection drying, solar drying is more beneficial as it requires more fluid and energy cost is also high [1]. In comparison with the open sun drying, solar drying is a better option. Some of the benefits of solar drying are it increases the drying temperature and on the other hand it decreases the relative humidity of the products. Solar drying is a very convenient method as it constitutes specialized structure which controls the drying process and also protects the products from damages such as insects, dust and rain. In comparison with the open sun drying, the products obtained from solar drying are of better quality [2], [3].

A. Principle of heat absorption

For heat conversion, the most fundamental process which is nowadays generally brought in use is greenhouse effect. It got its name because it was first brought in application in green house projects. It helps the plants grow better especially at those places where sunlight is not sufficiently available.

The large portion of the solar energy is received from the sunlight which is basically a "shortwave radiation". This radiation when comes in contact with any liquid or solid material, the heat is absorbed by the material and it transforms into heat energy. This increases the temperature of the material and it stores this heat energy. After that, it starts conducting this heat to its surroundings such as liquids, solids or air or conduct it to any material available in contact with it and have a comparatively lower temperature. This type of radiation is termed as "long wave radiation".

The absorption of the visible sunlight at 20°C, on the surface of the ground, will emit IR lights at approximately 10μm wavelength. However, sunlight of shorter wavelength is not absorbed by carbon dioxide.

ARTICLE

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Nonlinear Bending Analysis of Cylindrical Panel under Thermal Load

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Nonlinear;
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Abstract

In this communication, the nonlinear bending behaviour of laminated cylindrical panels in the presence of thermal load has been studied using the finite element-based simulation package ANSYS. The efficacy of present numerical results is compared with published results. Thereafter, the effect of radius-to-span ratio (R/a) on the nonlinear static response of isotropic and laminated panels under thermal load is studied here. Moreover, the nonlinear bending deflection verses x-axis of cylindrical panels at different thermal loads is presented here that will serve as benchmark for future research.

1. Introduction

Curved panels are widely used in defence, automobile, aerospace, civil and other engineering applications. Thus, the strength and flexural stiffness of these thin-wall structures under the thermal environment is very important for engineers and researchers (Thang, Nguyen, and Lee). The generalized differential quadrature numerical method was employed for the nonlinear analysis with thermo-mechanical loads of moderately thick laminated cylindrical panels and considering the variation of thickness for conical panels (Naidu and Sinha). The linear bending behaviour of skew plates has been studied by employing a shear deformable triangular finite element (Yoosefian, Golmakani, and Sadeghian). They studied the effect of thickness ratio and lamination sequence for skew plates. The geometrically nonlinear bending behaviour of composite plates with analytical approach such as Navier type and Levy type techniques has been reviewed by (Madrigal, Navarro, and Chaves). The nonlinear dynamic responses of curved panels have been investigated by employing finite element method with first order shear deformation theory considering Von-Karman's geometric nonlinearity. (Loja, Barbosa, and Soares). The buckling behaviour of isotropic plates under compression and shear has been studied by Qiao, P., & Huo, X. (Qiao and Huo) Analytically investigated the linear buckling of rectangular plates under shear and compression using Rayleigh-Ritz Method (Aghdam and Falahatgar), Kantorovich Method (Yuan and Jin Shufrin, Rabinovitch, and Eisenberger) and numerically by using Finite Strip Method (Smith and Sridharan de Vargas Lisbôa and Marczak). The linear bending results of isotropic plates employing energy method has been by Liew (Saadatpour and Azhari), and investigated the effect of boundary conditions. The static analysis of plates has been performed by using Galerkin Method (Karami, Shahpari, and Malekzadeh Yu and Shen Kumari). Static and Dynamic behaviour of flat panels has been examined by using finite element method with First-Order Shear Deformation Theory (Kumari and Saxena ZHAO, LIU, and LI). The nonlinear bending response of three-dimensional braided laminated cylindrical panels has been investigated using higher-order plate theory with Von-Karman's Geo-

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Analysis of Piston of Internal Combustion Engine under Thermo-mechanical Load

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Abstract

The main objective of this article is to study the thermal and structural performance of piston using finite element based commercial software ANSYS. Piston is modelled using SOLIDWORKS and analysis would be performed through ANSYS workbench. Optimization analysis has been performed considering three different materials such as Grey Cast iron, structural steel and aluminium alloy because these three material have good compression strength and their thermal conductivity and density will different for each one. For the same amount of pressure Aluminium alloy has shown maximum deformation and equivalent strain, where von misses stress value is minimum for it. Whereas, Structural steel and Grey cast iron shows deformation and strain values less than that of Aluminium alloy for same pressure load. Aluminium alloy has highest heat flux and lowest temperature on piston head under thermal load. Piston receives thermal energy generated via combustion and higher heat flux ensures quick cooling of component by quick drainage of thermal energy. Grey cast iron and Structural steel has half of the value of heat flux to that of Aluminium alloy. Therefore, Aluminium alloy is the preferable material for the design of automobile piston among the given three materials.

Keywords: Internal Combustion Engine, Piston, ANSYS, FEA, Load Analysis

1. Introduction

Single-slider crank mechanism is a four linkage simple slider mechanism that is used in internal combustion engines. An internal combustion engine consists of cylinder, piston, crankshaft, piston rings, inlet & exhaust valves, and connecting rod. The component of IC engine which is exposed to combustion is piston. The main aim of automobile manufacturers and researchers has been to modify engine's performance and maximize its power output for limited fuel consumption. Piston is the main component of whole engine assembly. Various researches and modifications have been done throughout the decades to reduce wear and tears, to resist high pressure, maintain temperature generated during combustion and to increase overall lifecycle of piston and its components. In the engine cylinder, during power stroke piston experiences extreme temperatures. Piston also undergoes cyclic gas pressure and inertial forces due to reciprocation. Under these thermal and mechanical stresses piston may fail. Since, this thermal and mechanical stress depends upon the properties of piston materials. So, the material preferred for the piston, cylinder, piston rings, and other related parts of an internal engine must have high thermal conductivity, high wear and tear strength. Due to the versatile nature, castability and mechanical properties of magnesium and aluminium alloys have several applications for example automotive and aerospace industries [1]

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A review on the Social Media in Healthcare

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Abstract:

Now days social media is a main platformfor healthcare providers and consular to communicate with patients and resolve their health-related issues. Itis providing a platform to discuss health-related problemsusing computer-based technology, that facilitate to medical professionals for shar their ideas, thoughts, documents, audios, videos, photos, x-rays and massages. Electronic communication is a form,which is used to create online communications. Social media also providesa platform to share personal experience (patients-to-patients), asking questions and answers (professionals-to-patients), etc. Professionals and patients engage with each other through computer, tablet, smartphone via social media,web-based software / web applications. Healthcare professionals use social media to promote their services for the betterment of their patients,but the utilization of social media in the right direction is really a difficult task.Healthcare providers should give useful information consistently and respond to their queries to harvest healthcare benefits for their patients. The aim of this article is to provide an overview of the extant literature on the effects of social media: use for health-relatedissues of patients and their relationship with healthcare professionals. In this article, reviewed the bright and dark side of the social media in the healthcare field that will help in patient empowerment.

Keywords:bright side, healthcare management, online health communities, professional networking, Facebook, Twitter, YouTube, Web 2.0.

1. Introduction

Several social media tools and web applications are available for healthcare professionals, for example,social networking sites, blogs, microblogs, wikis, YouTube, Instagram, WhatsApp, google plus, LinkedIn, zoom, media sharing sites, virtual life,and virtual reality gaming environments[1]. The popularity of social media has increased drastically in medical, technical and engineering applications. These tools may be used to

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GINAL ARTICLE

Design of a Stephenson III six-bar path generating mechanism for index finger rehabilitation device using nature-inspired algorithms

Debaditya Chakraborty[1] · Ayush Rathi[1] · Ramanpreet Singh[1] · Vimal Kumar Pathak[1] · Kailash Chaudhary[2] · Himanshu Chaudhary[3]

Received: 24 April 2021 / Accepted: 8 July 2021 / Published online: 22 July 2021

Abstract
The paper presents a new mechanism for an index finger rehabilitation device. The mechanism was designed based on a pre-specified trajectory obtained by performing flexion/extension experimental trials with index finger. These experiments were performed 30 times and mean of the normalized trajectory was extracted. From this trajectory, six precision points were selected and based on the obtained trajectory, a path generating optimization problem was formulated to imitate the flexion/extension. Besides, rectification constraints were posed to avoid defects that typically encounter during synthesis. The formulated nonlinear optimization problem was solved using nature-inspired and metaphor-less algorithms. It is found that the summed error between the desired and generated trajectories was very less in case of nature-inspired algorithm in comparison with metaphor-less algorithm. Then, all rectification constraints were validated. It is found that obtained mechanism is completely defect-free and is able to imitate the desired flexion/extension trajectory. Therefore, design obtained using nature-inspired algorithm may prove to be beneficial for the patients with dysfunction index finger.

Keywords Mechanism synthesis · TLBO · BWP · Nature-inspired algorithm · Finger rehabilitation

1 Introduction

Injuries and various other kind of diseases such as stroke, motor disorders, and meningitis can cause loss or impairment of motor function in hands, which includes stroke, injury, cerebral palsy, multiple sclerosis, etc. These diseases leave the people impaired and devoid of a normal life. The neural impairment also causes difficulty in movements required in performing routine activities. Neurological disorders have become a major causes of death and disability worldwide, most number of cases of neurological disorders includes stroke (42·2%), migraine (16·3%), Alzheimer's and other dementias (10·4%), and meningitis (7·9%) [1]. Approximately, 150 billion dollars are spent in the USA every year on nerve injuries [2].

Moreover, it has been observed that function of arm is acutely impaired in a large number of patients affected with stroke [3–5]. The deficits are persistently prevalent in the distal upper phalanges of the finger. In fact, extension of finger is the function which is mostly impaired in a stoke patient [6]. Therefore, in the case of stroke patients, it is important to undergo rehabilitation postoperation to regain

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STUDY ON EFFECTIVENESS OF CLOUD COMPUTING IN IMPROVING THE PERFORMANCE OF MANUFACTURING INDUSTRIES

Pankaj Sankhla
Dr. Kailash Chaudhary

Abstract

For the past few years, Cloud Manufacturing (CM) as a new manufacturing paradigm has accomplishing a huge amount of attention worldwide. Currently, many articles and review papers on Cloud Manufacturing are being published to speed up the research and to identify future trends. It is an emerging customer centric and service-oriented model to solve existing problems in traditional manufacturing. The aim of CM is to deliver and share ubiquitous on demand manufacturing service to consumers over internet which will enhance overall efficiency, reduce product cost, and allow for optimal resources. This is an innovative and web-based new paradigm which uses core information technology such as Cloud Computing, IOT, virtualization, radio frequency identification and service-oriented technology to solve complex manufacturing problems. However, the industry adoption of CM is still limited. The objective of this paper is to present fundamental concept model, participants, and architecture of Cloud Manufacturing. The paper also focuses on status of CM, benefits of implementation its model in industry and the future developments trends in manufacturing sector.

Keywords: Sustainable manufacturing, cloud computing, cyber-physical system, cloud manufacturing

I. INTRODUCTION

Cloud computing plays a pivotal role in the development of the global and sustainable manufacturing systems. Using cloud computing, product manufacturers and consumers interact with each other which helps in highly efficient rapid product development in minimum cost. A design and manufacturing cloud consists of collection of interconnected physical and virtual service pools of resources. Manufacturing industry professional need to know the characteristics of cloud computing-based manufacturing technology and its advantages as against the traditional manufacturing methods. The Internet- and web-based service-oriented system for machine availability monitoring and process planning is critical for sustainable manufacturing. This study discusses cloud manufacturing related research and development activities being carried out all over the world. It also presents the major challenges of developing and utilizing cloud computing technologies for manufacturing systems and services.

Manufacturing industry has always been a pillar industry of developed economics. To enhance national wealth and power reach nations are creating a high-quality manufacturing sector. As there is an increase in competitive pressure, rapid technology development and globalization, modern manufacturing requires a flexible and dynamic management. The traditional business models cannot sustain successful innovation because the old conventional ways of organizing work and services do not meet the level of agility, creativity and connectivity that companies require so that they can remain competitive in today's environment [1]. Hence, there is a need of adequate manufacturing approach, which addresses the issues and fulfills the current market demands and requirements. This gives birth to the concept of *Cloud Manufacturing.*

Cloud Manufacturing (CMfg) is a new manufacturing business model which is service oriented to share manufacturing capabilities and resources on a cloud platform. It merges the current informatized manufacturing technology and new information technology which transforms manufacturing resources and capabilities into manufacturing services. It builds a manufacturing service pool. CMfg is a platform where consumers can request services including product design, manufacturing, testing, management, and all other stages of a product lifecycle. Using this method, we can use the most sustainable and robust manufacturing route which results in customer centric supply chains. Modern technologies such as Cloud Computing, Service oriented Internet of Things (IOT), Virtualization, Radio Frequency Identification, Semantic web, and advanced high-performance computing technologies play a key role in CMfg. Customers could access the resources as services and manufacture their products. In this manner, they could use the distributed heterogeneous manufacturing resources for simple and complex tasks in supply chains. CMfg provides high quality, reliable and secure, relatively cheap and on demand manufacturing services to the users.

National Institute of Standards and Technology (NIST) defined Cloud Computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction [35]. This short description is intended to serve as a means for broad comparisons of cloud services and deployment strategies while providing a baseline for discussion on the overall best uses for CC technology. The main factor which is restricting many industries to adopt CC technology is the security of their data for which they are mainly dependent on cloud service providers. Nevertheless, the main factor in favor of CC technology is that professionals get familiar quickly with its use as they are using IT extensively nowadays. Researchers

Computational and Experimental Methods to Investigate Fracture Behavior of Functionally Graded Material Structures—A Critical Review

Recent Advances in Smart Manufacturing and Materials pp 115-127 | Cite as

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Conference paper
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Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

Functionally gradient materials (FGM) are one of the most widely used advanced materials because of their adaptability to different situations by changing the material constituents. In recent decades, the crack problems of FGMs have attracted a significant amount of attention. This paper presents a comprehensive review of developments, applications, mathematical idealizations, computational and experimental methods, and solutions that are adopted for the analysis of FGMs. In spite of the variety of methods used to date of analysis of fracture behavior of FGMs, several common themes have emerged. Many of these works provide a fundamental understanding of the basic fracture behavior of the material. An attempt has been made to classify various numerical methods used for the crack and fatigue analyses of FGMs. Finally, some vital suggestions for future scope of research in the area of FGMs are presented. It is hoped that this review paper will serve the interests of all the academicians, researchers, and engineers involved in the analysis and design of FGMs.

Keywords

Fracture Crack Numerical FEM Experimental

References

Analysis of Load Capacity of Functionally Graded Material Structures

International Conference on Advances in Materials Processing & Manufacturing Applications

iCADMA 2020: Advances in Materials Processing and Manufacturing Applications pp 197-206 | Cite as

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Abstract

Functionally graded materials are made up of predefined combination of ceramic and metals. The functionally graded materials (FGM) have been developed as high temperature-resistant and heat-resistant materials in space engineering and nuclear engineering. The FGM exhibits the resultant properties of ceramics and metal. The ceramics are involved for resistance in a high-temperature environment, while the metal contributes toward fracture toughness. The variation in strength and other properties may arise from geometry and other variable material properties like density. The studies related to energy-absorbing configurations in consideration with graded properties are of a great interest these days in research areas. These structural elements having graded properties have application in areas like vehicles, ships, safety devices and other load carrying members. The idea behind the functionally graded materials (FGM) is to have variable properties in a dimension following a particular law. The main objective of this paper is to understand the load capacity variations of such materials when graded in terms of different parameters such as diameter and thickness. In this research paper, a study is conducted on a FGM tapered frustum structure to identify the exact variation in the load capacities of such members when graded in terms of diameter, thickness, endurance strength, etc., in accordance with the empirical relations, the study on which has been previously conducted, to make it useful for designing of such members.

Keywords

Dimensional Tolerance Analysis of Mechanical Assemblies with Symmetric and Asymmetric Tolerances

Ravikant Mordia, A. K. Verma, and Deepak Verma

Abstract Geometric and dimensional tolerances are the key factors for the proper assembly of the parts, their manufacturability, and design functions. Hence, these need proper evaluation. This paper presents automatic tolerance analysis of the dimensional tolerances by using modified worst-case and root sum square (statistical) methods. This helps in reducing production and assembly time, error and human interaction, leading to lower manufacturing cost. In contrast to the original worst case and root sum square methods which consider only symmetric tolerances without sensitivity, the modified methods can handle the asymmetric tolerances and also consider sensitivity. The influences of the lower and upper tolerance bounds of the manufactured dimensions on the assembly lower and upper bounds are shown in the form of percentage contributions on graphs in the modified models. In the modified models, linear and nonlinear problems are defined by using the Taylor series expansion which is implemented in the MATLAB. Finally, a perspective overview for future research of automatic tolerance analysis for the other problems is presented.

Keywords Dimensional tolerance analysis · Worst-case and statistical methods · Linear and nonlinear variables · Symmetric and asymmetric tolerances · Upper tolerance limit and lower tolerance limit · Percentage contribution

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IHMTC2021-618

Numerical investigation on melting and heat transfer characteristics of phase change material in a parallelogram enclosure

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ABSTRACT

In this paper, two-dimensional numerical simulations have been carried out in ANSYS Fluent to understand the melting and heat transfer characteristics of phase change material (PCM) kept inside parallelogram shaped enclosure. The results include evolution of solid liquid interface, melt fraction variation with time, averaged PCM temperature, averaged solid PCM temperature, averaged liquid PCM temperature, sensible heat absorbed, latent heat absorbed, total heat absorbed, variation of surface averaged Nusselt number, and time variation of maximum liquid velocity etc. The results are compared with the results of rectangular shaped enclosure. The results indicate that total time for complete melting of the PCM for parallelogram enclosure is considerably less as compared to that for rectangular enclosure. This can be attributed to enhanced strength of gravity assisted natural convection currents in liquid PCM as evident by increase in maximum velocity of liquid PCM in parallelogram enclosure. Higher value of Nusselt number for parallelogram enclosure depicts an enhanced heat transfer. The results so obtained will be useful in understanding the influence of geometry on passive manipulation of melting and heat transfer characteristics of PCM for thermal storage and thermal management applications.

Keywords: Phase change material, Melting, Parallelogram enclosure, Natural convection, Heat transfer enhancement.

1. INTRODUCTION

Melting and heat transfer characteristics of phase change materials are useful in engineering applications such as thermal energy storage and temperature management systems. Phase change materials are currently being attempted in temperature regulation of building walls, temperature management of solar photovoltaic panels (PV), thermal management of batteries to avoid overheating, as thermal energy storage units, as heat sinks in electronic devices, and in heat exchangers etc. Due to its practical significance, melting of phase change materials has motivated researchers to investigate melting and heat transfer characteristics through experimental as well as computational approaches. The melting of PCM inside rectangular containers is well documented and forms basis of research inside other shaped containers. It is revealed from past studies that inclination of rectangular containers affects the melting behaviour of phase change materials. A parallelogram shaped container can be fabricated by providing inclination to the upper and lower sides of a rectangular shaped container. However, detailed study on melting and heat transfer behaviour on parallelogram shaped containers is not available in literature. A parallelogram shaped container can be regarded as a basic form because it can be altered into rectangular or trapezoid shaped containers by changing the inclination of top and bottom sides of the container. Therefore, melting behaviour can be passively manipulated significantly by changing the shape of the container for the same amount of PCM inside the container.

2. LITERATURE REVIEW AND OBJECTIVE

Previous investigations involving melting and heat transfer characteristics of phase change materials in rectangular enclosure include both experimental works and numerical simulations. In these studies phase change material was filled inside a rectangular enclosure and one wall of the enclosure was heated while other walls were insulated. Two boundary conditions of the heated wall i.e. constant heat flux [6] and constant wall temperature [1, 10] were studied. Results were presented in the form of time progression of solid liquid interface, time variation of melt fraction, temperature distribution in PCM, energy absorbed by PCM and Nusselt number. Several researchers have studied the effect of inclination of enclosure on melting behavior of PCM. Various angles of inclination including horizontal and vertical orientation of container were studied. For inclined containers, heating was either provided from lower side wall [2, 4] or from upper side wall [5]. It is revealed that inclination of rectangular containers has significant effect on the natural convection in melted PCM which affects the melting behaviour of PCM. Low thermal conductivity of phase change materials affects the rates of heat transfer in the PCM and results in low melting and solidification rates. Therefore, use of high conductive metallic internal fins has been studied to improve melting rate of PCM. Results for both cases i.e. attaching fins on heated wall [3] or on back side wall [11] were studied. In literature a few studies involving melting characteristics of PCM in non-rectangular enclosures [7, 8] are also attempted. The review of literature reveals that melting behavior of PCM inside rectangular containers is mostly studied as function of inclination of container and fin attachement. However no detailed study on melting and heat

Pradeep Kumar

Springer Link

Suppliers Selection Using Fuzzy AHP and Fuzzy TOPSIS Method—A Case Study of a Bearing Manufacturing Company

Communication and Intelligent Systems pp 275-288 | Cite as

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Conference paper
First Online: 29 June 2021

Part of the Lecture Notes in Networks and Systems book series (LNNS, volume 204)

Abstract

Supplier selection is one of the most important activities of an industry. The goal of present paper is to exhibit key elements of supplier selection and ranking of potential suppliers. A bearing manufacturing company was considering two criteria of suppliers selection, i.e., quality rating and service rating. In the current paper, six criteria have been considered instead of two for improving the supplier's selection process which are product quality, product cost, location, delivery time, information system and service rating. First of all, the key factors involved in supplier selection have been identified, a survey has been conducted for data collection from purchase department in the company. Fuzzy AHP method and fuzzy TOPSIS method are used to calculate the criteria weights for the suppliers' selection and to determine the ranking of the suppliers. The contribution of this study is to give improved suppliers' selection process to the company.

Keywords

Fuzzy AHP Suppliers Selection

Notes

https://link.springer.com/chapter/10.1007/978-981-16-1089-9_23

Springer Link

Risk Management for e-Commerce Supply Chain Network Using Robust Optimization Approach: A Case Study

Recent Advances in Manufacturing, Automation, Design and Energy Technologies pp 35-46 | Cite as

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Conference paper
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Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

Supply chain (SC) encompasses all events involved in the transformation of goods from the raw material stage to the final stage, i.e., when the goods and services reach the end client. A supply chain comprises of flow of materials, information, funds, and services from suppliers, factories, distribution centers to the end clients. Decisions regarding facility locations, supply chain planning, and logistics should be made cautiously in order to establish robust supply chain. This work is an effort to provide the firms with the models so as to help the managers to take strategic level decisions under uncertainty. A close loop supply chain (CLSC) network design that consists of forward and reverse flow is carried out. The robust optimization (RO) based modeling with both direct shipping of the products and shipping through distribution center under demand uncertainty is proposed and analyzed. The results are presented for supply chain planning strategies for an e-supply chain of case company (furniture manufacturing firm). The objective function value for robust model increases for an increase in uncertainty level. This increase in the objective function value for robust model is because of meeting the customers demand in worst case. for the case company, it was observed that for uncertain parameters (demand = 0.8), opening of total 9 MF and 4 DC can accommodate the worst case of network design. The computational results indicate that robust model is better than the deterministic one for uncertain parameters.

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Layout improvement of railway workshop using systematic layout planning (SLP) – A case study

Shubham Khariwal, Pradeep Kumar, Manish Bhandari

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Abstract

Railways workshop is responsible for periodic overhauling of coaching stock and serves as a base for manufacturing, repairing and supply parts to Sheds/Depots. With increasing demand for rolling stock, workshop needs to increase its potential in maintenance and effectiveness to satisfy the demand of passengers. At the same time, the maintenance process needs to be equipped with the ability to have lower cost with higher effectiveness. Plant layout is one of the most effective ways to reduce the cost of maintenance for the improvement in productivity. It also increases good workflow in the production route. This Paper describes existing workshop layout, coach flow analysis that will include areas and distances among different shops. After studying the present layout, it has been found that there is scope of reduction in time delay in maintenance. Problems of movement of coaches in a long line, interrupted flow and useless area of the plant are existing. Considering these problems, Systematic layout planning (SLP) is the best method to improve workshop layout, which shows step-by-step improvement in layout and evaluation of layout. This method suggests a new workshop layout that improves the flow among the shops and helps to decrease movement in the workshop.

Keywords

Plant layout; Cycle time; Haulage

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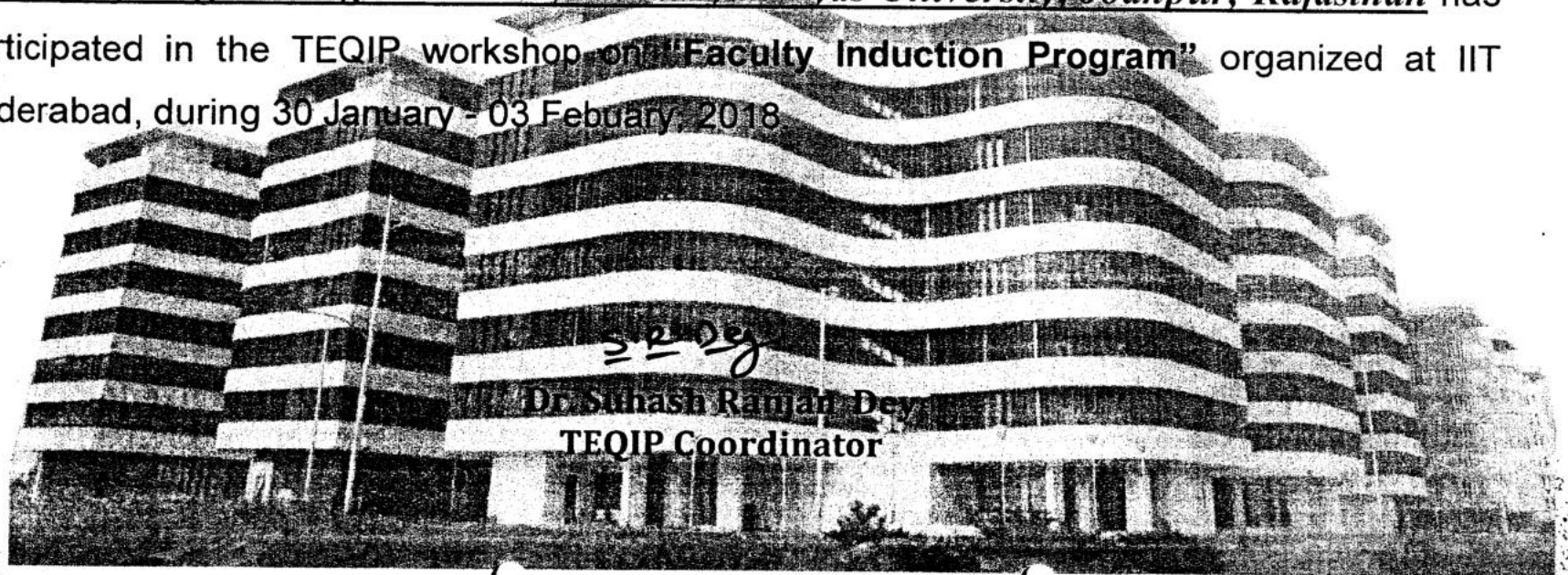

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AN EFFICIENT COLOR-BASED OBJECT DETECTION AND TRACKING IN VIDEOS

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ABSTRACT:

In this paper, a new efficient color based object detection and tracking of a moving object in a video is discussed, which is based on a new formula, proposed by the author, to convert an RGB image into an intensity image. The proposed formula has a great discriminating ability to highlight a shade of a particular primary color in an image and suppress all other colors. This discriminating ability is used to detect an object of any primary color shade very efficiently as it eliminates many additional processing steps, such as segmentation, histogram matching, etc, used in previously reported color based trackers. In future, the proposed concepts will be extended to track objects of any color.

[1] INTRODUCTION

Detecting and tracking moving objects in videos and reconstructing trajectories are an active research area of computer vision [1]. The ability to detect and track objects in videos helps a machine to simulate the basic abilities of biological systems, such as the abilities to understand scenes, detect objects (static or moving), understand surrounding, recognize events, analyze crowd, count people, detect people and vehicles detection, etc. Object detection refers to finding an object of some interest in a scene, for example detecting people, vehicles, etc. in a scene. Object tracking refers to estimate the trajectory of a moving object in a scene, for example, tracking the trajectory of a moving car to find lane violation. For object detection and tracking,

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29th Annual Conference of Rajasthan Ganita Parishad, held at Jodhpur Institute of Engineering & Technology, Jodhpur.

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Prof. (Dr.) K.R. Chowdhary
Campus Director - JIET

Prof. (Dr.) A.M. Khan
Convener

Mr. Ashutosh Vyas
Convener

National Conference On
"New Advances in Theoretical Computer Science,
Algorithms, and Mathematical Modeling"
&
29th Annual Conference of Rajasthan Ganita Parishad

TCSMM-18

27-28 April, 2018

This is to certify that ~~Mr.~~/Ms./~~Dr.~~ /~~Prof.~~ RACHNA VERMA has attended/contributed /presented research paper titled 3D TRAJECTORY RECONSTRUCTION OF A MOVING OBJECT BASED ON STEREO VISION.

at the National Conference on "**New Advances in Theoretical Computer Science, Algorithms, and Mathematical Modeling**" & **29th Annual Conference of Rajasthan Ganita Parishad**, held at Jodhpur Institute of Engineering & Technology, Jodhpur.

Er. Navneet Agarwal
Director General - JGI

Prof. (Dr.) K.R. Chowdhary
Campus Director - JIET

Prof. (Dr.) A.M. Khan
Convener

Mr. Ashutosh Vyas
Convener

IITER

CERTIFICATE

OF PARTICIPATION

International Conference on Recent Innovations in Computer Science and Information Technology (ICRICSIT-18)

02nd September 2018,Jodhpur

This is to certify that ..... **Shrwan Ram** .....

of.....*MBM Engineering College, Jai Narian Vyas University, Jodhpur*.....has done his/her excellence in presenting the research paper titled..." *Query Performance Analysis on Hadoop over Cloud Architecture* "

.....

on 02nd September 2018 at Jodhpur.

INTERNATIONAL INSTITUTE FOR TECHNOLOGY EDUCATION AND RESEARCH ★ IITER

Mr.Kumar
Secretary

Dr.P.C.Srikanth
Convener

Conference Info

Reference No.: CHD863

Academic Science

DIIF

Certificate of Publication

This is to certify that

Shrwan Ram

MBM engineering college, Jodhpur, India

Published a paper in

JETIR, September 2018, Volume 5, Issue 9, www.jetir.org (ISSN-2349-5162)

Titled as

"Object detection and classification through deep learning approaches"

UGC Approved Journal

Dr K. Agarwal
Editor, Academic Science

Conference Info

Academic Science

Reference No.: CHD863

DIIF

Certificate of Presentation

2ND INTERNATIONAL CONFERENCE ON SCIENCE, TECHNOLOGY & MANAGEMENT

Venue : Indian Council of Social Science Research, North West Regional Center, Punjab University Campus, Chandigarh, India on 16th September 2018

This is to certify that

Shrwan Ram

MBM engineering college, Jodhpur, India

Presented a paper Titled as

"Object detection and classification through deep learning approaches"

in the conference organized by Conference Info in association with Academic Science at Indian Council of Social Science Research, North West Regional Center, Punjab University Campus, Chandigarh, India on 16th September 2018

ICSTM-2018

Dr. K. Agarwal
Convener, ConferenceInfo

CENTER FOR Global Management
CALIFORNIA STATE UNIVERSITY, SAN BERNARDINO

ELSEVIER SSRN Tomorrow's Research Today

SURESH GYAN VIHAR UNIVERSITY
Accredited by NAAC with 'A' Grade

4th International Conference on
Cyber Security - (ICCS) 2018
October 26-27, 2018

This is to certify that

Dr/Mr/Ms Simran Choudhary

from MBM Engineering College, JNVU *has successfully presented Paper, titled*

Efficient Implementation & Analysis of Ring-LWE Quantum-Secure Key Exchange Protoc

on 4th International conference on Cyber Security - (ICCS) 2018, held on October 26 - 27, 2018 at Centre for Cloud Computing and Security, Suresh Gyan Vihar University, Jaipur, India.

Director, CCIS, SGVU

Conference Info

ICRTESM-2018

Reference No.: OUCIP537B

3rd International Conference on Research Trends in Engineering, Applied Science and Management

Venue : Osmania University Centre for International Programmes, Osmania University Campus, Hyderabad, Telangana, India on 4th November 2018

Certificate of Presentation

This is to certify that

Shrwan Ram

Department of CSE, MBM Engineering College, Jai Narian Vyas University Jodhpur, India

Presented a paper Titled as

"Query Execution Performance Analysis of Hive and Pig in Cloud Architecture"

in the conference organized by Conference Info in association with Academic Science at Osmania University Centre for International Programmes, Osmania University Campus, Hyderabad, Telangana, India on 4th November 2018

Academic Science

DIIF

Dr. K. Agarwal
Convener, ConferenceInfo

Conference Info

Reference No.: OUCIP537B

Academic Science

DIIF

Certificate of Publication

This is to certify that

Shrwan Ram

Department of CSE, MBM Engineering College, Jai Narian Vyas University Jodhpur, India

Published a paper in

IJMTE, Volume 8, Issue XI, November/2018 (ISSN NO : 2249-7455)

Titled as

"Query Execution Performance Analysis of Hive and Pig in Cloud Architecture"

Approved Journal

Dr K. Agarwal
Editor, Academic Science

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT & GRAMOTHAN, JAIPUR

International Conference
on
Emerging Technologies In Computer Engineering

"Microservices In Big Data Analytics"

ICETCE-2019

This is to certify that Prof./Dr./Mr./Ms. Rachna Verma has Participated/Presented from MBM Engineering College, Jodhpur a paper entitled on 3D Trajectory Reconstruction using Color-based Optical Flow & Stereo Vision. in the ICETCE'19 held at SKIT Jaipur during February 01-02, 2019.

Shri Jaipal Meel
Director (SKIT)

Prof.(Dr.) Anil Chaudhary
Conference Chair

Prof.(Dr.) C.M. Choudhary
Organizing Chair

Dr. Basant Agarwal
Program Chair

Technically Sponsored By

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Sponsored By
Department Of Science & Technology

M.B.M. ENGINEERING COLLEGE, JODHPUR
INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

TEQIP-III SPONSORED

MOODLE TRAINING WORKSHOP FOR TEACHERS

CERTIFICATE OF PARTICIPATION

This is to certify that **Dr. Rachna Verma** *from M.B.M. Engineering College, Jodhpur has participated in 3-day "Moodle Training Workshop for Teachers" during 19-21 February, 2019 under the aegis of TEQIP-III, MBM Engineering College, Jodhpur and TEQIP-III KITE, IIT Bombay.*

Mr. Abhisek Gour	Dr. Kailash Chaudhary	Prof. Sunil K. Parihar	Prof. Vikram M. Gadre	Prof. Sachin C. Patwardhan
Course Coordinator	Course Coordinator	Coordinator, TEQIP III, MBM	Coordinator, KITE, IITB	Co-Coordinator, KITE, IITB

M.B.M. ENGINEERING COLLEGE, JODHPUR
INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

TEQIP-III SPONSORED

MOODLE TRAINING WORKSHOP FOR TEACHERS

CERTIFICATE OF PARTICIPATION

This is to certify that **Mr. Rajendra Aaseri** *from M.B.M. Engineering College, Jodhpur has participated in 3-day "Moodle Training Workshop for Teachers" during 19-21 February, 2019 under the aegis of TEQIP-III, MBM Engineering College, Jodhpur and TEQIP-III KITE, IIT Bombay.*

Mr. Abhisek Gour	Dr. Kailash Chaudhary	Prof. Sunil K. Parihar	Prof. Vikram M. Gadre	Prof. Sachin C. Patwardhan
Course Coordinator	Course Coordinator	Coordinator, TEQIP III, MBM	Coordinator, KITE, IITB	Co-Coordinator, KITE, IITB

14th International Conference on Science, Technology & Management

ICSTM-19

ISBN: 978-93-87793-74-3

Conference World

www.conferenceworld.in

Certificate

This certificate acknowledges and honours

Prof./ Dr./ Mr./ Ms. Shrwan Ram

for participating & presenting his/her paper on

Sentiment Analysis of Twitter Datasets using Support Vector Machine and Naïve Bayes Classifiers

in

14th International Conference on Science, Technology & Management

Held on 2nd March 2019 at

Guru Gobind Singh Foundation's

Guru Gobind Singh Polytechnic, Nashik

Approved by AICTE New Delhi, DTE Mumbai, Govt. of Maharashtra & Affiliated to MSBTE Mumbai

(NBA Accredited Institute)

GGSF GURU GOBIND SINGH FOUNDATION

Prof. S.R.Upasani
Principal,GGSP, Nasik

Dr. A.K. Sharma
Editor Conference World

DEPARTMENT OF ELECTRICAL ENGINEERING
FACULTY OF ENGINEERING, M.B.M. ENGINEERING COLLEGE
JAI NARAIN VYAS UNIVERSITY
JODHPUR - 342001 (RAJASTHAN) INDIA

CERTIFICATE

This is to certify that **Dr. Alok Singh Gahlot**

of M.B.M. Engineering College , Jodhpur has attended the

TEQIP-III Seminar on

"**Technical Aspects of Cyber Crime: Prevention & Detection**"

held at

M.B.M. Engineering College Jodhpur, on 7th March, 2019.

Prof. Avdhesh Sharma
Patron

Prof. A.R. Garg
Convener

Prof. Jayashri Vajpai
Program Chair & Head
Electrical Department

DEPARTMENT OF ELECTRICAL ENGINEERING
FACULTY OF ENGINEERING, M.B.M. ENGINEERING COLLEGE
JAI NARAIN VYAS UNIVERSITY
JODHPUR - 342001 (RAJASTHAN) INDIA

CERTIFICATE

This is to certify that **Dr. Simran Chaudhary**
of M.B.M. Engineering College, Jodhpur has attended the
TEQIP-III Seminar on

"Technical Aspects of Cyber Crime: Prevention & Detection"

held at

M.B.M. Engineering College Jodhpur, on 7th March, 2019.

Prof. Avdhesh Sharma
Patron

Prof. A.R. Garg
Convener

Prof. Jayashri Vajpai
Program Chair & Head
Electrical Department

DEPARTMENT OF ELECTRICAL ENGINEERING
FACULTY OF ENGINEERING, M.B.M. ENGINEERING COLLEGE
JAI NARAIN VYAS UNIVERSITY
JODHPUR - 342001 (RAJASTHAN) INDIA

CERTIFICATE

This is to certify that **Ms. Bijayalaxmi Sahoo**
of M.B.M. Engineering College, Jodhpur has attended the

TEQIP-III Seminar on

"Technical Aspects of Cyber Crime: Prevention & Detection"

held at

M.B.M. Engineering College Jodhpur, on 7th March, 2019.

Prof. Avdhesh Sharma	**Prof. A.R. Garg**	**Prof. Jayashri Vajpai**
Patron	Convener	Program Chair & Head Electrical Department

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

NWIMI 2019

Certificate of Participation

This is to certify that

Simran Choudhary

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

General Chair

Organizing Chair

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

NWIMI 2019

Certificate of Participation

This is to certify that

Rachna Verma

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

Gaurav Bhatnagar
General Chair

Organizing Chair

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

Organized by IIT Jodhpur

NWIMI 2019

Certificate of Participation

This is to certify that

Anand Tanwar

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

General Chair

Organizing Chair

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

NWIMI 2019

Certificate of Participation

This is to certify that

Rajendra Aaseri

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

Gaurav Bhatnagar
General Chair

Organizing Chair

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

Organized by IIT Jodhpur

॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

NWIMI 2019

Certificate of Participation

This is to certify that

Bijayalaxmi Sahoo

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

General Chair

Organizing Chair

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

NWIMI 2019

Certificate of Participation

This is to certify that

Abhisek Gour

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

Gaurav Bhatnagar
General Chair

Organizing Chair

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

NWIMI 2019

Certificate of Participation

This is to certify that

Deepika Kamboj

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

General Chair

Organizing Chair

09 – 10 March 2019

National Workshop on Intelligent Multimodal Interfaces (NWIMI)

Organized by IIT Jodhpur

NWIMI 2019

Certificate of Participation

This is to certify that

Jagjeet Singh

participated in the **National Workshop on Intelligent Multimodal Interfaces (NWIMI)** organized at Indian Institute of Technology Jodhpur during 09 – 10 March 2019.

General Chair

Organizing Chair

11-12 March 2019

National Conference on AI Innovations and IP Trends (AIIIPR 2019)

Organized by IIT Jodhpur & Rajasthan Council of Science and Technology,
Department of Science and Technology, Government of Rajasthan

Certificate of Participation

This is to Certify that

Ms. Simran Choudhary

participated in the ***National Conference on AI Innovations and IP ~~Trads~~ Trends (AIIIPR) 2019***

organized at Indian Institute of Technology Jodhpur during 11-12 March 2019.

Convenor

11-12 March 2019

National Conference on AI Innovations and IP Trends (AIIIPR 2019)

Organized by IIT Jodhpur & Rajasthan Council of Science and Technology,
Department of Science and Technology, Government of Rajasthan

॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

विज्ञान एवं प्रौद्योगिकी विभाग राजस्थान

cipam Creative India Innovative India

Certificate of Participation

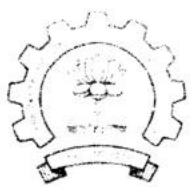
This is to Certify that

Dr. ANIL Gupta M.B.M. ENGINEERING COLLEGE

participated in the ***National Conference on AI Innovations and IP ~~Trads~~ Trends (AIIIPR) 2019***

organized at Indian Institute of Technology Jodhpur during 11-12 March 2019.

Convenor



PARIMAL AND PRAMOD CHAUDHARI CENTRE FOR LEARNING AND TEACHING

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

This is to certify that

Anand Tanwar, MBMEC, Jodhpur

has participated in the ***MHRD – TEQIP – III KITE Activity***

Selected Twinning and Pedagogical Activities -'Make in India' Curricular Initiatives, Placement Planning, GATE Sensitization, Transition Rate Improvement and Laboratory Visits

under the 'Knowledge Incubation under TEQIP' ('KITE') Initiative of the MHRD, Govt. of India

Conducted in IIT Bombay

During the period 29 March 2019 - 02 April 2019

KITE Coordinator
Prof. Vikram M. Gadre

Head, PPCCLT
Prof. Sachin C. Patwardhan

Certificate of Participation

This is to certify that

Rajendra Aaseri

has proactively participated in the Microsoft Workshop on transforming education through technology on April 3, 2019 at International Conference on Digital Pedagogies, April 2019, New Delhi.

Conference Chair

Workshop Sponsored By

Microsoft

Virtual Labs Workshop

MBM ENGINEERING COLLEGE, JODHPUR

3-4 April 2019

CERTIFICATE

This is to certify that *Mr./Ms. RAJENDRA AASERI, COMPUTER SCIENCE AND ENGINEERING, M. B. M. ENGINEERING COLLEGE JODHPUR* attended the Workshop on Virtual Labs under the National Mission on Education through ICT, (MHRD Govt. of India) on 3-4 April 2019 jointly conducted by Virtual Labs, IIT Roorkee and MBM Engineering College, Jodhpur.

Dean
MBM Engineering College

Nodal Coordinator, Virtual Labs
MBM Engineering College

Team Virtual Lab
IIT Roorkee

Virtual Labs Workshop

MBM ENGINEERING COLLEGE, JODHPUR

3-4 April 2019

CERTIFICATE

This is to certify that ***Mr./Ms. SIMRAN CHOUDHARY, COMPUTER SCIENCE AND ENGINEERING, M. B. M. ENGINEERING COLLEGE JODHPUR*** attended the Workshop on Virtual Labs under the National Mission on Education through ICT, (MHRD Govt. of India) on 3-4 April 2019 jointly conducted by Virtual Labs, IIT Roorkee and MBM Engineering College, Jodhpur.

Dean
MBM Engineering College

Nodal Coordinator, Virtual Labs
MBM Engineering College

Team Virtual Lab
IIT Roorkee

Virtual Labs Workshop

MBM ENGINEERING COLLEGE, JODHPUR

3-4 April 2019

CERTIFICATE

This is to certify that ***Mr./Ms. RACHNA VERMA, CSE, M. B. M. ENGINEERING COLLEGE JODHPUR*** attended the Workshop on Virtual Labs under the National Mission on Education through ICT, (MHRD Govt. of India) on 3-4 April 2019 jointly conducted by Virtual Labs, IIT Roorkee and MBM Engineering College, Jodhpur.

Dean
MBM Engineering College

Nodal Coordinator, Virtual Labs
MBM Engineering College

Team Virtual Lab
IIT Roorkee

An MHRD Govt of India Initiative

Virtual Labs Workshop

MBM ENGINEERING COLLEGE, JODHPUR

3-4 April 2019

CERTIFICATE

This is to certify that ***Dr. NEMI CHAND BARWAR, COMPUTER SCIENCE & ENGINEERING, M. B. M. ENGINEERING COLLEGE JODHPUR*** attended the Workshop on Virtual Labs under the National Mission on Education through ICT, (MHRD Govt. of India) on 3-4 April 2019 jointly conducted by Virtual Labs, IIT Roorkee and MBM Engineering College, Jodhpur.

Dean
MBM Engineering College

Nodal Coordinator, Virtual Labs
MBM Engineering College

Team Virtual Lab
IIT Roorkee

Virtual Labs Workshop

MBM ENGINEERING COLLEGE, JODHPUR

3-4 April 2019

CERTIFICATE

This is to certify that ***Mr./Ms. ABHISEK GOUR, CSE, M. B. M. ENGINEERING COLLEGE JODHPUR*** attended the Workshop on Virtual Labs under the National Mission on Education through ICT, (MHRD Govt. of India) on 3-4 April 2019 jointly conducted by Virtual Labs, IIT Roorkee and MBM Engineering College, Jodhpur.

Dean
MBM Engineering College

Nodal Coordinator, Virtual Labs
MBM Engineering College

Team Virtual Lab
IIT Roorkee

ANDAMAN AND NICOBAR ADMINISTRATION
DR. B.R. AMBEDKAR INSTITUTE OF TECHNOLOGY
(NAAC ACCREDIATED)
ANDAMAN & NICOBAR ISLANDS

★ CERTIFICATE ★

Sl. No. DBRAIT/CSE/BDML/2019/16

Awarded to ~~Dr.~~ / Ms. / ~~Mr.~~ DEEPIKA KAMBOJ from MBM JODHPUR

for having successfully completed One Week National Workshop on

"BIG DATA ANALYTICS & MACHINE LEARNING"

Jointly organized by Dept. of Computer Science and Engg, BRAIT and

NIT Trichy Under TEQIP-III Project, MHRD, Govt. of India

from 22.04.2019 to 27.04.2019

Place : Port Blair
Dated : 27.04.2019

Event Coordinator

HOD (CSE)
DBRAIT

Principal
DBRAIT

ANDAMAN AND NICOBAR ADMINISTRATION
DR. B.R. AMBEDKAR INSTITUTE OF TECHNOLOGY
(NAAC ACCREDIATED)
ANDAMAN & NICOBAR ISLANDS

★ CERTIFICATE ★

Sl. No. DBRAIT/CSE/BDML/2019/15

Awarded to ~~Dr.~~ / Ms. / ~~Mr.~~ SANGITA KUMARI from MBM JODHPUR

for having successfully completed One Week National Workshop on

"BIG DATA ANALYTICS & MACHINE LEARNING"

Jointly organized by Dept. of Computer Science and Engg, BRAIT and

NIT Trichy Under TEQIP-III Project, MHRD, Govt. of India

from 22.04.2019 to 27.04.2019

Place : Port Blair
Dated : 27.04.2019

Event Coordinator

HOD (CSE)
DBRAIT

Principal
DBRAIT

ANDAMAN AND NICOBAR ADMINISTRATION
DR. B.R. AMBEDKAR INSTITUTE OF TECHNOLOGY
(NAAC ACCREDIATED)
ANDAMAN & NICOBAR ISLANDS

★ CERTIFICATE ★

Sl. No. DBRAIT/CSE/BDML/2019/14

Awarded to ~~Dr.~~ / Ms. /~~Mr.~~ BIJAYALAXMI SAHOO from MBM JODHPUR

for having successfully completed One Week National Workshop on

"BIG DATA ANALYTICS & MACHINE LEARNING"

Jointly organized by Dept. of Computer Science and Engg, BRAIT and

NIT Trichy Under TEQIP-III Project, MHRD, Govt. of India

from 22.04.2019 to 27.04.2019

Place : Port Blair
Dated : 27.04.2019

Event Coordinator

HOD (CSE)
DBRAIT

Principal
DBRAIT

TEQIP-III

One Day Workshop on 3D Printing & Reverse Engineering

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING
MBM ENGINEERING COLLEGE, JODHPUR
2nd MAY 2019

CERTIFICATE

This is to certify that ***Mr. Rajendra Aaseri, Computer Science and Engineering, M. B. M. Engineering College Jodhpur*** attended the Workshop on **3D Printing & Reverse Engineering**, held on 2nd May 2019, organised by the Department of Production and Industrial Engineering, MBM Engineering College, JNV University Jodhpur.

Prof. Manish Kumar
Head and Convener

Prof. Arvind Kumar Verma
Convener

Naveen Suniya
Coordinator

TEQIP-III

One Day Workshop on 3D Printing & Reverse Engineering

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING
MBM ENGINEERING COLLEGE, JODHPUR
2nd MAY 2019

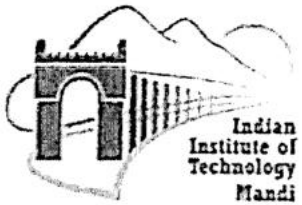
CERTIFICATE

This is to certify that ***Mr. Anand Tanwar, Computer Science and Engineering, M. B. M. Engineering College Jodhpur*** attended the Workshop on **3D Printing & Reverse Engineering,** held on 2nd May 2019, organised by the Department of Production and Industrial Engineering, MBM Engineering College, JNV University Jodhpur.

Prof. Manish Kumar
Head and Convener

Prof. Arvind Kumar Verma
Convener

Naveen Suniya
Coordinator



WADL 2019

Workshop on Applied Deep Learning

July 1-5, 2019

Certificate of Participation

This is to certified that Rajendra Aasesi of MBM Eng. College Jodhpur has participated in the **"Workshop on Applied Deep Learning"** organized by MANAS LAB, School of Computing and Electrical Engineering, IIT Mandi held from 1st to 5th July, 2019 at IIT Mandi.

Kamlesh Tiwari

Dr. Kamlesh Tiwari,
BITS- Pilani
(Convener, WADL 2019)

Dr. Aditya Nigam,
IIT Mandi
(Coordinator, WADL 2019)

Indian Institute of Technology Mandi

WADL 2019

Workshop on Applied Deep Learning

July 1-5, 2019

Certificate of Participation

This is to certified that Simran Choudhary of JNV University has participated in the **"Workshop on Applied Deep Learning"** organized by MANAS LAB, School of Computing and Electrical Engineering, IIT Mandi held from 1st to 5th July, 2019 at IIT Mandi.

Kamlesh Tiwari

Dr. Kamlesh Tiwari,
BITS- Pilani
(Convener, WADL 2019)

Aditya

Dr. Aditya Nigam,
IIT Mandi
(Coordinator, WADL 2019)

Indian Institute of Technology Mandi

WADL 2019

Workshop on Applied Deep Learning

July 1-5, 2019

Certificate of Participation

This is to certified that Abhisek Gour of JNVU, Jodhpur has participated in the **"Workshop on Applied Deep Learning"** organized by MANAS LAB, School of Computing and Electrical Engineering, IIT Mandi held from 1st to 5th July, 2019 at IIT Mandi.

Kamlesh Tiwari
Dr. Kamlesh Tiwari,
BITS- Pilani
(Convener, WADL 2019)

Aditya
Dr. Aditya Nigam,
IIT Mandi
(Coordinator, WADL 2019)

START UP CONCLAVE 2018

EDUCATE TO INNOVATE 1.0

27, 28, 29, July 2018

- Fostering startup and innovation culture within Engineering Campuses

PANELS I TALKS I WORKSHOPS I EXHIBITS / Venue: ESCI Campus, Hyderabad

Organised by:

Engineering Staff College of India

An Autonomous Organ of The Institution of Engineers (India)

(ISO 9001:2015 certified and CEA Recognised Institution)

Certificate of Participation

Engineering Staff College of India - An Autonomous Organ of The Institution of Engineers (India) appreciates the active participation by ***Prof. Anand Tanwar*** *from* ***JNVU, Jodhpur Rajasthan*** *for 3 days Start up conclave 2018 (Educate to Innovate 1.0) at ESCI Campus, Hyderabad conducted on 27th, 28th, 29th July 2018*

Er. P. Sai Kishore
Head (FDP Cell), ESCI

Brig. A. Umar Farook, VSM (Retd.)
Director (ESCI)

2nd INTERNATIONAL CONFERENCE ON COMMUNICATION & COMPUTATIONAL TECHNOLOGIES (ICCCT-2019)

30th -31st August, 2019

Organized by

Funded by

TEQIP-III

Technical Education Quality Improvement Programme

In Association with

Springer

Certificate

This is to certify that Dr./Mr./Ms. N.C. Barwar of J.N.V University, Jodhpur has attended / presented a paper titled A Collaborative Versioning Framework for Model Based Version Control Systems

in **2nd International Conference on Communication & Computational Technologies (ICCCT 2019)** held on **30th -31st August, 2019 at Rajasthan Institute of Engineering & Technology, Jaipur.**

Chair/Coordinator
RIET, Jaipur

Chair/Coordinator
RTU, Kota

General Chair

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

Seminar on Technical Teachers Training Policy, Its Implementation & AICTE Quality Initiatives

1st November 2019

Certificate

This is to certify that Mr./Ms./Dr. ANAND TANWAR, MBM JODHPUR participated in Seminar on Technical Teachers Training Policy, Its Implementation & AICTE Quality Initiatives on 1st November 2019 at MBM Engineering College, Jodhpur.

Col B Venkat
Director, AICTE, New Delhi

Prof. Rajat Bhagwat
Seminar Coordinator

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

Seminar on Technical Teachers Training Policy, Its Implementation & AICTE Quality Initiatives

1st November 2019

Certificate

This is to certify that Mr./Ms./Dr. ABHISEK GOUR MBM JODHPUR

participated in Seminar on Technical Teachers Training Policy, Its Implementation & AICTE Quality Initiatives on 1st November 2019 at MBM Engineering College, Jodhpur.

Col B Venkat
Director, AICTE, New Delhi

Prof. Rajat Bhagwat
Seminar Coordinator

TEQIP III

Technical Education Quality Improvement Program (TEQIP)
Knowledge Incubation in Technical Education (KITE) Center

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

This is to Certify that *Ms. DEEPIKA KAMBOJ* of *M. B. M. Engineering College, Jodhpur, Rajasthan* has participated in TEQIP workshop on "Faculty Training Program on Block chain Technology" organized at IIT Hyderabad between December 16th – 20th 2019.

Dr. Sathya Peri
Workshop Coordinator
IIT Hyderabad

S.R.Dey

Dr. Suhash Ranjan Dey
TEQIP Coordinator
IIT Hyderabad

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AMITY SCHOOL OF ENGINEERING & TECHNOLOGY | IEEE

10th INTERNATIONAL CONFERENCE

CONFLUENCE-2020

THEME: CLOUD COMPUTING, DATA SCIENCE & ENGINEERING

CERTIFICATE OF PARTICIPATION

This is to certify that Dr./Mr./Ms. Dupika Kamboj

from MBM Engineering College, Jodhpur has presented/published research paper on

A Review on IoT: Protocols, Architecture, Technologies, Application and Research Challenges during the

10th International Conference Confluence-2020 on the theme 'Cloud Computing, Data Science and Engineering'

held on 29th - 31st January, 2020 at Amity University Uttar Pradesh, Noida.

Dr. Abhishek Singhal
General Co Chair, Confluence-2020
Deputy HoD (CSE), ASET
Amity University Uttar Pradesh, Noida, India

Prof. (Dr.) Abhay Bansal
General Chair, Confluence-2020
Jt. Head ASET, HoD (CSE) ASET, Director BICET
Amity University Uttar Pradesh, Noida, India

Dr. (Mrs.) Balvinder Shukla
Patron, Confluence-2020
Vice Chancellor
Amity University Uttar Pradesh, Noida, India

GRRAS solutions pvt. ltd.

Certificate of Appreciation

This is to acknowledge that

Sangita Kumari

has satisfactory Coordinated

Workshop Program on: *ML- PYTHON WORKSHOP*

held on: *30-31 Jan 2020*

Place of Training: M.B.M. Engineering College, Jodhpur

Certificate No.: *444*

Gaurav Saluja

Gaurav Saluja
Director Grras Training Unit

H.O: 219, Himmat Nagar,Behind Kiran Sweets, Gopalpura Turn, Tonk Road, Jaipur(Raj.)
M: +91-141-3136868 | Email: info@grras.com | Website: www.grras.com

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY MANAGEMENT & GRAMOTHAN, JAIPUR

COMPUTER SCIENCE & ENGINEERING / INFORMATION TECHNOLOGY DEPARTMENT

INTERNATIONAL CONFERENCE
ON
EMERGING TECHNOLOGIES IN COMPUTER ENGINEERING

Machine Learning and Internet of Things

ICETCE-2020

This certificate is awarded to Prof./Dr./Mr./Ms. Rachna Verma

for Presenting/Publishing Paper on An Efficient Clustering Algorithm to Simultaneously Detect Multiple Planes in a Point cloud in the 3rd International Conferenc

held at SKIT Jaipur, during February 7th-8th,2020.

Shri Jaipal Meel
Patron, SKIT

Dr. Ramesh K. Pachar
Principal, SKIT

Prof.(Dr.) K. Subramania
IEEE Ambassador

Dr. C. M. Choudhary
Organizing Chair

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Conference Chair

IEEE | IBM Academic Initiative | Infosys Campus Connect | atural | AICTE

The Institution of Engineers (India)

33rd National Convention of Computer Engineers and National Conference

Jaipur, February 15th - 16th, 2020

Certificate

This is to certify that Prof./Dr./Er. /Mr./Ms. Anil Gupta.

Faculty/ Research Scholar/Student from Dept. of C.S.E., MBM. Engg. College, Jodhpur

has presented/participated in the National Conference on **"Applied Computational Intelligence and Informatics"** *held at the Institute of Engineers (India), Rajasthan State Centre, Jaipur (Raj.) on* **15th and 16th February, 2020.** *and paper entitled* Effect of Synaptic Depression in Modulating the Response properties of Cortical Neurons.

Er. Sajjan Singh Yadav
Chairman, IE(I), RSC

Dr. Hemant Kumar Garg
Convener, IE(I), RSC

Er. Gautam Raj Bhansali
Hony. Secretary, IE(I), RSC

Finland Labs

In Association With

National Summit

The Annual Social Festival of IIT Roorkee

Certificate of Participation

This is to certify that

JAGJEET SINGH

has participated in the 2 Days Instructor Led Live Online Workshop On

Python with COVID-19 Data Web Scraping and MySQL

held during 09th - 10th May 2020

Organized by

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of **MBM Engineering College** has participated in

"National Level 3-Day Online Workshop on Introduction to Deep Learning" Organised by

Department of Computer Science from 21-08-2020 to 23-08-2020. **Certificate Id:** PBW5D4-CE000045

Dr.T.S.Ravi Kiran
Organising Secretary

Prof.Rajesh C Jampala
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Dr.M.Ramesh
Principal

ICAIML 2020

04th - 05th September 2020, Jaipur, Rajasthan, India

International Conference

on

Artificial Intelligence & Machine Learning

Certificate

This is to certify that

Shrwan Ram, Anil Gupta

has presented a paper titled

Classification of Pituitary Tumor and Multiple Sclerosis Brain Lesions through Convolutional Neural Networks

in the International Conference on Artificial Intelligence & Machine Learning held during 04/09/2020 to 05/09/2020 at Jaipur, Rajasthan, India on Virtual Platform.

We wish the authors all the very best for future endeavors.

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Springer

This is to certify that

Anil Kapila

has presented a paper entitled

Multiple Sclerosis Disorder Detection through Faster Region-based Convolutional Neural Networks

in the **2nd International Conference on**

Inventive Computation and Information Technologies (ICICIT - 2020)

organised by RVS Technical Campus, Coimbatore. India on 24-25, September 2020.

Session Chair

Dr. S. Smys
Conference Chair

Dr. Y. Robinson
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Springer

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This is to certify that

Shrwan Ram

has presented a paper entitled

Multiple Sclerosis Disorder Detection through Faster Region-based Convolutional Neural Networks.

in the ***2nd International Conference on***

Inventive Computation and Information Technologies (ICICIT - 2020)

organised by RVS Technical Campus, Coimbatore, India on 24-25, September 2020.

Session Chair

Dr. S. Smys
Conference Chair

Dr. Y. Robinson
Director, RVS Technical Campus

Springer

ICSES 2020

CERTIFICATE OF PRESENTATION

This certificate is awarded to

Anil Gupta

for successfully presenting a paper entitled

Pre-Trained Deep Networks for Faster region-based CNN model for Pituitary Tumor Detection.

in the ***International Conference on Sustainable Expert Systems (ICSES 2020)*** organised by Tribhuvan University, Nepal on 28-29 September, 2020.

SESSION CHAIR

Dr. Jennifer S. Raj
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Prof. Dr. Subarna Shakya
CONFERENCE CHAIR

Springer

ICSES 2020

CERTIFICATE OF PRESENTATION

This certificate is awarded to

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for successfully presenting a paper entitled

Pre-Trained Deep Networks for Faster region-based CNN model for Pituitary Tumor Detection.

in the ***International Conference on Sustainable Expert Systems (ICSES 2020)*** organised by Tribhuvan University, Nepal on 28-29 September, 2020.

SESSION CHAIR

Dr. Jennifer S. Raj
ORGANIZING SECRETARY

Prof. Dr. Subarna Shakya
CONFERENCE CHAIR

Classification of Pituitary Tumor and Multiple Sclerosis Brain Lesions through Convolutional Neural Networks

Shrwan Ram
Anil Gupta

Department of Computer Science and Engineering
MBM Engineering College,
Jai Narain Vyas University,
Jodhpur, Rajasthan, INDIA

Abstract: Automatic classification of Brain Tumor and brain Lesions has become a very important step in the field of medical image analytics. The machine learning/Deep learning approaches are playing a tremendous role in the field of medical imaging classification, due to the drastic changes in the field of computing power and image analytics techniques. The deep learning, which is the subfield of machine learning, is playing the major role in the automatic classification of Magnetic Resonance Images (MRIs) having various brain abnormalities. Convolutional Neural Networks are widely used for the classification and detection of various brain disorders. In this research paper, Convolutional Neural Networks are designed with considering various learning parameters for the classification of Multiple Sclerosis Brain Lesions and Pituitary Tumor. In the proposed research, T1-weighted Contrast-enhanced Magnetic Resonance images are preprocessed with various image-preprocessing approaches such as to resize the images, to convert the images into suitable image format so that the experimental work can be performed with deep learning in the Matlab environment. The Experiment is conducted with the dataset of Multiple Sclerosis and Pituitary Tumor each of having 718 and 930T1-weighted MRI images respectively. The experimental results we achieved 99.7% classification accuracy of pituitary Tumor, and 99.2% accuracy of Multiple Sclerosis brain Lesions. The average accuracy of both classifications is 99.55%. The precision of the classification of Pituitary Tumor is 99.7, recall value is 99.7 and the f1_score of the classification is 99.7%. Similarly, the Precision of the classification of Multiple Sclerosis Brain Lesions is 99.15%, the recall value is 99.15%, and the f1_score is 99.15%. The purposed approach of the Convolutional Neural Network architecture exhibited outstanding performance as compared to other research outcomes.

Keywords- Brain Tumor, Multiple Sclerosis Brain Lesions, machine learning, Deep learning, Convolutional Neural Networks, brain disorders.

Lecture Notes in Networks and Systems 173

S. Smys
Valentina Emilia Balas
Khaled A. Kamel
Pavel Lafata *Editors*

Inventive Computation and Information Technologies

Proceedings of ICICIT 2020

Springer

Multiple Sclerosis Disorder Detection Through Faster Region-Based Convolutional Neural Networks

Shrawan Ram and Anil Gupta

Abstract Multiple sclerosis is a leading brain disorder that highly affects the normal functions of the human body. Due to this disorder, protective coverings of neuron cells are get damaged, which causes disrupting the information flow inside the brain and other body parts. The early detection of multiple sclerosis helps healthcare practitioners to suggest a suitable treatment for the disease. The detection of multiple sclerosis is a challenging task. Many types of approaches had been proposed by the researchers and academicians for accurately detecting the brain lesions. Precisely, detecting the brain lesions is still a big challenge. Due to the recent innovations in the field of image processing and computer vision, healthcare practitioners are using advanced disease diagnosis systems for the prediction of disorders/diseases. Magnetic resonance imaging approach is used for the detection of various brain lesions by the neurosurgeons and neurophysicians. The computer vision approaches are playing a major role in the automatic detection of various disorders. In this research paper, the faster region-based convolutional neural networks approach is proposed based on computer vision and deep learning, using transfer learning for the detection of multiple sclerosis as a brain disorder. The proposed approach is detecting the damaged area inside the brain with higher precision and accuracy. The proposed model detects the multiple sclerosis brain lesions with 99.9% accuracy. Three DAGNetworks are used for training; there are Alexnet, Resnet18, and Resnet50. As compare to Alexnet and Resnet18, deep networks, the Resnet50 Pre-trained network performed well with higher accuracy of detection.

Keywords Multiple sclerosis · Magnetic resonance imaging · Brain lesions · Computer vision · Convolutional neural networks · Deep learning

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https://doi.org/10.1007/978-981-33-4305-4_16

Lecture Notes in Networks and Systems 176

Subarna Shakya
Valentina Emilia Balas
Wang Haoxiang
Zubair Baig *Editors*

Proceedings of International Conference on Sustainable Expert Systems

ICSES 2020

Springer

Pre-trained Deep Networks for Faster Region-Based CNN Model for Pituitary Tumor Detection

Shrwan Ram and Anil Gupta

Abstract Due to drastic changes in the field of technology and computing power for the last decade, it has become very easy to implement the convolutional neural networks for the classification and detection of objects from the large volume of images. Nowadays, the various deep networks with hundreds of layers are developed and implemented by the researchers for the classification of images and object detection inside the images. The Faster region-based convolutional neural network (R-CNN) is a widely used state-of-the-art approach that belongs to R-CNN techniques that were first time developed and used in 2015. Different R-CNN object detection approaches are developed and implemented by the researchers. Three approaches are developed and implemented on different platforms, and these approaches are R-CNN, fast R-CNN, and faster R-CNN. The efficiency and accuracy of the approaches are tested for various object detections inside the different images. Algorithms based on region proposals are used in R-CNN approaches to generate the bounding boxes or the actual location of the objects inside the images. The ground labels are generated through image labeling approaches. These ground truth labels are stored in a file. The features are extracted by pre-trained deep networks or the convolutional neural networks using the ground truth labeled images. The classification layer of the convolutional neural networks predicts the class of the object to which it belongs. The regression layer is used to create the relevant coordinates of the bounding boxes accurately. In this research paper, the faster R-CNN approach with retrained deep networks is used for the detection of pituitary tumor. The tumor detection performance of the detectors trained with three pre-trained deep networks is compared in the proposed approach of tumor detection. Three pre-trained deep networks such as Googlenet, Resnet18, and Resnet50 are used to train the tumor detector with ground truth labeled images.

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S. Shakya et al. (eds.), *Proceedings of International Conference on Sustainable Expert Systems*, Lecture Notes in Networks and Systems 176,
https://doi.org/10.1007/978-981-33-4355-9_36

UGC National Conference on

Paradigms in Computing 2015 (COPIC'15):

Analytical Computing and Big Data Analytics

December 23-24, 2015

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

M.B.M. Engineering College, Faculty of Engineering

Jai Narain Vyas University, Jodhpur

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This is to certify that

Ms. RACHNA VERMA

attended/presented a paper

Automatic Clustering of Arbitrary Similar Patterns In A BRep Solid Model Database

in the National Conference - COPIC 2015 held on Dec 23-24, 2015

Dr. Rajesh Purohit
Chairman, COPIC-2015

Dr. N.C.Barwar
Convener, COPIC-2015

Dr. Anil Gupta
Convener, COPIC-2015

UGC National Conference on

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Mr. SHRWAN RAM

attended/presented a paper

Big Data Approaches To Healthcare Systems

in the National Conference - COPIC 2015 held on Dec 23-24, 2015

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Chairman, COPIC-2015

Dr. N.C.Barwar
Convener, COPIC-2015

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Convener, COPIC-2015

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Mr. Shrwan Ram

attended/presented a paper

A Survey of Open Source Tools For Big Data Analytics

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Convener, COPIC-2015

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Preventing Unauthorized Access In Hadoop Distributed File System

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Dr. Rajesh Purohit
Chairman, COPIC-2015

Dr. N.C.Barwar
Convener, COPIC-2015

Dr. Anil Gupta
Convener, COPIC-2015

Network Performance Analysis of Startup Buffering for Live Streaming in P2P VOD Systems for Mesh-Based Topology

Nemi Chand Barwar and Bhadada Rajesh

Abstract This paper explores mesh-based clustering for different start video streaming in P2P systems and estimates the performance of noncluster and clustered models. These models are based on mesh-based topology of P2P streaming consisting of peer join/leave. A new approach by way of "clustering" peers is proposed to tackle P2P VOD streaming. The proposed models were simulated and verified using OMNET++ V.4. A clustered model for video streaming is proposed and simulated to consider the performance of network under startup buffering for frame loss, startup delay, and end-to-end delay parameters. The results obtained from simulations are compared for both noncluster versus cluster models. The results show the impact of startup buffering on both models is also bounded due to time limits of release buffer and playing buffer under the proposed models, which causes reduction in wait time to view video improving the overall VOD system performance. The proposed model is also able to provide missing parts (of video) to late viewers, which gives the facilities of both live and stored streaming from user's point of view, therefore it serves to be functionally hybrid and is most useful.

Keywords Peer-to-peer (P2P) · Video streaming · Video on demand (VOD)

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S.C. Satapathy et al. (eds.), *Proceedings of the International Congress on Information and Communication Technology*, Advances in Intelligent Systems and Computing 439, DOI 10.1007/978-981-10-0755-2_29

2nd National Conference
on
Emerging Trends of Research in Applied
Sciences, Experimental and Computational Techniques

ETRASECT'16

26-27 February, 2016

This is to certify that

Mr./Ms./Dr. RACHNA VERMA

has attended/contributed/presented research paper titled DESIGN & CALIBERATION OF AN EXPERIMENTAL SETUP FOR 3-D RECONSTRUCTION OF A SCENE FROM STEREO IMAGES

at the National Conference on "Emerging Trends of Research in Applied Sciences, Experimental and Computational Techniques" held at Jodhpur Institute of Engineering & Technology, Jodhpur, INDIA.

Organized by :

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JIET Group of Institutions, Jodhpur, (Raj.) INDIA

Er. Navneet Agarwal	Prof. (Dr.) Rajendra Karwa	Prof. (Dr.) R. K. Gupta	Prof. O. P. Vyas
Director General - JG(	Campus Director - JIET	Convener	Convener

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Certificate

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DR. RACHNA VERMA

attended /presented a paper on

RESEARCH ISSUES IN OBJECT DISTANCE ESTIMATION USING A LASER POINTER AND A WEBCAM

in the National Conference on Advances in Computer Integrated Manufacturing (NCACIM-III), March 18-19, 2016.

Dr. Arvind Kumar Verma
Convener, NCACIM-III, 2016

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Co-Convener, NCACIM-III, 2016

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J.N.V. University, Jodhpur – 342011

Certificate

This is to certify that

SHRWAN RAM

attended /presented a paper on

A COMPARATIVE STUDY OF MULTILAYER PERCEPTRON, RADIAL BASIS FUNCTION NETWORKS AND LOGISTI REGRESSION FOR HEALTHCARE DATA CLASSIFICATION

in the National Conference on Advances in Computer Integrated Manufacturing (NCACIM-III), March 18-19, 2016.

Dr. Arvind Kumar Verma
Convener, NCACIM-III, 2016

Dr. Manish Kumar
Co-Convener, NCACIM-III, 2016

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(NCACIM-III)
March 18-19, 2016

Department of Production and Industrial Engineering
M.B.M. Engineering College
J.N.V. University, Jodhpur – 342011

Certificate

This is to certify that

DR. RACHAN VERMA

attended /presented a paper on

PREDICTING CONSUMER BEHAVIOUR USING ARTIFICIAL NEURAL NETWORK

in the National Conference on Advances in Computer Integrated Manufacturing (NCACIM-III), March 18-19, 2016.

Dr. Arvind Kumar Verma
Convener, NCACIM-III, 2016

Dr. Manish Kumar
Co-Convener, NCACIM-III, 2016

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
M. B. M. ENGINEERING COLLEGE, FACULTY OF ENGINEERING
JAI NARAIN VYAS UNIVERSITY, JODHPUR 342 011 INDIA
Tel. Off. 91-291-2515023, E-mail: rajeshpurohit@jnvu.edu.in

DR. RAJESH PUROHIT
HEAD

No. JNVU/FE/CSE/2797
May 11, 2016

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Dr. Alok Singh Gahlot, Assistant Professor has attended the following seminar/conferences as per record.

S.No.	Type	Title	Place	Dates	Duration
1	National Seminar	Emerging Trends in Soft Computing Based Artificial Intelligence (SCAI-04)	Dept. of CSE, MBM Engg. College, Jodhpur	27-29 Feb-2004	3 days
2	National Conference	Current Advances in Information Protection and Security, (CAIPS-05)	Dept. of CSE, MBM Engg. College, Jodhpur	26-28 Feb 2005	3 days
3	National Conference	Emerging Trends in Computer Simulations and Modelling for Complex System, (MRCS-07)	Dept. of CSE, MBM Engg. College, Jodhpur	23-24 Feb 2007	2 days
4	National Conference	New Advances in Programming Languages and Their Implementations, (APL-2013)	Dept. of CSE, MBM Engg. College, Jodhpur	15-16 Mar 2013	2 days

DR. RAJESH PUROHIT
HEAD
Dept. of Computer Science & Engg.
Faculty of Engg., J. N. V. University
JODHPUR

ISBN: 978-93-86171-00-9

Science, Technology and Management

Certificate

This certificate acknowledges and honours

Dr N C Barwar

for presenting his/her paper on

Comparative Analysis of CBIR System using Entropy

in

5th International Conference on Science, Technology and Management

held on 30th July 2016 at
India International Centre, New Delhi

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Associated Journal

International Journal of Science Technology & Management (IJSTM, ISSN-2394-1537) www.ijstm.com

International Journal of Innovative Research in Science and Engineering (IJIRSE, ISSN-2454-9665) www.ijirse.com

International Journal of Advanced Technology in Engineering and Science, (IJATES, ISSN-2348-7550) www.ijates.com

International Journal of Electrical & Electronics Engineering (IJEEE, ISSN-2321-2055) www.ijeee.co.in

International Journal of Advance Research in Science And Engineering (IJARSE, ISSN-2319-8354) www.ijarse.com

ISBN : 978-93-86171-03-0

6th International Conference on Recent Innovations in Science, Engineering and Management

ICRISEM-16

IIMT 1994

IIMT College of Engineering

Knowledge Park III, Greater Noida, Uttar Pradesh (India)

Certificate

This certificate acknowledges and honours

N C Barwar

for presenting his/her paper on

Comparative Analysis of Identification of Malicious Node in Vanet Using FFRDV and ERDV Routing Algorithm

in

6th International Conference on Recent Innovations in Science, Engineering and Management (ICRISEM-16) held on 20th August 2016

Organized by :- Department of Mechanical Engineering

Conference Director
Prof. (Dr.) Rahul Goyal
IIMT College of Engineering

Organizing Secretary (s)
Prof. Anand Prakash Singh
IIMT College of Engineering

ICRISEM-16

Editor Conference World
Dr. A.K. Sharma
www.conferenceworld.in

Associated Journal

International Journal of Science Technology & Management (IJSTM, ISSN-2394-1537) www.ijstm.com

International Journal of Innovative Research in Science and Engineering (IJIRSE, ISSN-2454-9665) www.ijiirse.com

International Journal of Advanced Technology in Engineering and Science, (IJATES, ISSN-2348-7550) www.ijates.com

International Journal of Electrical & Electronics Engineering (IJEEE, ISSN-2321-2055) www.arresearchpublication.com

International Journal of Advance Research in Science And Engineering (IJARSE, ISSN-2319-8354) www.ijarse.com

NATIONAL CONFERENCE
ON
NEW ADVANCES IN COMMUNICATIONS, NETWORKS AND CRYPTOGRAPHY

NACNC - 2017

28-29 MARCH, 2017

IEEE Student Branch

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has attended/contributed/presented a research paper titled ...Analyzing Big Data Using Updatable Classifiers..... at the National Conference

on "COMMUNICATIONS, NETWORKS AND CRYPTOGRAPHY" held at JIET College of Engineering, Jodhpur (Raj.).

Organized by :

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JIET Group of Institutions, Jodhpur, (Raj.) INDIA

Er. Navneet Agarwal

Prof. (Dr.) K.R. Chowdhary

Prof. Simran Choudhary

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NACNC - 2017

28-29 MARCH, 2017

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Certificate of Appreciation

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has attended/contributed/presented a research paper titled Comparative Study of K-Nearest Neighbor Classification & J48 Decision Tree Algorithm with & without Clustering Considering different data Parameters on "COMMUNICATIONS, NETWORKS AND CRYPTOGRAPHY" held at JIET College of Engineering, Jodhpur (Raj.).

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Er. Navneet Agarwal

Prof. (Dr.) K.R. Chowdhary

Prof. Simran Choudhary

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MBM Engineering College, Jodhpur, India

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" A study of Security issues towards Distributed System"

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A Review on Tools For Cyber Security

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ABSTRACT:- *Cyber security is the group of advancements, procedures and practices intended to protect networks, computers, data and information from attack, damaged or unauthorized access. cyber security or information security are the strategies of ensuring computers, networks , data and information from unauthorized access or attacks that are gone for abuse. Principle zones canvassed in digital security are Application Security, Information Security, Disaster recuperation, Network Security.*

KEYWORDS: - Cyber security, internet, wire shark, ngrep, ICT

INTRODUCTION:-In the present scenario increasing dependence on information and communication technologies (ICT), especially the Internet, for delivery of services and operations, the biggest challenges the world facing is that of cyber security. It is a complex issue which affecting many application domains and straddling many disciplines and fields. To Secure the critical infrastructures requires protecting not only the physical systems but, just as important, the cyber portions of the systems on which they rely. Given the kind of activities being carried out in the cyberspace, cyberspace merges seamlessly with the physical world. But so do cybercrimes. Backbone of cyber criminals the underground black market supported by exploit kits, packaged malware and hacks is expected to continue and evolve citing tried-and-true crime ware like Black Hole, ransomware, APTs which have been improved and refined in ways that shows the extent of professionalism and methodology for developing malwares. Cyber attackers can disrupt critical infrastructures such as financial and air traffic control systems, producing effects that are similar to terrorist attacks in the physical space. They can also carry out identity theft and financial fraud; steal corporate information such as intellectual property; conduct espionage to steal state and military secrets; and recruit criminals and others to carry out physical terrorist activities. What makes cyberspace even more attractive to criminals including non-state actors is that attribution in cyberspace is difficult, especially given that cyberspace is borderless and cuts across jurisdictions. It allows criminals to launch attacks remotely from anywhere in the world. With this growing threat landscape, cyber-readiness of the security systems has been constantly put to test.

CYBER SECURITY RESEARCH:-Cyber Security Research is one context where the solution to deal with cyber criminals is germinating. Investment of time and resources requires fostering strategies for research and developing transformative solution to meet critical cyber security challenges involving a certain technology (e.g. cloud computing), or a particular application domain (e.g. finance), or a combination of two. To begin with the focus of cyber security research is nowadays to deal with new emerging threats and detecting the threats before they effect or cause good amount of damages. With growing number of phishing, APTs and botnet attacks, there is lot to be worked in terms of technological advancements and detection technology to meet the cyber threats of the future.These are some useful tools used in cyber security.

WIRESHARK:- Wireshark is the world's foremost and widely-used network protocol analyzer. It lets you see what's happening on your network at a microscopic level, standard across many commercial and non-profit enterprises, government agencies, and educational institutions. It is a network analysis tool formerly known as Ethereal, captures packets in real time and display them in human-readable format. Wireshark

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Convener

Conference Chair

Efficient Implementation and Analysis of Ring-LWE Quantum-Secure Key Exchange Protocol

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Abstract:

Today's cryptosystems based on classical hard mathematical problems in number theory like integer factorization, discrete logarithm over the finite fields and elliptic curve variants will become obsolete. The quantum algorithm proposed by Shor's for RSA and Proos and Zalka's for ECDLP claimed that these hard problems can be solved in polynomial time on quantum computer. While the symmetric key cryptography have minor threat as it make use of highly nonlinear s-boxes, p-boxes, cycles of confusion and diffusion. The only known threat to some symmetric cryptographic schemes like DES is Grover's algorithm that proposes a square root speed-up over classical brute force algorithms. NIST [14] points out that if the key sizes are sufficient, symmetric cryptographic schemes (specifically the Advanced Encryption Standard-AES) are resistant to quantum computers. The development of quantum computer is on full pace, hopefully it might be available in a decade. Thus, it is necessary to develop efficient quantum secure public key cryptosystems to provide safe key exchange in quantum era. In this paper we presented an efficient implementation of a Ring-Learning with errors public key cryptosystem whose security is based on intractability of hard problem on lattices. And comparative analysis of proposed cryptosystem with RSA, ECDH and LWE based key exchange protocols is presented.

Keywords—Lattices, Learning with errors, Ring-Learning with errors, Reconciliation mechanism

1. Introduction

Public-key encryption is an asymmetric cryptographic technique based on one–way function. It plays an exceptionally important role in secure key exchange, pseudorandom number generation, digital signature generation and authentication. The threat of quantum computers, which break most widely used public key cryptographic primitives like RSA, Diffie-Hellman (Diffie & Hellman, 1976) and Elliptic curve Diffie–Hellman key exchange, has raised interest in symmetrical structure lattice. Lattice is a set of points in n-dimensional space with a periodic structure. There are two fundamental computational problems in lattices (Goldreich, Goldwasser, & Halevi, 1997), the Shortest Vector Problem, i.e., finding a non-zero lattice vector with minimal Euclidean length and the Closest Vector Problem, i.e., given a non-zero lattice vector t, find a vector in lattice that is closest to t. All the lattice based cryptographic constructions are fundamentally based on these hard problems. This is further emphasized by an announcement of NIST, for starting standardization of post-quantum cryptography and by the statement of NSA's Information Assurance Directorate (IAD) to "initiate a transition to quantum resistant algorithms in the not too distant future" for Suite B cryptography. The usage of lattices in cryptography started in 1996, when Ajtai (Ajtai, 1996) revealed that there are certain problems in the area of lattices that have strong security guarantees from the worst-case hardness. Cryptography basically requires average-case intractability, i.e., problems for which random instances drawn from a specified probability distribution are hard to solve. This is qualitatively different from the worst-case notion of hardness usually considered in the theory of algorithms and NP-completeness, where a problem is considered hard if there merely exist some intractable instances. Thus, the problems that appear hard in the worst-case often turn out to be easier on the average. The Lattice-based cryptography has emerged as the most promising candidate that provides good performance in addition to resistance against both classical and quantum cryptanalysis. It has many compelling features, like security under worst-case hardness assumptions, efficiency and parallelism. It provides advanced cryptographic constructions like identity-based encryption, fully homomorphic encryption schemes [2] and multilinear maps.

Ideal lattices and cyclic lattices are widely used in recent lattice based cryptographic constructions (Alkim, Ducas, Pöppelmann & Schwabe, 2016). Learning with Errors (LWE) problem (Regev, 2005) is an average-case problem with strong security guarantee and high efficiency when parameters are properly chosen. Later its ring variant, Ring Learning with Errors (RLWE) was introduced in 2010 (Lyubashevsky, Peikert & Regev, 2013). Hardness of LWE and RLWE can be reduced to solve hard problems in regular lattice and ideal lattice (Micciancio, & Peikert, 2013). Since no classic or quantum algorithms can solve lattice problems and their versatility, LWE and RLWE are considered as important building blocks for post-quantum cryptography. Our public key cryptosystem is simple and analogous to the unauthenticated Diffie–Hellman Key exchange protocol and comes with a strong proof of security based on the Ring Learning with error problem, which is related to hard lattice problem. Ring Learning with Errors (RLWE) is a computational problem which is widely believed to be very difficult to solve. This problem is being used as the foundation for a new class of public key cryptosystems designed to withstand attack by a Quantum computer. The problem is generally described in the mathematical ring formed by polynomials of degree n-1 over a finite field such as the integer's mod a prime number q. The motivation behind selecting the RLWE-based construction in our work in contrast to the LWE-based construction is to improve the efficiency while maintaining essentially the same level of security. A major advantage for RLWE compared with LWE is that it has a much reduced key size, and this is more desirable for real world applications due to smaller communication and storage cost. The cryptographic primitives based on the LWE problem, which has been shown to be as hard as worst-case lattice problems such as the shortest vector problem (SVP) and the shortest independent vector problem (SIVP), generally have key sizes and computation times that are at least quadratic in the major security parameter n (Peikert, 2009). The RLWE problem deals with public key sizes that are smaller by n, which in this case corresponds to the ring dimension, and polynomial multiplications that can be performed using Fast Fourier Transform in O(nlogn). The RLWE problem can be stated in two different ways. One is called the "Search" version and the other is the "Decision" version. The Search version of the problem can be stated as follows. Let $a_i(x)$ be a set of random but known polynomials from the ring of polynomials with coefficients from the integers mod q (i.e. F_q), $e_i(x)$ be a set random and unknown polynomials where the coefficients are constrained to be small over the integers (i.e. less that +/- an integer b with b much less than q), s(x) be a single unknown polynomial which also has small coefficients relative to the same bound, b. And $b_i(x)$ be the set of polynomials $b_i(x) = a_i(x)\cdot s(x) + e_i(x)$. Given the list of polynomial pairs $(a_i(x), b_i(x))$ find the unknown polynomial s(x). Using the same definitions, the Decision version of the problem can be stated as follows. Given a list of polynomial pairs $(a_i(x), b_i(x))$ determine whether the $b_i(x)$ polynomials were constructed as $b_i(x) = a_i(x)\cdot s(x) + e_i(x)$ or were generated with random coefficients from the integer mod q. The RLWE problem is proved to be hard using a quantum reduction from worst-case approximate SVP on ideal lattices to the search version of RLWE. It is also proved that the RLWE distribution is pseudorandom if the RLWE search problem is hard (Peikert, Regev, Stephens-Davidowitz, 2017).

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A study of Security issues towards Distributed System

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ABSTRACT
Improvement of secured and trusted Distributed system is a basic research issues. This paper is a commitment towards the summarization of work completed in this field and in addition distinguishes new research lines. A few methodologies about security angles in Distributed system have been talked about, similar to confirmation based methodologies, improvement of trust based models, get to control based approaches, and so forth. A synopsis of these issues is given in conclusion area. Aside from this, many research lines about secure Distributed system are talked about.
Keywords:-Distributed System Security, authentication, cryptography, quorum, mobile agent, trust based models, access control

I INTRODUCTION: - We are interested in the unique security issues that arise from the requirements of two fundamental goals, interoperability and transparency, for computer networks and distributed systems. Interoperability refers to the ability to have effective information exchange between hosts and between process in systems that have heterogeneous components. The effectiveness of information exchange must be augmented with security attributes. Transparency refers to the uniform view of a system that has transparent. Distribution of computation and resources. It is worthwhile to find out the effect of transparency on the design of a secure distributed system and whether the transparency concept should be extended to include security. To address these issues let us first consider the system architecture with embedded security features. The security methods in distributed system [1, 2, 44] are the critical issues. A few components of Distributed system security are recognized, similar to confirmation, authorization, encryption and framework security. In beginning days, the security administration condition depended on single authority frameworks yet now the attention is on the advancement of per action, experts and gatherings with shared responsibilities. The general security assaults on the appropriated frameworks are spying (increasing mystery data), disguising (making suppositions on the character of clients), and message treating (changing the substance of the message), replaying the message and forswearing of administrations. The dependability of dispersed frameworks is vital in a number of situations. For expressive economy the term security is utilized to speak to the two its conventional importance as well as those thoughts conveyed by the term protection. Before talking about the variables influencing security in appropriated frameworks, a review of circulated framework design is presented and utilized as a system for ensuing examination. This paper has been partitioned into 3 sections. Segment 2 clarifies different security parts of dispersed frameworks. Segment 3 concludes the new research lines in creating secure dispersed frameworks. Section 4 is conclusion and future extension.

2. SECURITY ASPECTS IN DISTRIBUTED SYSTEMS:-

Different kinds of security approaches are used to build a secure distributed system. These are authentication based, trust based, access control based, cryptography techniques based etc

2.1 Authentication Based Security:-

Authentication is process which allows a user to confirm his identity to an application [1]. An on request way revelation calculation has been proposed to empower spaces to safely find ways in the cooperation

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Research paper

^{57}Fe Mössbauer spectroscopy study of organic rich sediments (source rocks) from test well CT-1, Chinnewala structure of Jaisalmer basin, India

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ABSTRACT

^{57}Fe Mössbauer spectroscopic study was carried out on the organic rich sedimentary samples collected at different depth intervals from newly drilled test well Chinnewala Tibba-1 (CT-1) located in Jaisalmer Petroliferous basin India. It is found that iron is mainly distributed in high spin Fe^{3+} and Fe^{2+} state in clay minerals. The plot of $Fe^{2+}/(Fe^{2+} + Fe^{3+})$ indicates the presence of poor redox conditions in the samples. Results obtained are also compared with those already reported in the literature. This comparison shows that there may exist a correlation between prospecting of the basin, the redox environment in sediments and the nature of iron bearing minerals distributed in the sedimentary sequence.

1. Introduction

^{57}Fe Mössbauer spectroscopy is particularly useful for characterization of iron bearing species because it probes the local environment of iron nuclei sensitivity. This method offers certain advantages over other conventional techniques such as chemical, optical, electron microscopic analysis etc. Indeed each technique has its own strength, but where Mössbauer spectroscopy can give results, it offers a quick reliable and simple method. Being non destructive technique in the sense that the sample either in powder form or thin slice is not altered during the experiment also in a single run, one can get information about all the iron phases present in the sample by proper deconvolution of the Mössbauer spectrum.

This technique is widely used for the study of geological samples including all types of sediments. As it is well known that oxidation state of iron metal in sediments is a measurement of oxidation-reduction condition of sedimentation. It is the only technique which provides crucial information about ferrous/ferric ratio in sediments. To get better insight about the application of ^{57}Fe Mössbauer spectroscopy for geological samples, we refer to excellent review by Tominaga and Minai (1984). Mössbauer spectroscopy is also used widely to study organic rich sediments (source rocks) from different petroliferous basin. In fact source rocks are tiny generators of oil/gas or both. Source rock characterization is one of the important aspect for the exploration of oil/gas. To get more information about source rocks we refer to Hobson and Tratsoo (1981) and Tissot and Welte (1984).

The mineral matters present in source rocks also contain iron bearing minerals which can be characterized by Mössbauer spectroscopy.

In an early work Mørup et al. (1985) have studied the chemical state of iron in the organic rich sediments from Danish North Sea offshore and onshore wells. They have shown that in the offshore sediments, iron was mainly present in most of the samples in the form of Fe^{2+} in clay minerals and pyrites. In some samples siderites/ankerite was also present. This distribution of minerals suggests that North Sea offshore sediments were deposited in highly reducing environment. It is worthwhile to note that offshore region is major oil field of North Sea. In view of above study the detail study of chemical state of iron in subsurface sediments for four different petroliferous basin of India was carried out by our group

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Research Article Open Access

Shallow Marine Trace Fossils from Mandai Formation of the Barmer Basin, District-Jaisalmer, Western Rajasthan, India

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Abstract

Thirteen well-preserved trace fossil species namely *Thalassinoides horizontalis, Thalassinoides suevicus, Ophiomorpha nodosa, Ophiomorpha borneensis, Palaeophycus heberti, Palaeophycus tubularis, Planolites, Planolites montanus, Planolites beverleyensis, Planolites annularis, Siphonites, Paleomendron, and Phycodes palmatum* have been reported from Mandai Formation of the Barmer Basin at Mandai area, western Rajasthan, India. The present study area is located about 15 km southwest of Fatehgarh town on Fatehgarh–Jhinjinyali tar Road. The Mandai Formation is 27 m thick lithostratigraphic unit deposited in the north-western part of the Barmer Basin and overlies on Early Palaeocene Bariyara -Dharvi-Sajit Member of the Akli Formation and overlain by Giral-Thumbli Member of Akli Formation of Early Eocene. The Mandai Formation has mixed siliciclastic, minor carbonate and phosphorite facies and its starts with bioturbated medium to fine grained ferruginous sandstone at the base. These trace fossils are preserved of full relief in yellowish to dark brown medium to fine grained ferruginous sandstone and greyish yellow coarse and coarse to medium grained calcareous sandstone. The entire ichnogenera shows shallow marine depositional environment of Mandai Formation of Barmer Basin. No age can be assigned on the basis of these trace fossil as they have long range (Cambrian to Recent).

Keywords: Shallow marine; Trace fossils; Mandai formation; Barmer basin; Jaisalmer and Western Rajasthan

Introduction

Barmer Basin is mainly Tertiary basin, opened as narrow, roughly N-S trending linear graben and it has a maximum length 100 km; while the width is about 50 km [1]. Biswas et al. [2] opined that Barmer Basin considered as northern extension of Cambay Basin connected through the Sanchore Basin. The Barmer Basin is floored by Malani igneous suite, Lathi sandstone and Jaisalmer Formation [3]. The sediments of the Barmer Basin are classified into eight formations *viz*; Sarnu Formation, Fatehgarh Formatiom, Mandai Formation, Barmer Hill Formation, Akli Formation, Mataji ka Dungar Formation, Kapurdi Formation and Uttarlai Formation. The Sarnu Formation is represented by red siltstone and sandstone with plant fossils, the Fatehgarh Formation comprises siltstone, ferruginous sandstone, phosphatic sandstone having significant microvertebrates- magnetic spherule bearing bone bed and gastropod bed [4,5], the Mandai Formation is represented by bioturbated ferruginous sandstone and calcareous sandstone, medium to coarse grained sandstone, phosphatic bivalves bed, fine to medium grained sandstone, coarse grained sandstone and pebbly sandstone [6], the Barmer Hill Formation comprises sandy sandstone with chert and poorly preserved plant fossils and well -preserved *Asthenopodichium* wood bearing trace fossils [7]. the Akli Formation is represented by bentonite, clay, lignite and ferruginous sandstone with gastropods, microvertebrates and plant fossils [8], the Mataji ka Dungar Formation is dominantly composed of coarse grained sandstone, ferruginous sandstone and clay and bentonitic clay at the base [6,9], the Kapurdi Formation is represented by fuller's-Earth, gypseous clay, bioclastic limestone and marl with plants fossils, crabs, shrimps, turtles, fishes and gastropods [10] and the Uttarlai Formation comprises salt, gypsum, gypseous clay and sands [1]. Many trace fossils have been already reported from the rocks of the Barmer Basin by various researchers such as Borkar et al. [11], recorded *Thalassinoides, Planolites* and *Planolites Montanus* from Fatehgarh Formation; nearshore – shallow marine trace fossils from Fatehgarh Formation reported by Parihar et al. [7,9] and trace fossils from Mandai Formation reported by Parihar et al. [12]. The present investigation here deals with detailed study of shallow marine trace fossils from Mandai Formation of Barmer Basin at Mandai area *viz; Ophiomorpha nodosa, Ophiomorpha borneensis, Palaeophycus heberti, Palaeophycus tubularis, Planolites annularis* trace fossils found in yellowish to dark brown medium to fine grained ferruginous sandstone and *Thalassinoides horizontalis, Thalassinoides suevicus, Planolites, Planolites montanus, Planolites beverleyensis, Siphonites, Paleomeandron and Phycodes palmatum* trace fossils are occurred in greyish yellow coarse and coarse to medium grained calcareous sandstone in the lower phosphatic – carbonate dominated sequence of Mandai Formation. The objectives of present paper (i) To first reports of 13 trace fossils from Mandai Formation of the Barmer Basin. (ii) To the systematic ichnology of trace fossils and environment of deposition of trace fossils bearing facies of the Mandai Formation of Barmer Basin, Western Rajasthan, India.

Geology of the Study Area

The Mandai Formation is located about 15 km south -west of Fatehgarh on Fatehgarh-Jhinjinyali tar Road (Figure 1). The Mandai Formation is 27 m thick lithostratigraphic unit deposited in the north -western part of the Barmer Basin. The various lithounits of the Mandai Formation forms low to high ridges and hillocks in and around Mandai Village. The Mandai ridge running from south of the Jaton ki Dhani and up to Mandai in the south and the overall strike length of ridges is about 10 kms (Figure 2). The Mandai Formation

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Review Article Open Access

Near Shore - Shallow Marine (*Ophiomorpha* and *Margaritichnus*) Trace Fossils from Fatehgarh Formation of Barmer Basin, Western Rajasthan, India

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Abstract

Two trace fossils namely *Ophiomorpha* and *Margaritichnus* have been reported from the Bariyara section of the Fatehgarh Formation of Barmer Basin. Here the *Margaritichnus* trace fossil sp. is the first record from the western Rajasthan. The present study area is located about 6 km south of Fatehgarh town and 70 kms north of Barmer on Bramer–Jaisalmer road. The *Ophiomorpha* trace fossils are found in white fine grained calcareous sandstone from lower siliciclastic sequence while *Margaritichnus* trace fossils occurs in dark brown medium to fine grained ferruginous sandstone of middle phosphorite - siliciclastic sequence of the Fatehgarh Formation of Barmer Basin. The *Ophiomorpha* trace fossils were considered as crustaceans and shrimps whereas *Margaritichnus* were mainly produced by worm–like deposits feeders such as sipunculids and priapulids or possibly hydrozoa. The ichnological and sedimentological investigations suggests near - coastal shallow marine depositional environment for the Fatehgarh Formation of the Barmer Basin. It is difficult to attribute a more specific age of Bariyara section of Fatehgarh Formation because of the long stratigraphic range of *Margaritichnus* (Permian-Cretaceous) and *Ophiomorpha* (Permian-Recent) as attributed the Fatehgarh Formation to the Cretaceous age on the basis of microvertebrate assemblages recorded from the same Bariyara section.

Keywords: Near-shore; Shallow marine; *Ophiomorpha*; *Margaritichnus*; Trace fossils; Fatehgarh formation; Barmer basin; Western Rajasthan

Introduction

Barmer Basin is the Mesozoic–Tertiary basin extends for about 100 kms in north-south direction and 50 kms in east-west as its maximum width [1]. It is tectonically a graben bounded in north by Fatehgarh fault, in east by Sarnu fault and in west by Barmer Faults [2]. The horst is in its eastern flanks is made up of Jodhpur sector of Malani Igneous Suite and its north -western flanks is made up of Devikote High [3]. Datta [4], Biswas [5], Biswas et al. [6] opined that Barmer Basin considered as northern extension of Cambay Basin and southern extension of main Indus Basin. The rocks of the Barmer Basin are grouped into seven namely, Sarnu Formation, Fatehgarh formatiom, Barmer Hill Formation, Akli Formation, Mataji ka Dungar Formation, Kapurdi Formation and Uttarlai Formation. The Sarnu Formation consists of siliciclastic facies with plant fossils of Early Cretaceous age, the Fatehgarh Formation is represented by siliciclastic and phosphorite rocks having significant microvertebrates - magnetic spherule bearing bone bed and gastropod bed of Late Cretaceous age [1,7] the Barmer Hill Formation consists of siliciclastic rocks with poorly preserved plant fossils and well -preserved *Asthenopodichium* wood bearing trace fossils of Palaeocene age [1], the Akli Formation is consists of bentonite, clay, lignite and siliciclastic rocks with gastropods, microvertebrates and plant fossils of Palaeocene to Early Eocene age [8], the Mataji ka Dungar Formation is represented by clay and bentonitic clay at the base and fining upward sequences of siliciclastic rocks of Middle to Late Palaeocene age [9,10]. The Kapurdi Formation is consists of fuller's Earth, gypseous clay, bioclastic limestone and marl with plants fossils, crabs, shrimps, turtles, fishes and gastropods of Early Eocene age [11]. The Uttarlai Formation is represented by salt, gypsum, gypseous clay and sands of Quaternary age [12]. The Barmer Basin is floored by Malani igneous suite, Lathi sandstone and Jaisalmer Formation [3].

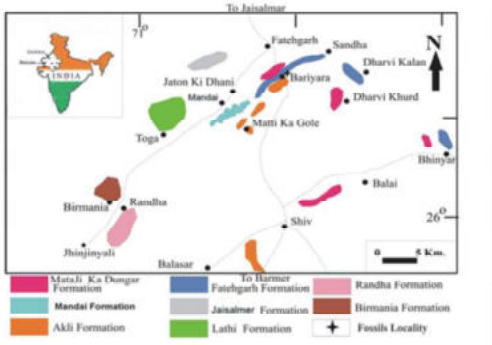

Figure 1: Location map of the Bariyara section of Fatehgarh Formation of Barmer Basin showing trace fossils locality [10].

The rocks of the Barmer Basin studied for ichnological aspects by various workers and many trace fossils are already recorded such as

Changes in Optical Behaviour of Iron Pyritohedron upon Microwave Treatment

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Abstract. We have utilized the volumetric heating of materials by microwave energy absorption for investigating the changes in the optical behavior of a well characterized natural crystal of iron pyritohedron (FeS_2). For microwave treatment virgin central core pieces of the FeS_2 crystal were ground to fine powder and then heated in a microwave oven for half an hour. Powder XRD measurements confirmed that the microwave treatment on FeS_2 does not affect the face centered cubic structure of FeS_2. The UV-Visible optical spectrum of the microwave treated FeS_2 display a narrow optical absorption peak at ~315 nm, on the other hand in the UV-Vis spectrum of pure FeS_2 a broad absorption band with a maximum centered ~310-330 nm was observed. The band gap energies for pure and microwave treated FeS_2 are estimated to be 1.09 eV and 1.35 eV respectively. This study clearly indicates that microwave treatment results in a blue shift in the absorption edge and enhancement in the band gap energy.

INTRODUCTION

In recent years, transition metal chalcogenides have attracted considerable attention due to their excellent optical, electrical, magnetic, and transport properties. The nontoxic semiconductor iron pyrite (FeS_2) is one of the most promising technological material with strong light absorption, high natural abundance and low cost but with a lower than optimum band gap of 0.95 eV and nonmagnetic nature [1-2]. Iron pyrite is extremely common mineral, and occurs in virtually all geological environments. It can form well crystallized specimens and occurs as cubes, pyritohedrons and octahedrons and combination of these forms also occur. In the literature, number of controversies exists on its non-stoichiometry, optical, electrical and magnetic properties. The feasibility to enlarge the band gap and induction of ferromagnetic ordering through elemental doping or creating defects in un-doped bulk and nanocrystalline FeS_2 needs to be explored [1-4].

The emerging technique of volumetric heating of materials by microwave energy absorption is an effective way for fast sample preparation at relatively low temperatures, for defects creations in materials and also for tuning the physical properties of materials [5].

Here, we report a comparative study on the effect of microwave annealing on the structural and optical properties of sulphur rich natural crystal of Iron Pyritohedron (Iron Pyrite:FeS_2).

EXPERIMENTAL DETAILS

A natural crystal of iron pyrite pyritohedron was obtained from soap-stone mine located in the Udaipur region of Rajasthan, India. The iron pyritohedron shaped crystal was consists of twelve sides polyhedron that has all sides

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Assessment of Impact of Groundwater Augmentation Structures in Granitic Terrain of Ramsin - Jaswantpura Region of Jalore District, Rajasthan

KEYWORDS: Groundwater, Augmentation, Igneous Rocks

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ABSTRACT *Groundwater is the water located beneath earth's surface in soil and rocks pore spaces and in the joints and fractures of rock formations. Groundwater is the primary source of potable water supply in rural India. Deforestation and the resulting soil erosion hamper the recharging of the groundwater therefore groundwater levels are decreasing country wise in almost entire India. There is severe groundwater depletion problem in Rajasthan state too.*

Hundreds of groundwater augmentation structures have been constructed in last 10-15 years in the Jalore district of Rajasthan by State Watershed Department and other agencies. We have studied only those structures which are in granitic terrain of Ramsin and Jaswantpura region of Jalore district. Our study aims to analyse the significance of water augumentation structures regarding changes in groundwater table of villages Baitarana, Bithan and Punak Khurd of Ramsin region and Rathpura of Jaswantpura region. It is revealed that these structures which were constructed in hard rock or granitic terrain are useful for local villages. They are providing water for their cattle and are also recharging their nearby wells. Therefore, we are of the opinion that the groundwater augmentation structures be preferred in rocky, fractured and jointed igneous terrain to recharge the aquifers.

Introduction

Groundwater is the primary source of potable water supply in rural regions of not only Rajasthan but all over India too. It is not readily available in most parts of India due to hard rock shield, which covers 70% of the country. Central and southern part of the country consists of a peninsular slab where surface water is scarce or seasonal and the groundwater is deep (Ramakrishnen, 1998; Radhakrishna, 2006). The similar situation prevails in Malani igneous and other metamorphic rocks of Rajasthan (Subhajyothi, 2013).

Deforestation and the resulting soil erosion hamper the recharging of the groundwater. Hence, in India groundwater levels are decreasing countary wise. Groundwater levels are further affected in drought- prone regions and in places where there has been over pumping for agricultural or industrial needs, or where there are just too many people using the available water. Although, many states are affected, there is serious groundwater depletion problem in Gujarat, Rajasthan, Uttar Pradesh, Andhra Pradesh and Madhya Pradesh.

Igneous and metamorphic rocks possess negligible primary porosity but attain porosity and permeability due to fracturing and weathering. In metamorphic rocks groundwater yield also depends on the rock type and grade of metamorphism (CGWB, 2006).

In Jalore district, Quaternary age alluvium and wind blown sand cover vast area. Only 5 to 10% of the total district area (10640.00 sq. km) has rock exposures. Ramsin village falls in Bhinmal Tehsil of the district. The granitic aquifers around Ramsin-Jaswantpura region geologically belongs to Erinpura Granite and Malani Group of igneous rocks. These rocks obtain porosity and permeability due to fracturing, jointing and weathering. The water augmenting structures are constructed on near by drainages.

The Study Area - Jalore District:

Jalore district is located between 24° 37' and 25° 49' North latitude and 71°11' and 73° 05' East longitude. As stated above the district has a geographical area of about 10640 sq.km. It is bounded by Barmer district in the north -west, by Pali district in the north- east, by Sirohi district on the south-east, and by Banas- Kantha district of Gujarat state in the south (Fig.1). The district is comprises of seven tehsils viz: Jalore, Ahore, Bhinmal, Sanchore, Raniwara, Sayala and Bagora and also seven blocks viz: Jalore, Ahore, Bhinmal, Sanchore, Raniwara, Sayala and Jaswantpura.

Hydrogeology

Groundwater occurs under unconfined condition in saturated zone of rock formation. Its occurrence is controlled by topography, physiography and structural features of the geological formations. The movement of the groundwater in hard rock areas is governed by size, openness, interconnection and continuity of structural weak planes while in unconsolidated rocks groundwater movement takes places through pore space between grains. (CGWB,2008) Water bearing properties of different aquifers belonging to rocks of Precambrian age are briefly described below.

Granite & Rhyolite: These aquifers occur predominantly in Jalore, Jaswantpura, Bhinmal and Raniwara blocks. Malani rhyolite encompasses small area in Raniwara block. Granite and rhyolite together cover nearly 8% groundwater potential area. Few intrusives are also found which have low permeability. Groundwater is retained in weathered zones, fractures joints etc in these granites & rhyolites. Depth in open wells tapping these aquifers ranges from 20 to 50m. Yield of wells varies from 20m /day to 188m /day. The depth to water level in the area tapping the aquifer ranges from 11m to 31m.

Phyllite: The aquifer occur predominantly towards Jas-

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Dimensional Stones: Weathering Nature and Technical Properties

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Abstract: *Rocks are naturally occurring aggregates of minerals. Most of the rocks are consist of many minerals but some are monomineralic. Rocks which are consist of one or more minerals called stones. Stone is a basic building material used by man from pre-historic time. It is clearly evident by statues and monuments of historic times. Even today stones are used for elegance, beauty, durability and decoration of architectural work in houses, hotels, monuments, temples and palaces. A thorough knowledge of mineral composition, weathering nature, geological and engineering properties and accordingly selection of stone will surely increase life of the rock and the building too. Not only this but the screening among different colour of stones will be good for an area remaining under certain conditions of sunlight and what type of stone should not be used for a kitchen's plate-form. Which stone will be suitable for exterior or interior of a building? The paper is aimed to give an idea of all these characteristics of dimensional stones to common users.*

Keywords: Dimensional stone, monomineralic, technical properties, weathering, buildings.

1. Introduction

With increasing prosperity among citizens of India they want to utilize their money for constructing best quality houses for their comfortable abode. Not only abode they are constructing very beautiful temples and other monuments too. However most of the peoples while selecting dimensional stones for their use, generally they give more preference to attractiveness of the stones colour and texture than to geological and engineering properties. Any rock specially cut or shaped in different sizes are termed as 'Dimensional Stones' for example granite, gabbro, dolerite, sandstone, limestone, marble, serpentinite (commercially known as green marble) gneiss etc. Decorative stones are those utilized for exterior and interior decorations of various high profile buildings. In India the geological time-scale encompasses rocks like granite, marble, sandstone and limestone mostly used in constructing buildings. Rajasthan is especially rich in these building stones and particularly in marbles (Rathore et al. 2000, Roy & Jakhar, 2002).

Not only modern building but also we have to take care for the heritage buildings from weathering effects. The heritage buildings are buildings that for various factors society have decided that they shall be preserved for periods as long as possible. Heritage buildings are seriously endangered by environmental agencies such as moisture, acid rains, intense solar radiation, temperature, vibrations and prevailing winds which change their physical characteristic. The major effects of environmental agencies include discolouration, abrasion, cracks and fungal growth.

All users of stones are not technical persons hence they are guided here through this paper by giving some ideas about nature and properties of dimensional stones. For example if one wish to use tiles of stone for flooring where peoples allowed walking bare foot only. Then white colour marble or white colour tiles will be suitable because white colour will reflect maximum light back and your floor will remain cool. Green marble (serpentinite) may not be used for exterior decoration because it is highly susceptible to environment and it will get dull by losing its luster very soon. Marble or limestone may not be used for kitchen's plate-form because it is composed of carbonates which react with citric acid of lemons and other acidic materials used in kitchens. Same way marble or limestone should not be used for bathroom tiles because bathrooms remain wet for long time and also washed by chemicals of acidic nature which will start weathering in the marble and limestone.

2. Weathering

Weathering is the breakdown and alteration of rocks and minerals at or near the Earth's surface. The extent and style of weathering is mainly controlled by climate. Water is extremely important for weathering. The more water present, the faster weathering occurs. Temperature is also important for weathering. Warmer temperatures also promote faster reactions, so chemical weathering is more effective in warm climates. Thus, warm, humid climates tend to have the most rapid weathering on rocks.

There are three broad categories of mechanisms of weathering: physical, chemical and biological.

Mechanical or Physical Weathering: Mechanical (physical) weathering breaks down stone into smaller fragments without altering or change in their chemical composition. It is process of slow natural disintegration of rocks (Singh, 2008) and also depends on nature of minerals of which the rock is composed. An example of this is fractures in rocks. Temperature variation can cause mechanical weathering. As Minerals expands and contracts with the variation of temperature, freezing and melting cycles can result in cracks and other damage to stones of any building. A list of the following common rock-forming minerals is given to have an idea in order from most resistant to least resistant minerals to physical weathering (i.e. hardest to softest): quartz, orthoclase, muscovite, biotite, plagioclase, olivine, pyroxene, amphibole, calcite

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RESEARCH ARTICLE

MULTIPLE USE OF DESICCATED LIK RIVER OF THE THAR DESERT IN WESTERN RAJASTHAN

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ABSTRACT

It is well established through studies of diverse parameters that there are a number of palaeochannels exist in the Thar Desert of western Rajasthan. These palaeochannels are good sites for plantation. Plants through their transpiration process increases in content of water vapour in the atmosphere leading to precipitation in form of rain. The rain will reduce frequency and intensity of draught and will convert dry land into greenery which will check further extension of the desert. Other then wood we will get a number of products from plants too. The primary aim of the present study is to find out the possible cause of the contribution of palaeochannels for well being of local residents of the area.

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INTRODUCTION

The Thar Desert exists mainly in western part of the state and occupies an area about 57% of the total area of the state. The region is arid and having low rainfall. The average annual rainfall varies between 150 and 400 mm. The maximum temperature goes up to 50°C (average 40 – 45°C) in summers and minimum air temperature range between 1- 2°C (average 10 – 12°C) in winters. It has been inferred that sometime in the past the desert was a green land recharged by a very mighty Himalayan river "Sarswati" flowing through western Rajasthan and meeting Arabian Sea. Sarswati is described as a mighty and holy river of India in the Vedic period literature like Rigveda, Yajurveda, Ramayana, and Mahabharata etc. (Kochhar, 1997). The river become extinct about 1500-2000 B.C. Numerous workers (Kar, 1988, 1999; Roy and Jakhar, 2002; Bhardwaj, 1987; Bhadra *et al.*, 2009; Thussu, 1999; Valdiya, 2002; Kar, and Ghosh, 1984; Yashpal *et al.*, 1980; Bakliwal, and Grover, 1988; Sahai, 1999; Gupta *et al.*, 2004; Rajawat, 1999) have worked on palaeochannels of the Sarswati and its tributaries in western Rajasthan. They have been recognised by scientist of different disciplines on basis of data gathered by them including remote sensing imageries, geomorphic features, occurence of fluvial deposits and ground checks. These palaeochannel are oriented in NE-SW to N-S direction.

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However some of palaeochannels cum desiccated rivers were flowing almost parallel to NW-SE direction i.e. almost right angle to the path of present Arabian monsoon which is trending in NE-SW direction in Rajasthan. The palaeodrainage map prepared by Regional Remote Sensing Centre, Jodhpur is shown in figure 1. The Lik River (Fig. 2A and B) is desiccated one and lies in Jaisalmer and Barmer districts of Rajasthan. The orientation of the river is almost NNW-SSE (Jakhar, 2010)

Lik River and Plantation

To start within a palaeochannel for plantation, the Lik River may be chosen for experimental work. The Lik river is a western tributary of the ephemeral river Luni. The river originates from rhyolitic mounds (Roy and Jakhar, 2002) exposed west of village Bhaniyana (Fig. 2A and B). It traverses more than hundred kilometres distance to join the Luni River near Balotra in Barmer district (Fig. 2A and B). The river has not witnessed continuous water flow in the living memory. With lapse of time the meandering river lost its identity as its course is obstructed by the moving sand dunes. In its entire course it passes through hard and weathering resistant volcanic rock rhyolite. The river is more or less wider than half-kilometre throughout its course. The human habitation have encroached the sight of the old and abandoned channel of the river. It is a good site for plantation because state Government have already started laying pipeline to bring drinking water from Indira Gandhi Canal to Pokaran and then to Bhaniyana, Phalsund and Balotra area (Fig. 2A and B, Photo 1).

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Calcium Carbonate and Derived Products

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Abstract: *Calcium carbonate is one of the most versatile and widely distributed mineral. Various forms of this mineral with variety of chemical composition, though differing to only minute level, make it highly attractive for various applications. These minerals not only differ in chemical composition but also physical forms; such as amorphous, calcite etc. This article deals with a comprehensive but brief over view of calcium carbonate and its applications.*

Keywords: Calcium carbonate, lime stone

1. Introduction

Calcium carbonate, or $CaCO_3$, comprises more than 4% of the earth's crust and is found throughout the world. It's most common natural forms are chalk, limestone, and marble, produced by the sedimentation of the shells of small fossilized snails, shellfish, and coral over millions of years. Although all three forms are identical in chemical terms, they differ in many other respects, including purity, whiteness, thickness and homogeneity. Calcium carbonate is one of the most useful and versatile materials known to man. Calcium carbonate ($CaCO_3$), in the form of chalk, limestone (figure 1A, 1B & 3), marble (figure 2 & 5)and calcite (figure 4) is one of the most widespread mineral of the earth.Chalkis a fine, microcrystalline material, which has been used as a tool for writing, for last thousands of years. As a school boy, one might haveencountered calcium carbonate basedblackboard chalk-sticks.Term chalk has been used for the friable limestone which is composed of microscopic remains of marine organisms and on crushing gives fine powder. It is also used in the manufacture of paint, distemper, filler in rubber goods, etc. Normal soil, besides silica and silicates, is rich in carbonate-minerals (~4%); particularly those of calcium and magnesium. Natural water (ground, rivers and lakes, and sea) contains varying amount of calcium carbonate, which is reversibly solubilised (Eq.-1) as bicarbonate on absorbing atmospheric carbon dioxide and which causes water hardness

$$CaCO_3 + H_2O + CO_2 = Ca(HCO_3)_2 \quad \text{(Eq.-1)}$$

Even the pearls, which are produced in certain shelled sea-animals, are mainly composed of calcium carbonate. These are highly valued due to their limited natural occurrence. Pearls are used as gems in ornaments. Cultured pearls are now produced by harvested shelled animals.

Crystalline calcium carbonate; calcite is also known as 'calc-spar. The calcite crystal generally is considered a rhombohedron because of its cleavage properties. Cleavage is what causes crystals to angle where the bonding forces are weak and are apt to break into planes. Calcite is unique in that its cleavage takes three distinct directions. Specific gravity range is 2.71-2.72. Melting point is about 825°C. It decomposes, giving off CO_2 leaving CaO (or lime), which melts at about 2570°C. Colourless white but also various shades like pink, brown etc. depending upon the impurities present. Fracture varies, depends upon structure. Its different varieties are, transparent to opaque. It is brittle. There are more than 300 forms of calcite crystals. Another important property of the calcite crystal is its property of double refraction. Double refraction occurs when a ray of light travels through a medium and is split into two different beams, one traveling slowly, one traveling fast. The two different beams are bent at two different angles of refraction. As a result of this property a person looking through calcite sees two images. This property of double refraction is a feature valuable to a number of optical applications. Calcite is often very pure however; sometimes part of the calcium is replaced by magnesium, iron or manganese. It is often mixed with impurities, such as silica, clay, organic matter, limestone or hematite.Calcite occur in a great variety of forms, the more important of which are as follows;***dogtooth spar***, which occurs in acute, scalenohedral crystals; ***nailhead spar***, which occurs in flat rhomohedral crystals, ***satin spar*** (term also used for a variety of gypsum), which is fibrous and has a silky luster, ***iceland spar or ordinary calcite*** deposited from solution as vein fillings etc. The only form of calcite or crystallized calcium carbonate which has properties and uses distinct from other forms and for which there are no entirely satisfactory substitutes in the finest of optical instruments is Iceland Spar. Transparent calcite was discovered in Iceland and become widely known, hence the name 'Iceland Spar'. Iceland spar is the name given to a pure crystallized form of calcite which is highly transparent and free from defects to be used in the manufacture of optical instruments. The properties in Iceland spar of value are transparency, double refraction or very high birefringence and ability to polarize light. Aragonite has the same chemical composition as calcite, but it crystallizes in the orthorhombic system, often in radial, columnar, or fibrous aggregates. It has a hardness of 3.5 to 4, specific gravity 2.9 to 3; imperfect prismatic cleavage; and conchoidal fracture. Commercially, it has no distinctuses. It is however, an unstable mineral, found mainly associated with gypsum beds and the tests of reef building corals. The Nicol prism which finds applications in the microscope and polariscope is the most common use. It is used in eyeglasses and for windows in trains, planes, and autos to remove a

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Lithostratigraphy of Bar-Mohra Khurd-Raira Khurd Area of Pali District, Rajasthan and their Relationship with the Soil and Vegetation

Beena Tripathi, G. Singh

Abstract

The paper deals the study a metasedimentary sequence, overlying schistose formation of Sendra Formation of Delhi Supergroup and the underlying Banded Gneissic Complex of Pre-Delhi age, in Birantiya Khurd -Raira Khurd areas in northwestern Rajasthan. The sequence is important due to its heterogenous lithologic association. It shows by different type of conglomerates imbedded in quartzofeldspathic schist. The process of soil formation by breaking up the rock particles and organic matter from weathering and erosion of subterranean parts are influenced by different biological activity. This sequence has been defined as the 'Bar conglomerate horizon' in this paper. The soils derived from the parent rocks which sustain different vegetation, depends upon the climatic conditions. Hence, the nutritional status is required to be studied from the point of view of sustenance of flora in the area. There is no clarity, so far, regarding the exact chronology of deformation in the area. At the same time, the lithostratigraphic history of the area also needs a further revision. In view of the above, the Bar-Mohra Khurd-Raira Khurd area have been studied extensively and results are presented in this paper.

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High Heat Producing Radioactive Granites of Malani Igneous Suite at Northeast of Jodhpur, Northwestern India

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ABSTRACT

The Malani igneous suite, a terrain showing crustal formation as late as in Neoproterozoic, shows some pink and grey granites in the northeast of the desert city of Jodhpur, in northwestern, India. The average heat generation value of 15.925 HGU for these granites that is much higher than the average known value (3.8 HGU) for the continental crust has been reported here. The concentration of uranium determined is four times higher than the average continental crust. Thorium is still higher than U and K. The radioelement concentration (Ur) varies from 15.58 to 73.48 in the granites with an average of 45.671, clearly indicates a 'hot crust'. Hence it is favourable for the formation of mineralization of HFS elements like, Nb, Ce, REE and U and Th, which need to be explored in the terrain as an economic deposit.

INTRODUCTION

The crustal evolution in the history of earth has occurred in two stages. The first stage involved upward vertical migration of magma produced by partial melting of pyrolitic composition of the mantle and the ocean floor igneous rocks have been produced at the ridge, but once these igneous rocks had been differentiated and emplaced, forming the oceanic lithosphere, the horizontal motion became operative as the lithosphere was carried away from the ridge as the second stage when island arc igneous rocks have been formed above the sinking oceanic lithospheric slabs containing the early produced igneous rocks (Patwardhan, 2010). The heat required for greater partial melting of the upper mantle was largely provided by the exothermic reactions involved in the radioactive decay of unstable isotopes of U, Th and K. The heat generated by such decay progressively decreased with time, ever since the earth's existence. The heat energy for the first stage of fractionation might also have been contributed by the profuse meteoritic bombardment and impact cratering, if one draws analogy with the lunar surface which preserves its early history (Bhandari, 2009). It appears that due to the excessive heat generated by radioactive decay and the meteoritic impacts, more than 65% of the total continental crust was already formed during the period 3.2-2.5 Ga (Roy, 2009).

High heat production (HHP) granites (Kochhar, 1989; 2012; Sharma, 1994; Srivastava, 2003; Shrivastava et al. 2013) are those evolved calc-alkaline granites which have comparatively higher content of Th, U, K and total REE and responsible for nearly half of the crustal heat flow (Morgan and Sass, 1984; Plant et al., 1985; Morgan, 1985) through radiogenic decay of isotopes of Th, U and K, of which uranium is the dominant heat producing element. Therefore, the granites with nearly four times or more uranium than the general abundance (3.5 ppm; Clark et al., 1990, 4 ppm: Rogers and Adams, 1969) are considered as HHP granites. Such granites act as 'heat engine' and prolongs the circulation of ore bearing hydrothermal fluids (Fehn et al., 1978; Kimberley, 1978), which ultimately may lead to the formation of a mineral deposit.

The Malani igneous suite is an unique terrain which shows crustal evolution as late in Neo-Proterozoic and these granites are part of the igneous activities of the Malani Igneous Suite (780 Ma-660 Ma) (Bhushan and Chandrasekaran, 2002; Roy et al., 2012; Kochhar, 2012). The field relationship of these granites favour its Malani age rather than Erinpura (Shrivastava et al., 2013).

In the present paper, granites of northeast of Jodhpur have been studied for the evolution of their high heat production value, with a possibility of economic deposit formation. The study area lies between latitudes 26°16'57" to 26°26'52" and longitudes 73°28'54" to 73°44' 10" which is almost 60 km NE of Jodhpur and constitute peripheral semicircular ring, having a diameter of 45 km with Jodhpur city at its centre and show isolated outcrops of these granites in the desert sand.

FIELD AND PETROLOGY

Geomorphologically, the higher topography is occupied by grey granites and the lower has been covered by desert sand and alluvium. In between the two, there is presence of pink granite. Both, the pink (Plate 1: Fig A) and grey granites (Plate 1: Fig B) which appear different in the field, at least because of colours, have very similar petrology. It is observed that there is presence of equal amount of all the three essential minerals namely, quartz, orthoclase and plagioclase (Plate 1: Fig C), with small amount of biotite (Plate 1: Fig D). Some euhedral isotropic ores are also present in small amounts (Plate 1: Fig D). The interesting and dominating texture in these rocks is graphic texture (Plate 1 Fig F). Various sizes and shapes of quartz especially cruciform are commonly present (Plate 1: Fig H). There is presence of cauliflower-type graphic texture. Occasionally large and small 'myremekite' are also present, showing vermicular growth of quartz and sodic plagioclase adjacent to potash feldspar. The process responsible for such solid solution structure, essentially seems to be secondary. The overall texture is holocrystalline, ranging in grain size from medium to coarse (Plate 1: Fig E). Generally, orthoclase is coarse grained. Feldspars are invariably altered to clays (Plate 1: Fig G).

GEOCHEMISTRY

To represent the whole granite body, fifteen granite samples were collected from different locations. In the laboratory, the rock samples were crushed to make a fine powder of 53 micron or smaller size, before coning and quartering of each of the samples. Major oxides have been determined using XRF. The trace and rare earth elements have been determined by ICP (MS). Both the analysis have been performed in the laboratories of the Wadia Institute of Himalayan Geology, Dehradun, India.

Energy-dispersive X-ray Fluorescence has been used with isotopic excitation source ^{109}Cd/30 mCi and Si/Li detector system, 30mm^2 x 3 mm, having resolution for 5.9 keV radiations of 200 eV. It was coupled to series 90 MCA of Canberra Industries. The configuration of XRF system is of SIEMENS SRS 3000 sequential X-ray spectrometer with end window Rh X-ray tube. For major oxide analysis pressed power pellets have been used. For major oxides, the operating conditions include no filter, vacuum path, 20/40 kV and for trace elements, no

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Discovery of Trace Fossils from Lower Odania Member of Lathi Formation of Jaisalmer Basin, Akal area, District- Jaisalmer, Western Rajasthan, India

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Abstract: The Lathi Formation is the oldest lithostratigraphic unit unconformably overlying rocks of Malani Igneous suites, Birmania Formation, Marwar Supergroup and Bhadhura Formation and overlain by lower Hamira Member of Jaisalmer Formation of the Jaisalmer Basin. It is well developed mainly in the vicinity of Lathi, Odania, Thaiat and Akal area and divided into two members *viz;* Lower Odania Member and Upper Thaiat Member. The present investigations here documented eight trace fossils namely *Thalassinoides suevicus, Thalassinoides paradoxica, Ophiomorpha nodosa, Ophiomorpha borneensis, Palaeophycus heberti, Palaeophycus tubularis, Gyrocrote* and *Phycodes palmatum* from grayish yellow coarse to medium grained calcareous sandstone of Lower Odania Member of Lathi Formation of Jaisalmer Basin in Akal area. The trace fossils bearing Akal section is located about 18km south of Jaisalmer city on NH-15. The complete section is about 22m thick comprises glauconitic sandstone at the base, calcareous sandstone, petrified wood bed and ferruginous sandstone with box works and concretionary structures. These trace fossils are well -preserved and abundant in nature in Akal area and ethologically they represents domichnia and fodinichnia. The ichnological and sedimentological investigations suggest near-shore to shallow marine depositional environment of trace fossils bearing calcareous sandstone of Akal area. No age can be assigned on the basis of these trace fossils as they have long range (Precambrian to Recent).

Key words: Trace fossils, Odania Member, Lathi Formation, Jaisalmer Basin and Western Rajasthan

1. Introduction

Jaisalmer Basin is the mainly Mesozoic -Tertiary basin which is floored by Malani igneous suite, Marwar Supergroup, Bhadhura Formation on surface (Pareeek, 1984 and Roy & Jakhar, 2002) and Permo-Triassic Bhuana Formation in sub-surface (Bhandari, 1999 and Roy & Jakhar, 2002). The sediments of the Jaisalmer

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To Study on Physico-Chemical Analysis of Soil Around Bar-Dipawas- Lawacha-Kalab Kalan Section of Raipur Area of Pali District, Rajasthan, India

KEYWORDS: enriching the soil, urbanization, industrialization, indiscriminate mining, sandy and loam, Delhi Supergroup, Pali district, Rajasthan

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ABSTRACT *Minerals and organic matter are the main constituents of soils. The process of soil formation by breaking up the rock particles and enriching the soil with organic matter from aerial and subterranean parts are influenced by biological activities. River sands, gravels, cobbles, pebbles, and boulders are the main and chief sources of soil. In India, arid soils cover about 20 million ha area covering Rajasthan, Gujarat, Punjab and Haryana and most of the soils are arid soils (Dregne, 1976). The ever increasing population, urbanization and industrialization have led to generation and indiscriminate mining of large amount of ores, rocks, minerals, placer deposits and soil for domestic, commercial and industrial purposes. The investigated area is located in the great Indian Thar Desert of Rajasthan, where soil of the Raipur- Pali area is of sandy and loam type with medium grained texture. The natives and relating to the indigenous inhabitants of the Bar, Dipawas-Lawacha area of Pali district suffer and bear adverse challenges of climatic conditions along with some specific aspects related to market on rock types and soils which are used as a building material and different mineral deposits used in different industries. Its importance has not only been felt for the inhabitant but, for our country too and to the civilization at large. Sporadic small and huge rock exposures and various litho units ranging about 50 m to 200 m or even more than this are present in different locations of study area.*

Introduction

The roads and highways along the road sides and river valley slopes innumerable rock cutting and open cast mining generated granules and debris, occurring in the form of soil and fine clay. Heavy vehicles etc generation micro-seismic waves which add to the instability of the soil particles which are already unstable due to road cutting. During rainy season, the water that flows on the surface and simultaneously penetrated inside the fractures, pores, cavities and fissures which create devastating results. These structures are formed with partial dissolution and erosion of rocks.

The rocks of Bar-Lawacha-Dipawas area of Pali district are included under three main tectonic divisions of Delhi Supergroup from southwest to northeast viz. Banded Gneiss Complex (BGC), Barotia Formation (Barotia sequence of Heron, 1953) and Sendra Formation (Sendra complex of Heron, 1953). All the three tectonic divisions are well displaced in the study area and the same names have been followed in this paper. The BGC is made up of Precambrian basement in the southwestern side and the lower most tectonic unit of the area. It is separated from the overlying rock of the Barotia Formation with an unconformity (Gangopadhyay, P.K. and Lahiri, A. 1983).

The Barotia Formation consists of Bar Conglomerate Horizon, Calc amphibolite schist, Quartzitic schist and Calc-schist with intercalated Quartzite schist. Bar Conglomerate Horizon is further divided into Quartzofeldspathic

Heron (1953)	Lithostratigraphy of the Study Area
Intrusive granite	Intrusive granite is not exposed in the investigated area

Sendra Complex	Sendra Formation	Calc amphibolite gneiss with alternate bands of mica schist and foliated quartzite	
Nandana Crystalline Limestone	Dolomite		
Barotiya Sequence	Barotia Formation	Calc-schist with intercalated quartzite schist	
		Quartzite schist	
		Calc amphibolites schist	
		Bar Conglomerate Horizon	Kyanite schist
			Staurolite schist
			Garnetiferous mica schist
			Bar Conglomerate schist
			Quartzofeldspathic mica schist
Unconformity	Unconformity		
Banded Gneissic Complex	(B.G.C) Granitic gneiss		

Schist, Bar conglomerate schist, Garnetiferous mica schist, Staurolite schist and Kyanite schist. The overlying Sendra Formation constitutes the northeastern part of the study area. Dolomite (equivalent to Nandana crystalline lime-

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To Study on Soil Nutrient and Physico-Chemical Analysis of Soil in Bar-Phatakhera-Raipur Section of Pali District, Rajasthan, India.

KEYWORDS: Soil enriching, soil nutrient, rock material, Delhi Supergroup, Pali district, Rajasthan.

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ABSTRACT *The main constituents of soils are minerals and organic matter, which are produced by breaking up the rock particles. The soil enriching with organic matter from aerial and subterranean parts and are influenced by biological activities. The role of the vegetation is relatively less in arid zones because of the scanty sparse canopy cover and the poor development of aerial parts but the root systems often exhibit exceptional development and have the greatest influence of the cracking of the rocks influencing soils formation processes. The parent rocks had definite relation with the soil nutrient and material which supports the vegetations. But in western Rajasthan the studies of relation between parent rock material and soil and further correlation of these aspects with different types of vegetations e.g. herbs, shrubs and trees supported by the soil is quite deficient. The present paper, therefore, highlights by the fact that the vegetations including herbs, shrubs and trees and most importantly the herbaceous vegetation vary from soil to soil depending upon minerals present in the soil and these minerals are derived from the parent rock materials. The present investigation may bridge this gap in the Aravalli hill ranges occurs in semi arid region. Therefore, the objective of this paper are i) to study the type of soils formed under the influence of parent rocks found in and around the Bar region of Delhi Supergroup; and ii) to investigate nutrient availability and different characters in soil for finding out its relation with the different type of vegetations it supports. River sands, gravels, cobbles, pebbles, and boulders are the main and chief sources of soil.*

The unique desert and semi-desert locations of Rajasthan having difficult geoenvironment and particular kind of cultural and economic aspects makes it a distinct and characteristic state. Rajasthan is a predominantly mountainous as well as desert state and is home to many endemic, endangered and threatened species, which affects the socio-economic condition of the existing natives of the state. Great diversity in climate and wide variety of topography has further distinguished Rajasthan from other states. The lifestyle of the people is purely rooted in the traditional values. Rajasthan is also well known for its rich culture, lifestyle and natural resources.

The roads and highways along the road sides and river valley slopes innumerable rock cutting and open cast mining generated granules and debris, occurring in the form of soil and fine clay. Heavy vehicles etc generation micro-seismic waves which add to the instability of the soil particles which are already unstable due to road cutting. Devastating results occurred during rainy season, water flows on the surface and simultaneously penetrated inside the fractures, pores, cavities and fissures. These structures are formed with partial dissolution and erosion of rocks. Agriculture is common land use of the area, mostly of single crop nature in Dipawas and in Lawacha villages. Double crop areas are found in patches especially in Phatakhera and Kalab Kalan villages. There are two major categories present as wasteland i.e. "Land with scrub" and "Land without scrub". Whatever reserve forest area left over is confined around Kalab Kalan village i.e. Bagri Kalaliya Reserved Forrest. It is huge reserved forest but a very limited investigated area is under the forest cover in the region. These are subsidiary trophic i.e. full of nutrition type of dry tropical forest that are widely scattered over hillocks and ridges, Beena and Singh (2015). To prevent erosional processes plantation has been done on Kalab Kalan hills by the Department of forest, Government of Rajasthan, India.

Geology of the area

The rocks of Bar-Phatakhera- Raipur area of Pali district are included under three main tectonic divisions of Delhi Supergroup from southwest to northeast viz. Banded Gneiss Complex (BGC of Heron, 1953), Barotia Formation (Alwar Group) and Sendra Formation (Ajabgarh). All the three tectonic divisions are well displaced in the study area. The BGC is made up of Precambrian basement in the southwestern side and the lower most tectonic unit of the area. It is separated from the overlying rock of the Barotia Formation with an unconformity (Gangopadhyay, P.K. and Lahiri, A. 1983).

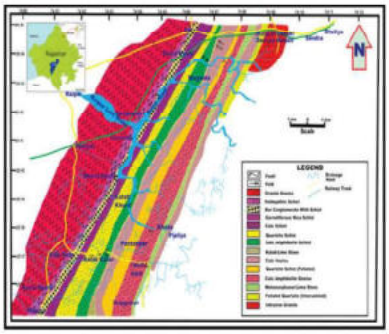

Fig. GEOLOGICAL MAP OF BAR-PHATAKHERA-RAIPUR SECTION OF PALI DISTRICT (RAJ)

Mineral Content of Soil

Gupta (1958) studied on the desert sands of Rajasthan and found a varying amount of easily weatherable minerals, such as, hornblende, feldspars, kyanite and mica, which seemed to be Aeolian in origin. The clay minerals in the soil of Rajasthan contain illite (mica, smectite, vermiculite, kaolinite and chlorite). In this, first four are dominated in sandy soils, whereas grey loam soil contains attapulgite as the additional mineral (Table 1).

While working in Yamuna alluvial plain, Haryana Shanwal et al. (1989) found mica is the predominant in soil followed by kaolinite, chlorite, vermiculite and smectite in a decreasing order. They considered that the presence of fibrous mineral was due to aeolian material from Rajasthan and not as alluvial

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RESEARCH ARTICLE

ANALYSING THE SOIL NUTRIENT AND PHYSICO-CHEMICAL CHARACTERISTICS OF SOIL IN BAR-MOHRA KHURD-KALAB KALAN SECTION OF PALI DISTRICT, RAJASTHAN, INDIA

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ABSTRACT

Minerals and organic matter are produced by weathering and breaking up the rock particles. The soil enriches with organic matter and minerals from aerial and subterranean parts. These are the main and important constituents of soils, which are influenced by biological activities. The role of the vegetation is relatively less in arid zones because of the scanty sparse canopy cover and the poor development of aerial parts but the root systems often exhibit exceptional development and have the greatest influence of the cracking of the rocks influencing soils formation processes. The parent rocks had definite relation with the soil nutrient and material which supports the vegetations. But in western Rajasthan the studies of relation between parent rock material and soil and further correlation of these aspects with different types of vegetations e.g. herbs, shrubs and trees supported by the soil is quite deficient. The present paper, therefore, highlights by the fact that the vegetations including herbs, shrubs and trees and most importantly the herbaceous vegetation vary from soil to soil depending upon minerals present in the soil and these minerals and derived from the parent rock materials. The present investigation may bridge this gap in the Aravalli hill ranges occurs in semi arid region. Therefore, the objective of this paper are to study the type of soils formed under the influence of parent rocks found in and around the Bar region of Delhi Supergroup. Another region is to investigate nutrient availability and different characteristics of soil for finding out its relation with the different type of vegetations it supports.

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INTRODUCTION

Rajasthan is a predominantly mountainous as well as desert state and is home to many endemic, endangered and threatened species, which affects the socio-economic condition of the existing natives of the state. The unique desert and semi-desert locations of Rajasthan having difficult geoenvironment and particular kind of cultural and economic aspects makes it a distinct and characteristic state. Great diversity in climate and wide variety of topography has further distinguished Rajasthan from other states. The lifestyle of the people is purely rooted in the traditional values. Rajasthan is also well known for its rich culture, lifestyle and natural resources. The roads and highways along the road sides and river valley slopes innumerable rock cutting and open cast mining generated granules and debris, occurring in the form of soil and fine clay. Heavy vehicles etc generation micro-seismic waves which add to the instability of the soil particles which are already unstable due to road cutting. Devastating results occurred during rainy season, water flows on the surface and simultaneously penetrated inside the fractures, pores, cavities and fissures.

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These structures are formed with partial dissolution and erosion of rocks. Agriculture is common land use of the area, mostly of single crop nature in Dipawas and in Lawacha villages. Double crop areas are found in patches especially in Phatakhera and Kalab Kalan villages. There are two major categories present as wasteland i.e. "Land with scrub" and "Land without scrub". Whatever reserve forest area left over is confined around Kalab Kalan village i.e. Bagri Kalaliya Reserved Forrest. It is huge reserved forest but a very limited investigated area is under the forest cover in the region. These are subsidiary trophic i.e. full of nutrition type of dry tropical forest that are widely scattered over hillocks and ridges, Beena and Singh (2015). To prevent erosional processes plantation has been done on Kalab Kalan hills by the Department of forest, Government of Rajasthan, India.

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Multiple Deformation of Bar Conglomerate around Bar, Birantiya-Khurd and Giri Section in Northwestern Part of Pali District, Rajasthan

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Abstract

The north-south trending conglomerate belt of Bar, Birantiya and Giri occurs between the granitic gneisses of Banded Gneissic Complex (BGC) and garnetiferous mica schist of Bar conglomerate horizon. The conglomerate belt is intruded at several places by pegmatite veins. The pebbles of Bar conglomerate were deposited with no gravity driven deformation. These pebbles are good strain markers of the prevailing shear strain. About 80% of the pebbles changed their shape and size from spherical to oblate during second deformation phase. The deformed pebbles range in size from ~ 2.5cm to >80cm. Field evidences indicate that the deformational sequence penetrated up to third deformation phase, where few pebbles of Bar conglomerate horizon were further deformed and folded symmetrically. The fourth phase of deformation resulted in the formation of diagonal shear zones along the pegmatite veins at Giri dam as well as near Ramdev temple, which gave rise to zonal crenulations. Thick and thin exposures of pegmatite veins presentin fringes are post tectonic in nature.

Keywords: Bar conglomerate, Deformation, Heterogeneous strain, Ductility contrast, Delhi Supergroup, Pali District, Rajasthan.

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Discovery of High Heat in Neo-Proterozoic Granites of Malani Igneous Suite at Binawas, Jodhpur District, Rajasthan, India

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Abstract

The Malani Igneous Suite show crust formation as late as in Neo-Proterozoic times, comprising pink and grey granites in the Binawas area of Jodhpur district, Rajasthan, India. This study reports the average heat generation value of 8.358 HGU (Heat Generation Unit) for granites, which is higher than the average value of 3.8 HGU for the continental crust. The heat required for the partial melting of upper mantle was largely provided by the exothermic reactions involved in the radioactive decay of unstable isotopes of U, Th and K. High heat production (HHP) granites are evolved alkaline granites that have higher contents of Th, U, K and total REEs. These rocks are partially responsible for crustal heat flow, where the concentration of uranium determined is twice the average continental crust. Thorium is still higher than U and K. The radioelement concentration (Ur) varies from 15.98 to 43.50 in the granites with an average of 24.498, which clearly indicates a 'hot crust'. Hence, the HHP granites need to be explored for economic deposits of U, Th and other HFS elements.

Keywords: Rare Earth Element, HHP Granites, Malani Igneous Suite, Uranium deposit, Hot Crust.

Introduction

The crustal evolution started during Haden Eon, involved upward vertical migration of magma produced by partial melting of pyrolitic composition of the mantle. The ocean floor igneous rocks have been produced at the ridge. The exothermic reaction involved in the radioactive decay of unstable isotopes of U, Th and K mainly provide required heat for the partial melting of the upper mantle. The heat generated by such decay was very high during the first two billion years (4.5 - 2.5Ga) (Valdia, 2010), which progressively decreased with time. This heat was responsible for the highly dynamic stage of the Earth during the Archean times, when basalt generation from the mantle (vertical movement) and its further transformation to felsic and silicic continental crust (horizontal movement, subduction and re-melting) proceeded at much faster rates as compared to the present rate of plate movement. The heat energy for the first stage of fractionation might have also been contributed by the profuse meteoritic bombardment and impact cratering (Bhandari, 2009). It appears that due to excessive heat generated by radioactive decay and meteoritic impacts more than 65% of the continental crust was formed during 3.2 - 2.5Ga and about 80% of the total continental crust was formed around 2.5Ga (Roy, 2009).

High heat production (HHP) granites (Kochhar, 1989, 2012; Sharma, 1994 and Srivastava, 2003; Shrivastava *et al*., 2013, 2014) are evolved calc-alkaline granites that have comparatively higher content of Th, U, K and total REE and responsible for nearly half of the crustal heat flow (Plant *et al*., 1985; Morgan and Sass, 1984; Morgan, 1985) through radiogenic decay of Th, U and K isotopes, of which uranium is the dominant heat-producing component. Therefore, the granites with nearly four times or more uranium than the general abundance (3.5ppm, Clark *et al*., 1990; 4ppm, Rogers and Adams, 1969) are considered as HHP granites. Such granites act as 'heat engine' and prolongs the circulation of ore forming hydrothermal fluids (Fehn *et al*., 1978; Kimberley, 1978), which may ultimately lead to form a mineral deposits.

The Malani Igneous Suite is a unique terrain, which shows crustal evolution in late Neo-Proterozoic. The granites are part of the igneous activities of the Malani Igneous Suite (745-680Ma) (Roy *et al*., 2012; Bhushan and Chandrasekaran, 2002; Kochhar, 2012). The field relationships of these granites favour its Malani age rather than that of Erinpura (Shrivastava *et al*., 2013). In the present work, the granites of Binawas

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The wood-boring trace fossil *Asthenopodichnium* from Palaeocene sediments of the Barmer Hill Formation, western Rajasthan, India

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The present study documents the wood-boring trace fossil *Asthenopodichnium* from the Palaeocene sediments of the Barmer Hill Formation (BHF) in the Barmer Basin, Western Rajasthan, India. The *Asthenopodichnium* trace fossils are loosely to tightly packed, pouch-like burrows or almond-shaped structures identified as *Asthenopodichnium lignorum*, whereas lozenge and J-shaped structures are designated as *Asthenopodichnium lithuanicum*. The *A. lignorum* trace markers are considered to be the feeding and dwelling burrows produced by wood-rotting fungi, whereas *A. lithuanicum* are interpreted as feeding and dwelling burrows produced by Mayfly nymphs and larvae. The sedimentological and palaeontological studies of trace fossil-bearing horizons of BHF suggest freshwater fluvial sedimentary environment with humid to sub-humid climate.

Keywords: *Asthenopodichnium*, freshwater environment, trace-fossils, wood-rotting fungi.

GLOBALLY, the oldest wood-boring trace fossils were reported from the Carboniferous and Early Permian sediments[1–7]. Later, the diverse insect records matching the number of modern insect families were reported from Cretaceous and Neogene deposits of Germany[8,9]. All these reports were from marine sediments. However, very little is known about wood-boring trace fossils from freshwater environment. Initially, the ichnogenus *Asthenopodichnium* and ichnospecies *Asthenopodichnium xylobiontum* were described from Late Neogene wood in Austria[10]. The pouch-like *Asthenopodichnium* wood-boring trace fossils have also been reported as *A. lithuanicum*, from Neogene coal layer in northeastern Lithuania[11] and *A. xylobiontum* from Late Cretaceous Wahweap Formation, Utah, USA[12]. Subsequently, *A. lignorum* was recorded from Early Miocene of Didot Island, New Caledonia[13] and from the Upper Cretaceous Kirtland Formation of San Juan Basin, New Mexico[14]. The wood-boring *Asthenopodichnium* trace fossils from these localities are small, U-shaped or pouch-like burrow structures in wooden, organic-rich siltstone or on bone substrates[10,11].

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A New Doubtful Microfossil from Pyrite Deposit at Amjhore Bijaigarh Shale, (Upper Mesoproterozoic) Vindhyan Supergroup, India.

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The Precambrian, thought in the beginning to be devoid of fossils, soon yielded diverse evidences of life that existed during this Eon. The Vindhyan Supergroup, has been an issue of global debate for its discordant 'radiometric-' and 'paleontological'- ages throughout the stratigraphic horizons. We are reporting a doubtful microfossil, which was identified during the course of ore microscopic study of pyrite recovered from the pyrite mine at Amjhore, Bihar, India. The host horizon of the sample is a massive pyrite bed, almost one meter thick, embedded in carbonaceous shale of Bijaigarh Shale Formation of Kaimur Group. The Kaimur Group is lower most group of the Upper Vindhyan Supergroup. The microfossil (?) is fully pyritized. In fact, pyrite as a mineral, always shows a prompt habit to fill the organic sacs or any other similar structure available in the geological environments. It seems important that the microfossil (?) in question, possibly belong to the upper part of the Mesoproterozoic time.

The microfossil (?) in polished section (Fig 1: A and B) is showing a circular structure (diameter almost of 5μ), the outer- and inner walls of which are filled mainly with the organic matter, while the intermediate space is filled with the unconsolidated pyrite granules or/and microcysts. The outer wall shows wavy structure. These waves possibly have a fixed wave length. The microfossil (?) which is compressed in the left side show that the regularity of the wavy pattern have also been modified because of compression. In this two dimensional view of the microfossil (?) there is one opening or aperture of almost rectangular shape. The aperture is without any collar. The size and circular shape of the microfossil (?) favours it being a microfossil. The presence of a doubtful aperture or opening and clearly available double wall structure is further giving strength to the possibility. The structure is totally pyritized and embedded in poorly compacted pyrite mass, which is having many microcysts and microgranules of pyrite. The filling of pyrite inside the walls of the organism (?) is greatly compact and well crystallized.

Specially, in the last two decades, the Vindhyans attracted world-scientists to study the earth's 'early-life' as well as fixing the 'biostratigraphic position' of its 9000 m thick sequence (Rao and Neelkantam, 1978, Prasad and Verma, 1991) that assumed to have crossed 1400 to 550 Ma time – span radiometrically (Kathal and Patel, 2015). Sharma (2003) reviewed the age of the Vindhyans based only on the 'paleontological data'. Azmi et al. (2007), however, reviewed the age of Vindhyans of the central India, highlighting the inconsistency in 'radiometric-' vs 'fossil-records' also by providing a table with extensive details.

Sharma and Kumar (2012) provided a 'Bibliography' on the Vindhyans with 'excessive comments' on the status of fossils recovered till then. The K-Ar age of the phlogopite of the Majhgawan pipe is 1140±112 Ma (Paul et. al. 1975). The Rb-Sr isochron age of lamproite body is 1067.31 Ma (Anil Kumar et al. 1993). Intrusion of the kimberlite pipe in the Rewa group (Middle group of Upper Vindhyan) shows that the Upper Vindhyan succession must have been started before 1100 Ma. With extensive discussions, Valdiya (2010) concluded that the lower part of the Upper Vindhyan succession possibly extends down into the Upper Mesoproterozoic. As the present microfossil (?) is part of the Bijaigarh Shale, a middle member of the Kaimur Group, which itself is lower part of the Upper Vindhyan Supergroup; the present status of knowledge states that the microfossil (?) seems to have an age older than 1100 Ma.

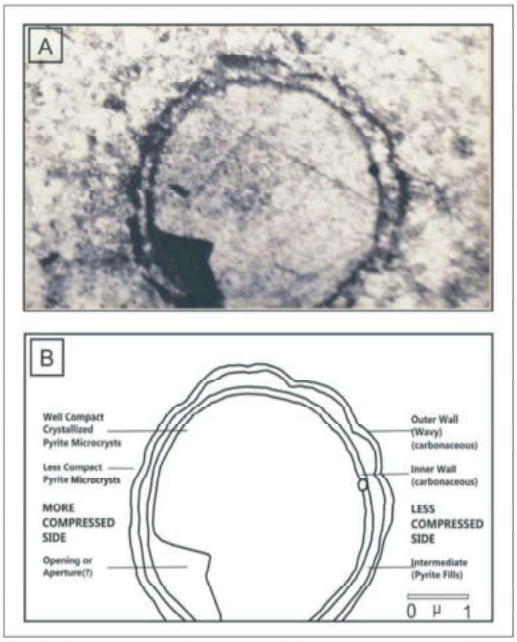

Fig.1. **(A)** A pyritized (?) microfossil in Polished Section. **(B)** Line-diagram showing details of the wall of the microfossil (?).

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Mössbauer Spectroscopic Study of Phosphatic Sediments Collected from Fatehgarh Formation of Northern Barmer Basin, Western Rajasthan

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ABSTRACT

A unique thin ferruginous layer sandwiched between phosphatic sediments of the Fatehgarh Formation representing northern periphery of the Barmer basin, India. Magnetic separation of this layer yielded presence of magnetic glassy spherules of millimeter size. In the present investigation, Mössbauer and XRD study of twelve phosphatic sediments including ferruginous layer of Fatehgarh Formation was carried out. For the first time, a very unusual and complex pattern of Mössbauer parameters attributed to an unusual thermal history in late Cretaceous phosphatic sediments of the Barmer basin has been shown.

INTRODUCTION

Barmer basin was formed when the Indian craton broke up, towards the end of Cretaceous and led to the formation of the Cambay rift and constituent basins in north western part of India. Barmer basin is one of the constituent basins. It is a narrow north-south trending graben that comprises sediments of middle Jurassic to lower Eocene age (Mathur et al., 2006; Compton (2009). The basin's presence was suspected from gravity and in the late 1980s but not confirmed until 1999 from seismic, magnetic and drilling data that the basin is a lacustrine failed rift. The Cretaceous to Paleocene sediments of northern part of Barmer basin are named as Fatehgarh Formation and are best exposed at Lordi Nala in the vicinity of Fatehgarh (26° 26.087'N, 071°12.519'E). For details about the geology, origin of major oil reservoir in the Fatehgarh Formation is discussed in detail by Compton (2009) and Dolson (2015). Further, the importance of Fatehgarh Formation has become more significant recently by the reporting of rich assemblage of biota (Mathur et al., 2006), magnetic spherule (Mathur et al., 2005a &b) and tectonics and sedimentation (Mathur and Kumar, 2003). Further, the discovery of oil and gas in the Barmer has proved to be the most significant global discoveries in the decade 2001-2010 (Compton, 2009).

While studying sediments from Fatehgarh Formation, a few centimeters thick (3-5cm) ferruginous limonitic layer (yellow-brown) sandwiched between phosphatic sediments is encountered (Mathur et al., 2005a). Except this layer no limonitic layer is present in the entire Fategarh Formation sedimentary sequence. Interestingly, the sandstone sequence below this layer are characterized by fluvial deposition while the bedded phosphorite deposit above this layer deposited in marine environment (Gour, 2005; Mathur et al., 2006). The abrupt change in the nature of sediments indicates that around this layer some sudden climatic change might have taken place during a very short period of time. Several rock samples were collected from this ferruginous layer. Out of these samples some of samples were macerated separately. A powerful hand magnet was used to separate magnetic fraction from the rock matrix. It was found that considerable fraction of magnetic part consists of large number of mm sized spherules along with the fine dust magnetite. It was also found that this limonitic layer is anomalously rich in Maastrichtian mass extinction fossils e.g. Igdabetis species along with Semionodontid, Lepisosteusindicus, Enchodontidaeindet, Labiridaeindet along with fossils of crocodile, turtle and dinosaur. These fossils are not present in sediments lying above this layer. For detail description (Mathur et al., 2005a, b; 2006) can be referred.

It is worth pointing that spherules can be formed in several ways e.g by volcanism (always rich in Ti content), as an ablation product of meteorite, melting of interplanetary dust(IDP) e.g it happened at the Cretaceous-Tertiary Boundary (KTB). KTB spherules contain anomalously large concentration of PGE elements and Ni. Spherules can also be formed due to digenesis of minerals but they will not be confined to thin layer only and show wider range of distribution. Spherules could also originate from anthropogenic source. Recently Niyogi et al. (2018) have reported the chemical composition of spherules of anthropogenic origin. These spherules are rich in silica content. In their study they found that the spherules are predominantly silica-rich (SiO_2: 70.96-74.13 wt.%). These spherules are devoid of Ni and Ti. Since there was no anthropogenic activity in Cretaceous era, the origin of Fatehgargh spherules due to anthropogenic activity is ruled out.

Recently Parthasarathy et al. (2019) have reported for the first time the presence of micro spherule from the infratrappean Gondwana sediments below Killari region of Deccan LIP, Maharashtra (India). This is very significant study in context of KTB event and its effect on the mass extinction in this part of the earth. It is worth pointing that Mathur et al. (2019) have already established the volcanic origin of Fatehgarh spherules. The titanium rich Fatehgargh spherules are devoid of PGE elements and Ni but contain anomalously large concentration of elements which are found in spherules of volcanic origin. In one of the earlier study our group have already reported detailed Mössbauer spectroscopic study of magnetic fraction extracted from this ferruginous layer and samples of rock matrix from which spherules were macerated (Mathur et al., 2005b). In present investigation Mössbauer spectroscopy is extended to study the samples of phosphatic sediments as a function of depth lying below the ferruginous layer to see the variation in the iron minerology with respect to ferruginous layer. Before discussion of results, it is

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Aspidella: the Ediacaran body fossil from the Jodhpur Sandstone of the Marwar Supergroup, Sursagar area, Jodhpur, western Rajasthan, India

Aspidella: *un fósil de cuerpo blando ediacárico de la Arenisca de Jodhpur (Supergrupo de Marwar), área de Sursagar, Jodhpur, Rajasthan occidental, India*

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ABSTRACT

This paper describes well-preserved *Aspidella* remains, the Ediacaran body fossils from the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India. They show distinct morphological features previously described in other famous Ediacaran fossil sites, such as the Fermuse Formation of Newfoundland, South Australia and White Sea of Russia

Keywords: Aspidella; Jodhpur Sandstone; Ediacaran; Rajasthan; India.

RESUMEN

Se describen en este trabajo los restos bien conservados de *Aspidella*, fósiles de cuerpo blando ediacáricos de la Arenisca de Jodhpur (Supergrupo de Marwar) el área de Sursagar, Jodhpur, al oeste de Rajasthan, India. Éstos muestran características morfológicas características descritas anteriormente en otros famosos yacimientos fósiles ediacáricos, como los de la Formación de Fermuse (Terranova), Australia meridional y el Mar Blanco de Rusia.

Palabras clave: *Aspidella*; Arenisca de Jodhpur; Ediacárico; Rajasthan; India.

Introduction

The present paper describes well-preserved *Aspidella* remains, the Ediacaran body fossils from the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India. The Jodhpur Sandstone is the basal and significant group of the Marwar Supergroup (MSG).

Results

The Marwar Supergroup was earlier described as Trans-Aravalli Vindhyans as it is occurring on the western side of the NE-SW trending Aravalli Mountains, and occupies a large area in the northwestern Rajasthan (Pareek, 1984; Chauhan *et al.*, 2004). It is up to 1000 m thick, unmetamorphosed

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New Record of Ediacaran Biota from the Jodhpur Sandstone of Marwar Supergroup, western Rajasthan, India

Nuevo registro de la biota ediacárica en la Arenisca de Jodhpur (Supergrupo de Marwar), Rajasthan occidental, India

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ABSTRACT

In western Rajasthan, India, the Jodhpur Sandstone of the Marwar Supergroup has yielded a new Ediacaran fossil assemblage comprising macroscopic well-preserved specimens of *Aspidella*, *Hiemalora*, large Ediacaran discs, *Tirasiana disciformis*, *Medusinites asteroides*, *Anfesta*-like Ediacaran body fossils and microbial mat structures (*Arumberia banksi*, *Kinneyia* mat structures, wrinkle mat structures and other mat structures). The fossil record allows suggesting a broad correlation with the Fermuse Formation, Newfoundland, South Australia, White Sea of Russia and Norway, and regionally correlated with the Bhander Group of Vindhyan Supergroup and Krol Group of Lesser Himalaya

Keywords: Jodhpur Sandstone; Soft-bodied metazoans; Mat structures; Ediacaran.

RESUMEN

En el oeste de Rajasthan, India, la Arenisca de Jodhpur (Supergrupo de Marwar) ha librado un nuevo conjunto fósil ediacárico que comprende especímenes macroscópicos bien conservados de *Aspidella*, *Hiemalora*, grandes discos ediacáricos, *Tirasiana disciformis*, asteroides de *Medusinites*, fósiles de cuerpo blando ediacáricos similares a *Anfesta* y estructuras de tapices microbianas (*Arumberia banksi*, estructuras microbianas de tipo *Kinneyia*, estructuras microbianas arrugadas y otras estructuras microbianas). El registro fósil permite sugerir una amplia correlación con la Formación de Fermuse, Terranova, Australia meridional, el Mar Blanco de Rusia y Noruega, y la correlación regional con el Grupo de Bhander (Supergroup de Vindhyan) y el Grupo de Krol del Himalaya Interior.

Palabras clave: Arenisca de Jodhpur; Metazoos de cuerpo blando; Estructuras microbianas; Ediacárico.

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A MOSSBAUER STUDY OF UNUSUAL GOLDEN COLOUR MICA FROM HIGH HEAT PRODUCING GRANITE OF MALANI IGNEOUS SUITE, NORTH-WEST, INDIA

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Abstract

Mossbauer study of an unusual golden coloured mica from the high heat producing granite, Malani Igneous Suite has been performed at 300° K. Result shows presence of the unique four Fe^{3+} doublets for the first time ever in any mica. The four Fe^{3+} doublets occur probably because of the presence of a mixed type of octahedral layers, one like that in the common mica and the other containing impurities.

Keywords: Mossbauer, Golden Mica, High Heat Producing Granite, Malani Igneous Suite

1. Introduction

Mossbauer studies have been performed to understand many aspects of geological sciences; for example coal (Tripathi and Shrivastava, 1990; Shrivastava et al., 1992) Petroleum (Tripathi et al., 1998, 2009) Meteorites (Shrivastava, et al., 1997; Tripathi, et al., 2000) and Polymetallic Nodules (Shrivastava et al., 2009).

The Malani Igneous Suite in north-west India comprises of many high heat producing granites (HHP) (Shrivastava et al., 2013, 2014, 2017, 2018). The golden coloured mica has been recovered from one such HHP granite occurring near Binawas, located about 45 Km east of the city of Jodhpur.

It occurs as an accessory mineral of almost 6 mm diameter and pentagonal in shape. The essential minerals in the host granite observed in hand specimen are quartz, orthoclase and plagioclase. Biotite represents an accessory mineral with flakes almost of the same size as of the golden coloured mica. The golden coloured mica offered the opportunity to determine the Mossbauer spectroscopic parameters and spectra for comparison with the common mica.

2. Experimental

For Mossbauer spectroscopic studies absorbers were prepared by sandwiching the sample powder ($\simeq$ 50 mg cm^{-2}) of golden mica between two thin paper discs of 25mm diameter in a sample holder. The Mossbauer spectroscopy consisted of an electro-mechanical drive in a constant acceleration mode. A proportional counter with accessory electronics was backed by an 1k channel analyser. The radiation source was 10m Ci, ^{57}Co in Pd matrix. The spectrum was recorded at 300°K (room temperature) in transmission geometry. The spectrum was analysed using a program in which the spectrum was assumed to be the sum of Lorentzians. Isomer Shift (IS) was observed with respect to centroid of the standard (25 μm) α-iron foil absorber. The solid line in the spectrum corresponds to the computer fitted curve while hollow squares represent the experimental points.

Result and Discussions

The Mossbauer Spectrum of the unusual golden coloured mica is presented in Fig.1 and the Mossbauer parameters are given in Table 1. The minimum value of χ^2 (goodness of fit parameter) was obtained assuming the presence of four quadropole doublets. The attempt to fit more or less than for quadrupole doublets will always result in poor values of ^{2} (2.0 per degree of freedom).

In Table 1, IS and QS values corresponding to Fe^{3+} suggest that Fe^{3+} present at octahedral sites is in the high spin state. There are four Fe^{3+} doublets present, marked as I, II, III and IV in Fig. 1.

Previous investigations carried out on both, dioctahedral and trioctahedral mica have indicated the presence of maximum two Fe^{3+} doublets in octahedral sites, one with a large QS value centred around 1.00 mm

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A LABORATORY STUDY OF CONDUCTIVITY OF PYRITES FROM EARLY DIAGENESIS TO HIGH GRADE METAMORPHIC GEOLOGICAL CONDITIONS

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Abstract

A sophisticated procedure and technique have been adopted in the laboratory to determine conductivity of the mineral pyrite by developing a suitable conductivity cell. The pyrite samples showing a range of temperature and pressure in geological environments have been collected from two different mines. Sedimentary pyrite showing early, middle and late diagenesis were collected from a pyrite mine at Amjhore. Metamorphosed pyrites are from the Dariba-Rajpura polymetallic sulphide mine covering the range of mild to high grade metamorphic association. It is concluded that conductivity of the pyrite samples determined in the laboratory is inversely proportional to the original temperature of their formation under geological conditions.

Keywords: Pyrites, Conductivity, Sediment on pyrite, Dariba-Rajpura mine, Temperature-Pressure

1. Introduction

The electrical properties of pyrite have been investigated since 1928 and reviewed several times (Harvey, 1928; Smith, 1942 and 1947; Tellces, 1950; Parasnis, 1956; Fischer and Hiller, 1956; Hill and Green, 1962; Vaughan and Craig, 1978; Seehra and Seehra, 1979). Smith (1947) had suggested that pyrite formed at high temperatures were more thermometrically positive than those formed at low temperatures under natural geological conditons. Later, Fischer and Hiller (1956) had proposed that this correlation will only be qualitative and dependent upon the trace elements incorporated in the pyrite lattice, these presumably, also being dependent upon the temperature of formation of pyrite. Hill and Green (1962) had further used thermoelectricity and resistivity to correlate only two types of pyrite samples formed at low and high temperatures in geological environments. Hill and Green (op.cit.) had also indicated a tentative correlation between Cu and/or Mo content in both pyrite types with their high resistivity.

None of the earlier studies, however, could cover the wide geological range of the origin of pyrites in terms of increasing diagenetic stages or metamorphic grades. Moreover, in most of the previous attempts, either sophisticated techniques and procedures were not available or had not been used. Also earlier studies had not given consideration to the associated base metal mineralization with pyrites.

In the present work a study of conductivity was performed on pyrite samples which have been collected from a wide range of geological conditions covering early diagenesis to high grade metamorphism. The samples also represent association with rich, poor or no mineralization of base metals.

2. Theoretical Background

The energy band theory of solids is developed from the concept of nearly free electrons moving in the periodic potential of the atom cores which is a well known fact in physics. This is achieved because when a group of atoms is brought together to form a solid, the individual electronic energy levels of the separate atoms 'over lap' to form bands of closely spaced energy levels. The study of electrical properties of any solid provides information on the electrical conduction mechanism. The simple band for solids has shown the existing difference between insulator, metal and semiconductors (both, intrinsic and extrinsic).

Metals exhibit high conductivity, which is associated with the overlapping of valence band and conduction band (for a partly filled band). At room temperature the conductivity is largely dependent on impurities and lattice defects in metals and there is no forbidden energy gap between valence band and conduction band.

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HISTOPATHOLOGICAL CHANGES IN THE KIDNEY OF A FRESHWATER TELEOST *CHANNA PUNCTATUS* AFTER 24 HOURS OF EXPOSURE TO LEAD NITRATE

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ABSTRACT : Present studies include the toxicity induced changes in the kidney of a freshwater fish, *Channa punctatus* (Bloch) following the administration of $Pb(No_3)_2$ (concentration 5.15mgl^{-1}) for 24 hrs. Fishes under taken for experiments measured about 30 ± 0.5cm in length and 225 ± 1 gm in weight. They were kept in water with temperature maintained at 28.5° C and pH at 7.5. No food was given to the fishes after treat. It was observed that there appears to be slightly degenerative changes in renal tubules and vacuolization in mesenchymal cells of the kidney of $Pb(No_3)_2$- treated fish, *Channa punctatus*. However, in control, these changes were invisible.

Key words : Channa punctatus, $Pb(No_3)_2$, histology.

INTRODUCTION

Lead nitrate is considered as a heavy metal toxic polluting element which can cause major impairments to the metabolism of living organisms. It occurs naturally in the earthcrust and may contaminate aquatic environment which affects the aquatic flora and fauna (Kumar, 1989; Seth, 2000; Kar *et al*, 2008; Begum *et al*, 2009). Lead intoxication may cause anaemia and disorders of the gastro-intestinal, renal, and nervous systems (Gerber *et al*, 1980). Among the aquatic fauna, fishes are the most affected creatures of such contaminated water which transfers the nephrotoxins as it is widely used in the food for human being (Shukla and Tripathi, 2012). Some histopathological work has been done by various scientists (Banerjee and Bhattacharya, 1994; Gupta and Shrivastava, 2006) but still there is less known data about the lead nitrate toxicity in fishes. Study of toxicity of lead nitrate in relation to biochemical, histopathological and haematological changes have been described by the few workers only (Jha *et al*, 2012; Mohanambal and Puvaneswari, 2013; Dutta *et al*, 2015; Mary *et al*, 2015; Fernandes *et al*, 2016). However, results carried out till now are not showing any direct conclusion so keeping this in mind this work has been done to find out better results.

MATERIALS AND METHODS

The two fishes, *Channa punctatus* of approximately 30 cm of length and 225 gm in weight were brought from the local fish market. These fishes were acclimatized in the laboratory for 2-3 days and then treated for the experiment. One of the fishes was not treated as it is control and second one fish was exposed to lead nitrate dose 5.15 mgl^{-1} for 24 hours.

Before sacrificing the fish, a local anaesthesia was given to the fish and then the kidneys from the fish were taken out. The pieces of the kidneys were kept in the 10% neutral formaline solution for next 12-24 hours. Afterwards, tissues were washed in the 0.6% saline solution and processed for paraffin embedding through the alcohol series (30, 50, 70, 90 and 100%). 100% alcohol + xylene solution and then xylene + wax solution and finally into the wax and then block preparation takes place. These blocks were cut with the help of rotary microtome with 5-10 µ and then spread on the slides. These slides were transferred into the xylene and then decreasing order of alcohol series and then stained with Haematoxylin and Eosin for result and then mounted with DPX for permanent preparation.

RESULTS AND DISCUSSION

In the present study, lead nitrate in kidney of 24 hrs treated fish, *Channa punctatus* showed marked pathological changes (Plate 1, Fig. 1). Slightly degenerative changes in proximal tubules (PT), distal tubules (DT) and collecting tubules (CT) and vacuolization of mesenchymal cells (MEC), which include severe necrosis and spaces in Bowman's capsule were

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The wood-boring trace fossil *Asthenopodichnium* from Palaeocene sediments of the Barmer Hill Formation, western Rajasthan, India

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The present study documents the wood-boring trace fossil *Asthenopodichnium* from the Palaeocene sediments of the Barmer Hill Formation (BHF) in the Barmer Basin, Western Rajasthan, India. The *Asthenopodichnium* trace fossils are loosely to tightly packed, pouch-like burrows or almond-shaped structures identified as *Asthenopodichnium lignorum*, whereas lozenge and J-shaped structures are designated as *Asthenopodichnium lithuanicum*. The *A. lignorum* trace markers are considered to be the feeding and dwelling burrows produced by wood-rotting fungi, whereas *A. lithuanicum* are interpreted as feeding and dwelling burrows produced by Mayfly nymphs and larvae. The sedimentological and palaeontological studies of trace fossil-bearing horizons of BHF suggest freshwater fluvial sedimentary environment with humid to sub-humid climate.

Keywords: *Asthenopodichnium*, freshwater environment, trace-fossils, wood-rotting fungi.

GLOBALLY, the oldest wood-boring trace fossils were reported from the Carboniferous and Early Permian sediments[1–7]. Later, the diverse insect records matching the number of modern insect families were reported from Cretaceous and Neogene deposits of Germany[8,9]. All these reports were from marine sediments. However, very little is known about wood-boring trace fossils from freshwater environment. Initially, the ichnogenus *Asthenopodichnium* and ichnospecies *Asthenopodichnium xylobiontum* were described from Late Neogene wood in Austria[10]. The pouch-like *Asthenopodichnium* wood-boring trace fossils have also been reported as *A. lithuanicum*, from Neogene coal layer in northeastern Lithuania[11] and *A. xylobiontum* from Late Cretaceous Wahweap Formation, Utah, USA[12]. Subsequently, *A. lignorum* was recorded from Early Miocene of Didot Island, New Caledonia[13] and from the Upper Cretaceous Kirtland Formation of San Juan Basin, New Mexico[14]. The wood-boring *Asthenopodichnium* trace fossils from these localities are small, U-shaped or pouch-like burrow structures in wooden, organic-rich siltstone or on bone substrates[10,11].

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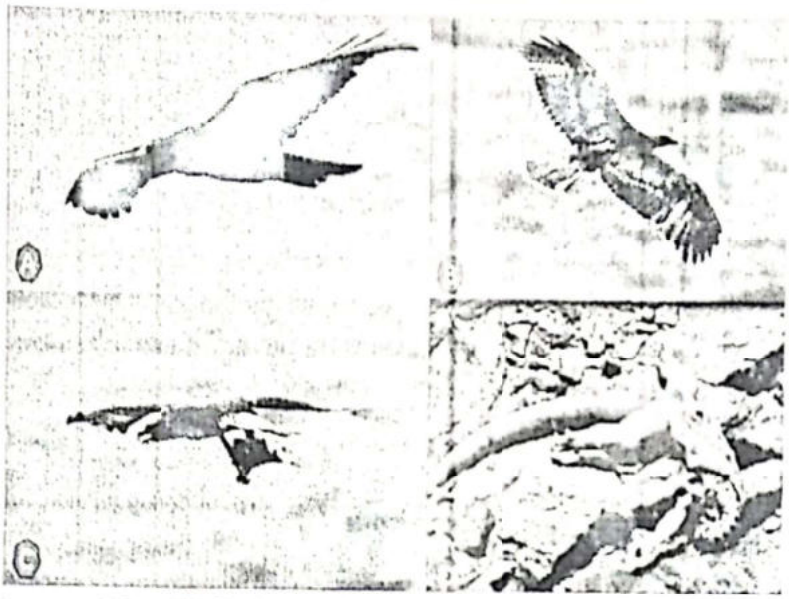
BONELLI'S EAGLE

Records of predation on *Varanus griseus* and *Ptyonoprogne concolor* by *Aquila fasciata* in Agolai, Jodhpur, India



Images of Bonelli's Eagle at Agolai, Jodhpur. (A) ventro-lateral view (B) dorsal view from top (C) a fresh predation of Dusky Crag Martin catch in flight (D) another predation of a Desert Monitor was sighted near to the Bonelli's Eagle nest

IUCN Red List: Least Concern (BirdLife International 2016)

Aves
[Class of Birds]

Accipitriformes
[Order of diurnal birds of prey]

Accipitridae
[Family of Hawks and Eagles]

Aquila fasciatus
[Bonelli's Eagle]

Species described by Vieillot in 1822

Prey-predator interactions are rarely observed in the field, and most attempts to identify and quantify their occurrence have focused on a narrow range of species. Raptors typically hunt and kill their prey. Small lizards and frogs are preyed upon by a great variety of animals (Duellman & Trueb 1986; Greene 1988; Zug 1993). Here we have recorded a predation upon Desert Monitor *Varanus griseus* and Dusky Crag Martin *Ptyonoprogne concolor* by Bonelli's Eagle *Aquila fasciata* in Thar Desert of Rajasthan.

Bonelli's Eagle is known to be a characteristic local and scarce resident breeding raptor species in countries surrounding the Mediterranean Sea and the Middle East (Gensbol 1987; Rocamora 1994). This raptor is also found commonly in the

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Research Article

NEAR THREATENED TO LEAST CONCERN: BLACKBUCK CONSERVATION EFFORTS FROM RAJASTHAN, INDIA

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ABSTRACT

Rajasthan is land where conservation is religion. In many sites peaceful cohabitation between humans and wildlife is conjoint. The mutual efforts of Forest Department, Rajasthan and local communities for the protection of wildlife lead to an almost threefold upsurge in blackbuck population in this region. Due to conservation efforts across the country including Rajasthan have placed blackbuck in the Least Concern category in Red Data Book published by IUCN from earlier Near Threatened category. In India, blackbuck is distributed across 15 states and in Rajasthan; it is distributed among 19 districts. The total population of blackbuck in Rajasthan including protected area is estimated to be over thirty thousand in 2016.

Keywords: Antelope, Community, Forest, Population, Protection.

INTRODUCTION

The Wildlife (Protection) Act, a landmark in the history of wildlife legislation in India, came into existence in 1972. The act provides the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto. The act provides the basic framework to ensure the protection and management of wildlife. Prior to the Act, hunting of threatened species such as tigers, elephants, blackbucks, Gazelle and leopards was widespread and led to each of these species becoming endangered. Since the Act was developed, many people have been convicted of offences related to poaching, hunting out of season, and killing endangered animals.

In India, people respect trees, animals, forests, rivers and other elements of nature like the sun and the moon. As we pass through the length and breadth of India, we frequently come across numerous sites that portray a peaceful coexistence between humans and wildlife. To some extent, this is possible due to traditional acceptance of the wildlife and largely it is the result of combined efforts of native people living around these sites which protects nature for its sustainable use and ecological significance. For multiple reasons, Rajasthan has perhaps one of India's most widespread traditions of community conservation. Several types of sacred spaces, mostly in forest and pasture land, have characterized the state (Meena *et al.*, 2017a). The state has the "orans", sacred pastures and woodlands used primarily for grazing of wildlife with the protected tree species. Various local communities including Bishnois consider trees as sacred, but their empathy extends to every living being on earth. So they protect the entire ecosystem that exists in their villages. Animals like blackbucks and chinkaras, and birds like vultures, partridges, peacocks and even the endangered Great Indian Bustard, find the village a safe haven.

Blackbuck (*Antilope cervicapra*) (Linnaeus, 1758) is a stylish gazelle-like antelope regarded as the best-looking member of the family Bovidae. It is called by the name Kàla Hiran in Hindi. Taxonomically blackbucks are classified under the subfamily Antilopinae, family Bovidae and the order Cetartiodactyla. The IUCN Red list has listed this animal as-Least Concern with increasing population trend (IUCN 2017) and is included in Appendix III of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In India, hunting and poaching of blackbuck are prohibited under Schedule I of

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Distribution, ecology and conservation status of blackbuck (*Antilope cervicapra*): An update

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Abstract
Blackbuck is the most elegant member of the antelope family. It has long association with Indian culture. Male and females have sharp sexual dimorphism – adult males are dark with long spiral horns while female and fawn are yellowish brown. They show variation in its diploid chromosome number. The Blackbuck is native to India and can be seen in the majority of Indian grasslands. Seasonal food availability and its quality, the sun elevation and temperature of the area are important factors for foraging activity. They feed on fresh tender leaves, grass, crops, cereals, vegetables and leaves of shrubs and trees. Due to combined efforts of communities and forest department of India, the population is increasing in various habitats.

Keywords: breeding, genetics, mythology, taxonomy, threats

Introduction
The blackbuck (*Antilope cervicapra)* is a medium-sized ungulate species of antelope native and endemic to the Indian subcontinent [1]. The general name "blackbuck" refers the dark brown to black colour of the dorsal (upper) part of the coat of the male. Blackbuck is the state animal of Punjab, Haryana and Andhra Pradesh. Common names for the blackbuck are Indian antelope (in English), kadiyal, kala hiran, krishna mrig and krishnasaar (in Hindi); krishna jinka (in Telugu); and iralai maan, velimaan (in Tamil) (Figure 1) [2, 3].

Blackbuck: Common names	
	English: Indian Antelope
	Hindi: Kala hiran, Krishna Mrig
	Telugu: Krishna jinka
	Tamil: Iralai maan, Veli maan
	Gujarati: Kaliyar/Redi
	Marathi: Kalweet

Fig 1: Common name of blackbuck in different Indian languages

Taxonomy
Blackbuck belongs to order Artiodactyla, family bovidae and subfamily antelopinae. The blackbuck is the only living species belonging to the genus Antilope [4, 5]. The generic name of *Antilope cervicapra* is derived from the Latin word antalopus ("horned animal"). The specific name cervicapra is composed of the Latin words cervus ("deer") and capra ("she-goat") [6, 7]. The systematic position of blackbuck is Figure 2.

Systematic Position	
Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Subclass:	Theria
Infraclass:	Eutheria
Order:	Artiodactyla
Family:	Bovidae
Subfamily:	Antelopinae
Genus:	Antilope
Species:	*Antilope cervicapra*
Subspecies:	1. *Antilope cervicapra cervicapra* 2. *Antilope cervicapra rajputanae*

Fig 2: Systematic position of blackbuck

India has two subspecies of blackbuck namely [8]

1. *Antilope cervicapra cervicapra* [9]
It is smaller in size as compared to second subspecies. It has short and fine hair. In males body colour is dark of the upper side running all down the limbs to the hoofs, white eye- ring narrowed above the eye. Horns are relatively short, not very divergent, with a relatively open spiral. It is distributed mainly in Tamil Nadu and Karnataka in south and Bengal in eastern parts of India.

2. *Antilope cervicapra rajputanae* [10]
It is larger, with longer, roughened pelage; males, in the breeding season, with a grey sheen; shanks largely white, with little or no extension of the dark colour from the upper limb segments; white eye-ring broad all around the eye. Horns

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DIPEPTIDYL PEPTIDASE-IV INHIBITION AND *EX-VIVO* ANTIOXIDANT POTENTIAL OF PHYTOCOMPOUNDS OF *WITHANIA SOMNIFERA, TRIGONELLA FOENUM* AND *BAUHINIA PURPUREA*

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ABSTRACT

Indigenous medicinal plants possess peculiar kinds of phytocompounds uses for various kinds of ailments as well as particularly remedy for diabetes by local people through utilizing traditional knowledge and are source of new drugs discovery. Photochemical have been found to possess a wide range of activates which may help in protection against chronic disease. The efficiency of certain antidiabetic plants contains some bioactive compounds of natural derive could be, at least moderately, explained by the inhibition of DPP-IV. In the present study, we were isolate and quantified some of the phytocompounds such as alkaloid, flavonoids, phenolic and phytosteroids etc, act as DPP-IV inhibitors, which is a novel potential for the treatment of type 2 diabetes mellitus; we isolated the different bioactive fractions from *Withania somnifera, Trigonella foenum, Bauhinia purpurea* were investigated for their potential to serve as a natural source of DPP-IV inhibitors. Methanolic extract (1 mg/ml) of *W. somnifera* inhibited DPP-IV activities (76.3±1.45%) at greater extent than that of *T. foenum* (65.6±0.98%) and *B. purpurea* (63.5±0.78%) as compared to standard drug i.e. sitagliptin (96.3±1.26%). *W. somnifera* and *B. purpurea* extract was reported to inhibit DPPH free radicals and inhibited erythrocytes haemolysis in higher than the *T. foenum.* The result of present study ravel that *W. somnifera, T. foenum* and *B. purpurea* plant extracts possess some novel DPP-IV inhibitors like phytocompounds and can be developed as therapeutic molecules for type 2 diabetes mellitus. The result of present study reveal that extracts of WS and TFG contains novel DPP-IV inhibitors with antiperoxidative potential and can be developed as therapeutic molecules for type 2 diabetes

KEYWORDS: Dipeptidyl Peptidase-IV inhibition, Erythrocytes hemolysis, Phytocompounds, Antioxidant, Type 2 diabetes mellitus.

INTRODUCTION

Medicinal plants play an imperative role in the therapeutics of type 2 diabetes mellitus (T2DM) by adjourning the development of diabetic problems and amending metabolic irregularities. Similarly, the Conventional herbal remedies have been used by T2DM patients around worldwide and many scientific studies have established the assistances of medicinal plants. Additionally, through the previous few years, some of the new bioactive drugs isolated from hypoglycemic floras have been confirmed to have antidiabetic activity as particularly to DPP-IV inhibition with comparative efficacy to synthetic oral hypoglycemic agents used in clinical therapy regimens. Dipeptidyl peptidase IV (DPP-IV) inhibitors are potent mediators for the therapeutics of diabetes and the effectiveness of certain antidiabetic extracts of natural origin could be, at least partially, explained by the inhibition of DPP-IV.[1-3]

Plants have a vast ability to synthesize aromatic substances mainly secondary metabolites, of which at least 12,000 have been isolated, a number estimated to be less than 10% of the total.[4] The synthesized aromatic substances (Metabolites) are used by plants as defensive molecules against predation by microorganisms, insects and herbivores. However, some of which may involve in plant odour (terpenoides), pigmentation (tannins and quinines), and flavour (Capsacin).[5] However, these defensive molecules give plants their medicinal value which is valued by human beings because of their great importance in health care of individuals and communities. In India, the use of different parts of several medicinal plants to cure specific ailments has been in vague from ancient times. The indigenous system of medicine namely Ayurvedic, Siddha and Unani have been in existence for several centuries.[6]

The purpose of standardized extraction procedures for crude drugs (medicinal plant parts) is to attain the

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RESEARCH ARTICLE

Assessment of dose-dependent reproductive toxicity of diclofenac sodium in male rats

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ABSTRACT

Diclofenac sodium is widely used in the non-steroidal anti-inflammatory drug in the treatment of pain and inflammation. It is also particularly associated with its adverse effects on avian fauna and linked to environmental issues. The present study was aimed to assess the dose-dependent toxicity of diclofenac sodium on a male reproductive system of rats. Four groups of healthy adult fertile male rats were administered with saline (control) or 0.25 mg/kg, 0.50 mg/kg and 1.0 mg/kg of diclofenac sodium, respectively for 30 days. Alterations in body and organ weight, sperm and testicular cell population dynamics, serum biochemistry, histopathology, and hematology were investigated as per aimed objectives. Diclofenac sodium treatment significantly ($p \leq 0.001$) reduced weights of testis, epididymis, ventral prostate and seminal vesicle. Sperm count, sperm density (in epididymis and testis), sperm motility and testicular cell population dynamics were lowered in a dose-dependent manner. Administration of diclofenac exhibited varying degrees of degeneration testis, abnormal histo-architectures, and shrinkages in seminiferous tubules, particularly in higher doses. Diclofenac sodium treatments also altered hepatic and renal function parameters significantly. In conclusion, it may claim that diclofenac sodium treatment altered reproductive metabolic status, androgenic activities and histo-architecture of the testis of male rats and induced hepatotoxicity and renal toxicity.

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KEYWORDS
Diclofenac sodium; male reproductive toxicity; sperm density; sperm motility; testicular histo-architecture; rats

Introduction

Diclofenac sodium, a phenyl acetic acid derivative, is one of the commonly used non-steroidal anti-inflammatory and analgesic agent (Small 1989, Malhotra *et al.* 2013, Vohra and Raut 2016). In clinical practices, it is primarily used in multiple complications such as treatment of inflammation, rheumatoid arthritis, degenerative joint disease, ankylosing spondylitis, surgery pains, trauma, and dysmenorrhea (Thanagari *et al.* 2012). Diclofenac acts by diminishing prostaglandin (PG) synthesis through inhibition of cyclooxygenase (COX) enzymes; especially COX-2 and it has been reported to decrease the process of angiogenesis and apoptosis stimulator (Mayorek *et al.* 2010, Aprioku *et al.* 2014). On the other hand, diclofenac has emerged as a threatening environmental pollutant for avian fauna as well as other vertebrates (Oaks *et al.* 2004, Hussain *et al.* 2008, Jain *et al.* 2009, Chen *et al.* 2014). It has been proved through several studies that diclofenac sodium caused toxic effects on the hepatic and renal tissues of vulture's species and claimed for vulture population declination (Oaks *et al.* 2004, Hussain *et al.* 2008, Jain *et al.* 2009). Whereas, the influence of diclofenac sodium on a male reproductive system of vertebrates including rodents is not properly invested (Moskovitz *et al.* 1987, Adegbegi *et al.* 2014).

Interestingly, it has been reported that exposure to drugs, toxicants, analgesics might have caused alterations in reproduction (Thanagari *et al.* 2012, Vohra and Raut 2016). From the toxicological point of view, it is very important to know the mechanism by which chemicals or drugs interfere in male reproductive status because the severity and reversibility of the disturbance depend on the process being disrupted. For this motive, one must know the effect on the male reproductive system in overall and exactly whether the function of the testis is compliant or not reversible. The substances or classes of substance affect spermatogenesis likewise straight or indirectly where the mechanism of action diverges relatively noticeable (Moskovitz *et al.* 1988). It is renowned, that the function of the testis is primarily androgen dependent. Whereas, the biosynthesis of androgens is regulated by the pituitary luteinizing hormone incentive; any drug or compound which inhibits secretion of gonadotrophin indirectly encouraging androgen deficiency (El-Maddawy and El-Ashmawy 2013). Furthermore, the influence of diclofenac sodium administration was not investigated, so far on male reproductive health and profiles. Therefore, the present study was carried out to assess the influence of diclofenac sodium on male reproductive profiles of rats and to ascertain the dose-dependent effects, if any.

Materials and methods

Experimental animals

Healthy adult male albino rats, weighing 150–200 g were used for present study. All animals were proven for fertility by examination of reproductive profile obtained from the

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Research Article

PROTECTIVE EFFECT OF CUMIN (*CUMINUM CYMINUM* L.) SEED EXTRACT ON CARDIOVASCULAR SYSTEM, TOXICITY, AND HEMATOLOGY ON HYPERLIPIDEMIC RABBITS: AN EXPERIMENTAL STUDY

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ABSTRACT

Objective: The present study is related with the assessment of anti-atherosclerotic efficacy of 70% EtOH extract of cumin seed in diet-induced hyperlipidemic rabbits.

Methods: Rabbits were rendered hyperlipidemic by oral administration of cholesterol for 15 days. Then, the animals were treated with 70% EtOH (ethanolic extract) of cumin seed extract for 45 days (Group III). Another set of animals was treated with atorvastatin, the standard drug for 45 days. At the end of experimental period, the serum biochemical, hematological, and histological analysis of thoracic aorta was done.

Results: The cumin seed extract was observed to contain hypolipidemic effect by reducing plasma cholesterol, low-density lipoproteins, and triglycerides level. While toxicological studies suggest no adverse effect on renal and liver function tests, hematological parameters were also observed in a normal range. Histological analysis showed that cholesterol administration caused a narrowing of the aortal lumen while treatment with 70% EtOH and atorvastatin decreased the plaque size and restored the luminal size of the aorta to normal.

Conclusion: The present study suggests that commonly used culinary spice cumin seed possesses hypolipidemic and cardioprotective effect with a positive effect on serum biochemistry, histology, and hematology.

Keywords: Atherosclerosis, Hyperlipidemia, Cumin seed, Cardioprotective.

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INTRODUCTION

Atherosclerosis underlies the leading reason of mortality and morbidity globally. Initiation of atherosclerosis involves a decade-long expansion of the arterial intima, which occurs due to an intricate interaction of circulatory factors and various cell types in the vessel wall including endothelial cells, lymphocytes, monocytes, and smooth muscle cells [1]. Cardiovascular disease (CVD) caused 1 of every 5 deaths in past years [2]. Current allopathic drug treatment for atherosclerosis involves statin (HMG-Co-A reductase inhibitors), fibrates, niacin, and bile acid resins. Among these remedies, the statin is the most widely and reliably used drug as it directly lowers the serum cholesterol level by competitively inhibiting HMG-CoA reductase enzyme in the liver [3]. However, as the main end product of HMG-CoA activity is mevalonate, which acts as a precursor of many other non-steroidal isoprenoid compounds, so the inhibition of this enzyme results in pleiotropic effects and thus long-term consumption of statin causes several side effects [4]. Side effects of statin are labeled as statin-associated symptoms which include muscular damage (statin-associated muscle symptoms), rarely rhabdomyolysis, statin-induced narcotizing myopathy, diabetes mellitus, Alzheimer's, and dementia [5]. If the condition of atherosclerosis goes more severe, the patients are suggested to undergo cardiovascular surgery. Cardiovascular surgery is an important treatment [6], but these surgical alternatives are very expensive. Hence, there is a need to find an effective, reliable drug with less or none side effects and the answer relies on herbal medicines. Studies suggest that 4 billion people (about 80% population) prefer herbal medicines for some aspects of primary health care [7]. Dietary plants and their ingredients can act effectively for the management of hyperlipidemia as they have been reported to possess lipid digestion and absorption inhibiting constituents [8]. In traditional medicinal system, aromatic plants have always been important and being used for a long time [9]. *Cuminum cyminum* Linn. is one of the important culinary, aromatic plants used as primary medicine for a long time. The present work is focused on exploring the cardioprotective and anti-atherosclerotic effect of cumin seed extract on cholesterol-fed rabbits.

METHODS

Extraction of plant material

Dried and cleaned seeds of the *C. cyminum* (Linn.) were bought from the local market. 70% of ethanolic extract was prepared with the use of Soxhlet apparatus for 24 h. The extract was treated under low pressure and temperature and then distilled to remove excess of ethanol from the extract. After complete removal of ethanol from the extract, it was dried to obtain the brown-colored sticky extract. The extract was stored in desiccation for future use in experiments.

Experimental animals

New Zealand white rabbits weighing between 1 and 1.25 kg were obtained from the certified institute. Animals were acclimatized for 10 days before the onset of the experiment. Animals were kept in clean, metallic wire gauge cages in a room with 12:12 h light-dark cycle, 20–25°C temperature, and 40–50% relative humidity and were fed with standard pellet diet and fresh green vegetables and drinking water. The experimental protocol was approved by the Institutional Animal Ethical Committee (Reg No.: 1646/GO/Re/12/CPCSEA).

Experimentation

Induction of hyperlipidemia

Rabbits were rendered hyperlipidemic by the oral dose of cholesterol powder at the dose of 500 mg/kg.b.wt./day dissolved in 5 ml of coconut oil for 15 days.

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Research Article

ELTROXIN LIKE MIMIC ACTION OF *WITHANIA SOMNIFERA* LEAF EXTRACT IN HYPOTHYROID-INDUCED RATS

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ABSTRACT

Objective: The present study was designed to examine the anti-hypothyroid activity of *Withania somnifera* (Ashwagandha)'s leafextract on 6-n-propyl-2-thio-uracil (PTU) induced hypothyroid rats.

Method: Ethanolic extracts of *W. somnifera* leaf and Eltroxin were administrated to PTU induced hypothyroid rats. The animals were divided into control, PTU treatment, *W. somnifera* leaf extract treatment, and Eltroxin treatment groups for 60 days. The serum T_3 and T_4 were estimated, and biochemical and hematological parameters of the blood serum were also evaluated.

Results: PTU induction caused a significant decrease ($p \leq 0.001$) in T_3 and T_4 level when compared with the control group. Adverse effects of PTU were also observed in blood sugar, cholesterol, alkaline phosphate, protein, albumin, globulin, liver function test, and renal function test parameters. Non-significant changes in LFT,RFT and Other parameters were observed. WSomnifera's leaf extract and Eltroxin treatment group recovered both of the thyroid hormone secretion as compare to control.

Keywords: 6-n-Propyl-2-thio-uracil, Hypothyroid, *Withania somnifera*, Eltroxin.

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INTRODUCTION

Hypothyroidism is one of most the common endocrine disorder [1]. It is defined as a condition when the level of the thyroid hormones decreases below the normal need of the body [2]. The hypothyroidism is a complex hormonal dysfunction rather than a single hormonal defect [3]. Thyroid hormone is a powerful modulator of cardiac function [4]. Hypothyroidism causes the disturbance in body weight and appetite [5]. Even during pregnancy time, a significant change in thyroid hormone metabolism is observed [6]. Synthetic levothyroxine is recommended for hypothyroidism, actually, this drug elevates the T_3 and T_4 level in blood serum so that thyroid gland activity can be controlled [7]. Whereas, 6-n-propyl-2-thio-uracil (PTU) is prescribed for hyperthyroidism because it can decrease the amount of both thyroid hormones secreted by the thyroid gland [8]. Long duration usage of the synthetic drug can cure the hypothyroidism, but they cause side effects. L-thyroxin can damage the vital organs such as the liver and kidney, and it also causes the reduction in body weight and an increase in the relative body weight of the kidney [9]. Thus, there is a need to develop a drug from plants origin which can work for the hypothyroid treatment. Ayurveda suggests that some plant products cure hypothyroidism and some investigation on the effects of plant products on hypothyroidism is also found. Several bioactive compound has been derived from various plants, having anti-thyroidal activity and low toxicity as compare to synthetic drugs, e.g., :Bamboo shoot [10]. These plant products can control the basal metabolic rate of the body and several cardiovascular diseases like atherosclerosis [11]. These extracts have antioxidants and these can affect the metabolism of the body too [12]. *Withania somnifera* can effect on antioxidants of animal, and it can increase the serum T_3 and T_4 significantly. Its roots have a compound name withanolides which can cure many diseases [13,14]. Roots of the *W. somnifera* are used in Ayurveda to cure hypothyroidism. This study is designed to evaluate the effect of *W. somnifera* leaf extract on hypothyroidism. Therefore, we have performed an experiment to examine the effect of *W. somnifera* leaf extract on PTU induced hypothyroid rats. This study is aimed to finding out whether *W. somnifera* leaves can increase Serum T_3, T_4 level and affect the thyroid gland activity positively.

METHODS

Extraction of plant material

W. somnifera plant's leaves were collected from Jodhpur, Rajasthan state, India, and scientific identification was done in the Department of Botany, Jai Narai Vyas University, Jodhpur. These leaves were extracted with 70% ethanol for 24–36 h by Soxhlet extraction method. Then, ethanol was separated under reduced pressure to obtain a blackish dark brown crude residue which was dissolved in distilled water and orally administrated to the animals.

Model animals

Wistar rats (150–250 g) were purchased from Certified Institute. Protocols for animal care, maintenance and experiments were followed given by Animal Ethical Committee (IAEC, Reg no.: 1646/GO/Re/12/CPCSEA). For this experiment, 20 female animals were housed in polypropylene cages containing corn-cob bedding and maintained at approximately 25–28° F on a 12-h light/dark cycle. For the animal adaptability, all rats had been fed for 1 week before the experiment. Rats were randomly divided into four groups.

Experimentation

Induction of hypothyroidism

Hypothyroidism was induced in euthyroid rats by administration of PTU at the dose of 10mg/kg in drinking water as well as orally for 30 days.

Dose regime of Eltroxin

Eltroxin was used as a standard drug to cure hypothyroid that was orally administrated at the dose of 0.5 µg/100 g body weight dissolved in 50 ml of distilled water.

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Research Article

ACACIA SENEGAL BARK EXTRACT IN REGULATION OF HYPOTHYROIDISM: AN EXPERIMENTAL APPROACH

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ABSTRACT

Objective: The objective of the present study was to evaluate the thyroid hormone stimulating efficacy of *Acacia senegal* (Gum Arabic) bark extract in 6-n-propyl-2-thiouracil (PTU)-induced hypothyroid albino rats.

Methods: Ethanolic extract of *A. senegal* bark was given to PTU-induced hypothyroid albino rats at the dose of 500 mg/kg body weight. The animals were divided into control, PTU, and *A. senegal* bark extract treated and standard drug Eltroxin-treated groups for 60-day experimentation. The serum thyroxin levels, organ's weight, and serum biochemistry were carried out.

Results: Oral administration of *A. senegal* bark extract caused a highly significant increase ($p \leq 0.001$) in serum triiodothyronine (T_3) and tetraiodothyronine (T_4), and significant changes were also observed in organ's weight with biochemical parameters as compared to hypothyroid albino rats and results were approximate to the standard drug Eltroxin.

Conclusion: These results evaluate that ethanolic extract of *A. senegal* bark helps to compensate or increases the serum thyroxin level in management of hypothyroidism.

Keywords: *Acacia senegal* bark, Hypothyroid, 6-N-propyl-2-thiouracil, Eltroxin.

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INTRODUCTION

Hypothyroidism is a worldwide issue which affects more women than men. It is not only caused by cluster of iodine deficiencies but also due to the insufficient level of thyroid-stimulating hormone (TSH) which yield low triiodothyronine (T_3) and tetraiodothyronine (T_4) hormone production resulting in mental and physical growth retardation [1]. In India, approximately 42 million people suffer from thyroid disease. Hypothyroidism is clear state of myxedema which may lead to multisystem failure or subclinical condition [2]. Hypothyroidism is identified by evaluating the thyroid hormone level in the blood and treated by a synthetic thyroid hormone. The Third National Health and Nutrition Examination Survey III stated that there is about 4.6% prevalence of hypothyroidism. It may extend from mild or subclinical to overt hypothyroidism. Hypothyroidism is categorized on the basis of occurrence with time as congenital or acquired, and according to the level of endocrine dysfunction as primary or central hypothyroidism. When the thyroid gland does not function properly, the level of serum TSH starts to elevate and this elevation is indicative of hypothyroidism. Mild thyroid failure or subclinical hypothyroidism is recognized with increased level of serum TSH in the blood, but the level of serum tetraiodothyronine (T_4) and triiodothyronine (T_3) remains normal or decreased [3]. Hypothyroidism has a number of signs and symptoms such as depression, anxious mood, weight gain, and poor ability to concentrate [4]. It is also the most common thyroid hormone metabolic disorder which occurs during pregnancy and causes congenital hypothyroidism that affects the growth of children [5].

At present, the necessity of plants in the remedy of diseases is rising like "back to nature" as a substitute for synthetic drugs which may be detrimental than the disease itself [6] as well as the long-term use of synthetic drugs may cause many other side effects. On the other hand, there are many plant products suggested by Ayurveda to cure diseases without any side effects. Thus, there is a need to develop a new plant drug with less or no side effects and approachable for patients which can helps to cure hypothyroidism. *Acacia senegal L.* (Fabaceae) tree, commonly known as Gum Arabic, Kumath, and Rfaudraksha, is found in drought or arid regions of the Thar Desert. Its bark, seed, leaves, fruit, and gum contain polyphenols, flavonoids, tannins, saponins, and alkaloids [7]. It was also reported that *A. senegal* bark contains antioxidants and used to treat bedsores and wounds [8], antimicrobial, anti-Fasciola activity [9], and also antidiabetic property [10], but its effect on thyroid hormone is still not known properly. Keeping these things in context, the present analysis copes with the impact of *A. senegal* bark extract on 6-n-propyl-2-thiouracil (PTU)-induced hypothyroidism in albino rats as a working model, if any. Serum T_3 and T_4 levels were analyzed with serum biochemistry.

METHODS

Extraction of plant material

A. senegal bark was taken from the area of Jai Narain Vyas University, Jodhpur, Rajasthan State, India, and authenticated by the Department of Botany, JNVU, Jodhpur. The bark was ground to powder and extracted in 70% ethanol for 24–36 h by Soxhlet extraction method. Then, ethanol was separated under reduced pressure to obtain a brownish crude residue which was dissolved in distilled water and orally administered to the animals.

Model animals

Healthy adult albino rats, *Rattus norvegicus* of Sprague Dawley strain, weighing about 150–250 g were used as working model. Animals were kept in polypropylene cages measuring 12"×10"×8" under controlled temperature (24±1°C), humidity at 40–60% with 12:12 h light and dark cycle. Animals were fed a balanced diet of soaked wheat and pulses supplemented with multivitamins and water *ad libitum*. The Institutional Animal Ethical Committee approved the protocol (IAEC Reg. No. 1646/GO/Re/12/CPCSEA).

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Possibilities to establish ecotourism for the conservation of biodiversity in Viratra Mata Oran, Barmer

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Abstract
Ecotourism comes with a guaranteed promise to promote visits to natural areas, to make a good contribution towards biodiversity conservation, and to benefit local communities. The word ecotourism is a modern form of tourism in which through education, undertaking, learning about the natural resources, we can protect and preserve nature. This paper summarizes a case study on Viratra Mata Oran, Barmer whether there is possibility to establish ecotourism and to what will be success rate of the same. The study uses a random sampling method to gather the data for a careful group interview and observations to evaluate the possibilities of ecotourism in Viratra mata Oran, Barmer. Conclusions have been drawn by properly analysing the data and expressing it into soft sheet format. Along with that images are also provided to support the conclusion drawn.

Keywords: ecotourism, biodiversity, conservation, communities

Introduction

Ecotourism is an economically, socially and environmentally sustainable activity that reliably and genuinely connects visitors with natural and cultural landscapes resulting in valuable exchanges among these landscapes, the community, and the visitor. Tourism that involves traveling to relatively unobstructed natural areas with the specified object of studying and enjoying the scenery and its flora and fauna, as well as any existing cultural traits found in these areas may be called Ecotourism. (Ahmed, 2013) [1]

Ecotourism is an enlightening natural travel experience that contributes to the conservation of ecosystem while representing the integrity of the host community (Seace *et al.*, 1992) [2]

Ruschmann (1992) stated that ecotourism involves education and explanation of natural environment and to manage it in an ecologically sustainable way [3].

Ecotourism can boost any areas efficiency. It may harm the biodiversity if it is not properly controlled. The local people of that region developed some methods through which the biodiversity can be conserved. These methods include the making of Sacred (Oran) and Pasteur land (Gauchers) (Parihar, 2016) [4]. Without local community participation, as major stakeholder, it is impossible to sustain tourism. (Ahn *et al.* 2002) [5]

Most tourism in natural areas today is not ecotourism and is not, therefore, supportable. Ecotourism is well-known by its emphasis on conservation, education, traveler concern and active community contribution. Specifically, ecotourism possesses the following characteristics:

- Reliable, low-impact visitor behaviour
- Understanding towards, and appreciation of, local cultures and biodiversity
- Provision for local conservation efforts
- Sustainable profits to local communities
- Local participation in policymaking
- Educational modules for both the traveller and local communities

Viratra Mata Oran

The Viratra Mata Oran, Dhok village has 1859 hectors area and located between altitude 234m, latitude 25° 27' to 48.2N and longitude 71° 01' to 34.4E. It is situated near the India and Pakistan border. It is also considered as the second largest Oran in Rajasthan after the Bhadariya Rai Oran in Jaisalmer district of Rajasthan. The area is covered by sand dunes and hills. The mountains close by are made up of igneous rocks in nature.

An Oran is a land devoted to god and no authority is responsible for its maintenance. According to the Hindu mythology Oran is itself protected by god. There is a prohibition to cut trees and kill animals in Oran. (Parihar, 1997) [6]

The region's main tourist attraction is its Goddess temple situated in the inner region of the oran. Most of the devotee come here to worship goddess Viratra. Goddess Viratra is also known as Vankal Mata. Devotees from all over the world come here in the month of October and November. Local people worship goddess for their village prosperity and growth. They truly believe in the gift given by goddess to conserve biodiversity so they themselves protect the Oran from being vandalized.

The sand dunes as well as hills have enormous floral and faunal diversity. This region is actually making a transition zone between the sand dunes and hills. Both mountain and sand dune biodiversity flourish here.

The climate of this region is considered to be very hot and arid with maximum temperatures ranges in between 45 C to 52 C in May/June and in winter it drops minimum around 0°C in December/January. This region receives 90% of its total rainfall (average 277 mm) during the monsoon in July-September. ("District profile Barmer") [7]

REPTILES & AMPHIBIANS

Some Snakes of the Arid and Semiarid Regions of the Thar Desert in Rajasthan, India

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Habitats in the arid terrain of the Thar Desert of Rajasthan range from agriculturally productive areas to true desert (K.K. Sharma and Mehra 2009). Although these conditions provide suitable conditions for many species of snakes, available information on distributions and habitat selection is sparse (R.C. Sharma 1996; Sinha and Sharma 2008; Solanki et al. 2015).

Herein, we provide locality records and data on the habitat of seven species of snakes encountered during time-constrained searches conducted by two or three persons at 19 sites in three districts (Fig. 1) every three months from September 2015 to August 2019. Sites in the Bikaner District were Bikaner, Kolayat, Shridungargarh, Poogal, Jorbeer-Gadwala Conservation Reserve, Khajuwala, and Nokha; sites in Jaisalmer District were Pokhran, Jaisalmer, Lathi, Desert National Park, and Mohangarh; and in Jodhpur District, sites were Jodhpur, Balesar, Dechu, Lohawat, Osian Bilara, and Bap. We characterized habitats as stabilized dune, barren dune, grassland, agricultural fields, rocky terrain, Indira Gandhi Canal area, and urban land (Fig. 2). All snakes were examined, identified using the available literature and diagnostic keys (Smith 1943; Whitaker and Captain 2004; R.C. Sharma 2007), and released in suitable nearby habitat.

During the study period, we recorded 219 snakes of seven species (four families) with principal areas of occurrence in desert habitat. Relative abundance and habitat associations are illustrated in a matrix plot (Fig. 3).

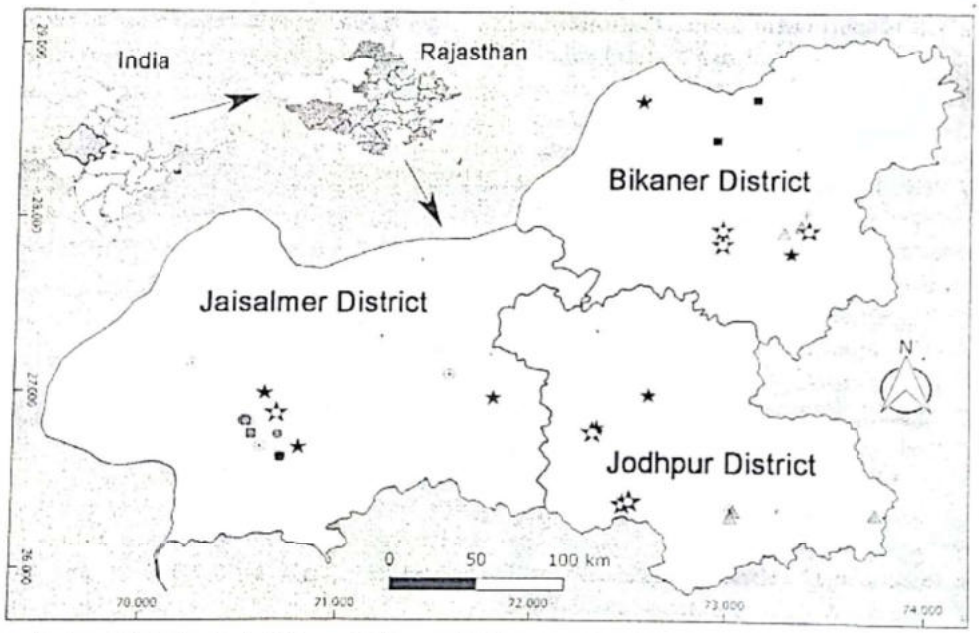

Fig. 1. Map of three districts of Rajasthan, India (Bikaner, Jaisalmer, and Jodhpur) marking observations of seven species of snakes in arid and semiarid regions of the Thar Desert: (☆) Sindh Awl-headed Snake (*Lytorhynchus paradoxus*), (+) Glossy-bellied Racer (*Platyceps ventromaculatus*), (★) Red-spotted Royal Snake (*Spalerosophis arenarius*), (△) Black-headed Royal Snake (*Spalerosophis atriceps*), (·) Afro-Asian Sandsnake (*Psammophis schokari*), (•) Sindh Saw-scaled Viper (*Echis carinatus sochureki*), and (▪) Sindh Krait (*Bungarus sindanus*). Created using QGIS desktop version 2.2.0 (Open Source Geospatial Foundation [OSGeo]).

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IJAS

Analysis of Soil Quality Using Physico-Chemical Parameters with Emphasis on Fluoride from The BackfilledMining Areas of Sanu Mines, Jaisalmer, Rajasthan, India.

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Abstract: ***Soil samples from were collected for analysis from the dumping areas of Sanu mines, district Jaisalmer, Rajasthan. Inhabitants, cattle and some crop species which are sensitive to fluoride toxicity of this tehsil suffer from fluorosis. Soil samples were collectedrandomly from given dumping areas. Total 15 samples (randomly) were analysed. Selected ion meter was used for estimation of fluoride. Fluoride ion concentration in soil samples varied from 1.0ppm to 8.23ppm.***

Keywords: Fluoride; Physico-Chemical; Parameters; Subsoil Water; Soil Dumps

1. INTRODUCTION

Soil is a vital component, medium of unconsolidated nutrients and materials, forms the life layer of plants. Soil developed as a result of paedogenic processes through weathering of rocks, alteration of soil strata, consisting of inorganic and organic constituents, possessing definite chemical, physical, mineralogical and biological properties, having variability from depth to surface of the earth, and provides a medium for plant growth Thakre [1]. Soil physic-chemical properties influence the behaviour of soil and hence, knowledge of soil property is important Sumithra [2]. Soil testing is the only way to determine the available nutrient status in soil and the only way we can develop specific fertilizer recommendations. Soil properties that are sensitive to changes can be used as indicators to improve soil quality. Analysis of soil is carried out for the studies of various parameters like total Organic Carbon, Available Nitrogen (N), Phosphorus (P_2O_5) and Potassium [K_2O]. pH, Electrical conductivity, soil texture, bulk density, chloride, fluoride and % moisture content. The fertility of the soil depends on the concentration of N, P, K, organic and inorganic materials, conductivity. The physicochemical properties such as moisture content. Nitrogen, phosphorus and organic matter required for the growth of plant. Potassium is used for flowering purpose, it is also required for building of protein, photosynthesis, fruit quality and reduction of diseases and phosphate is used for growth of roots in plants.

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ORIGINAL ARTICLE **OPEN ACCESS**

Revegetaion at Restored Disturbed Mining Area of Giral Mines, Barmer, Rajasthan, India.

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Wide-ranging lignite mining in the Indian (Thar) Desert inaugurated within the historical time. Associated mining of this treasured resource there have been noticeable, important environmental impacts. The subsequent land degradation has provoked concern from both public community and governing bodies. This research evaluates the success of restoration plans applied to revegetate a restored disturbed lignite mine area, near the village of Giral in western Rajasthan State. Restoration success was attained within the present environmental factors and their limitations of this northwest Indian hot-desert ecosystem using a combine method of: (1) backfilling (abandoned pits) the area with mine dumps and cover the backfilled-surfaces with fresh topsoil to a thickness of about 0.30 m; (2) use of rain water storage system; (3) soil profile alteration methods; (4) plant establishment methodologies; and (5) the selection of appropriate native species (trees, shrubs and grasses). Initial results indicate that the resulting vegetative cover will be capable of self-perpetuation under natural conditions. The mine spoil is alkaline in nature and has high electrical conductance. The average content of organic carbon, N, P and K is lower than in the regional topsoil. This study established approaches for the renovation of restored disturbed lignite mine areas and has also resulted in an understanding of restoration developments in arid regions with an importance on the long-term intensive care of restoration success.

Keywords: Lignite mining, revegetation, backfilling, restoration, environment, restoration success, rain water harvesting system.

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Mining includes destruction in the environment, construction of deep swallow holes, damage biodiversity, contamination of soil, groundwater, and soil surface by chemicals from mining processes. Mining disturbs the natural environment and soil strata. Mining areas stored by few methods like revegetation, preserving the topsoil during mining and leveling of the excavated overburden and restoring them, etc. Mining procedures usually require the removal of vegetative cover combined with the stripping of topsoil, overburden, and indulge materials. These activities, along with the construction of access roads, usually result in severe disturbance or destruction of soil structure, landscapes, and vegetation. Without proper management and regulation, additional adverse impacts change the habitat. India ranks third in the world in coal and lignite production and mined 316 million tonnes of this energy resource between 1998 and 1999; about 7 per cent of the total annual global production (IBM, 2001).

Vegetation cover is a critical component of terrestrial ecosystems, especially in arid and semi-arid regions, which must be sustained by sufficient water (Hadley and Szarek, 1981; Lehouerou, 1984). The vegetation dynamics concerning space and time are, therefore, primarily dominated by the availability of water (Elmore et al., 2006; Li et al., 2001). Due to the exaggerated mining activities during the most recent 10 years, the Giral area is mostly had dried up after excavation, which, consequently, led to a severe decline of vegetation cover and drastic changes in plant community structures along the underground water and artificial pond area of

Seasonal Incidence of Insect Pests on Mungbean (*Vigna radiata*) in Correlation with Meteorological data

10.18805/ag.D-5222

L. Gehlot, A.K. Prajapat

ABSTRACT

Background: Mung bean is important pulse crop in India due to its nutritional value. Its grain contains protein, fat, carbohydrate, vitamin and minerals therefore human uses it in various ways in food. Mung bean crop cultivated in kharif, rabi and summer season in India. Various species of insect pests are infested to mung bean crop and cause very harmful effect to crop and farmer. These pests decrease productivity and quality of mung bean.

Methods: Field experiment was carried out for the study of seasonal incidence of insect pests on RMG-62 variety of green gram during kharif season 2019. Mung bean was grown on a plot size of 25 m × 25m with 50 cm row to row and 20 cm plant to plant spacing. Randomly selected 20 plants from weekly interval to record population of insect pests. The population of jassid and whitefly was recorded by counting number of pests on 2 upper, 2 middle and 2 lower leaves of a plant whereas population of aphid was recorded by counting number of aphid on 10 cm twig/plant.

Result: The mean population of aphid, jassid and whitefly were recorded. Incidence of aphid started during 33th standard week with 0.9 aphid/10cm twig/plant, jassid and whitefly started during 32th standard week with 0.3 jassid/6 leaves/plant and 2.1 whitefly/6 leaves/plant, respectively. Peak mean population of aphid, jassid and whitefly reached during 36th standard week with 10.2 aphid/ 10cm twig/plant, 10.1 jassid/6 leaves/plant and 14.1 whitefly/6 leaves/plant, respectively. Simultaneously six species of insect pests also infested green gram, these were *Mylabris pustulata, Helicoverpa armigera, Trichoplusia ni , Lampides boeticus, Spoladea recurvalis* and *Diaphania indica*. The population of aphid, jassid and whitefly positively correlated with temperature. Population of aphid and whitefly had positive correlation with humidity, whereas jassid population had positive correlation with minimum humidity and negative correlation with maximum and average humidity. All three pests expressed negative correlation with rainfall.

Key words: Aphid, Insect pests, Jassid, Mungbean, Seasonal incidence, Whitefly.

INTRODUCTION

Mungbean or green gram, *Vigna radiata* is important pulse crop in India after chickpea and pigeon pea (Ved *et al.* 2008). It is used as fresh green pods, dry seeds as vegetables due to presence of protein, vitamin and mineral (Das *et al.* 2014). Mungbean grains contain 24.2% protein, 1.3% fat and 60.4% carbohydrate (Hussain *et al.* 2011). It is also consumed as fresh sprout, seeds used for making soups, bread and biscuits (Sehrawat *et al.* 2013).

Mungbean is an important *kharif* pulse crop grown in the arid and semi-arid regions of India. India is the largest producer and consumer of mungbean, which is grown in 4.26 million hectare with an annual production of 2.01 million tones and yield 472 kg/hectare. More than 80 per cent of mungbean production comes from 10 states of India. These are Rajasthan, Madhya Pradesh, Maharashtra, Bihar, Karnataka, Tamil Nadu, Gujarat, Andhra Pradesh, Odisha and Telangana. Rajasthan with 42.23 per cent area and 39 per cent of production is largest mungbean producing state in India during 2017-18. In Rajasthan, mungbean grown in 17.19 lakh hectare area and production is 7.42 lakh tones (Anonymous, 2018).

Mungbean grow easily in Rajasthan because it has ability to drought tolerance, grow in harsh climate and minimum rainfall, rapid growth, early maturation, restore soil fertility by nitrogen fixation and increase soil fertility (Sharar *et al.* 2001).

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Many insect pests attack mungbean crop causing extremely elevated losses to the crop and its production. Hence insect pests act as a limiting factor in production of mungbean (Panchabhavi and kadam, 1990). Dar *et al.* (2002) reported *Bemisia tabaci, Empoasca kerri, Aphis craccivora and Ophiomyia phaseoli* on mungbean and urdbean of which *Bemisia tabaci* was major pest during summer season. The insect pests noted on mungbean involve jassid (*Empoasca motti*, Pruthi), thrips (*Caliothrips indicus*, Bagnall), whitefly (*Bemisia tabaci*, Genn.), semilooper (*Plusia orichalcea*, Fab.), green bug (*Nezara viridula*, Linn.), stemfly (*Ophiomyia phaseoli*, Tryon), pod borers (*Helicoverpa armigera*, Hubner and *Maruca testulalis*, Geyer), tortricid moth (*Cydia ptychora*, Meyr), galerucid beetle (*Madurasia obscurella*, Jacoby) and

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POPULATION STATUS OF DEMOISELLE CRANES IN SATLANA WETLAND JODHPUR, RAJASTHAN, INDIA

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ABSTRACT : Wetlands support a huge kind of faunal diversity by providing them suitable habitat, alongside food and water. The main objective of this study was to assess the population status of the demoiselle crane at Satlana village, Jodhpur. Demoiselle cranes were observed from September 2019 to December 2020. The random transect method was used to study for Demoiselle crane in varied habitats. Direct observation of demoiselle crane and discussion with local people in the study area were made. During migration, it travels more than 2000 km. in 5 to 7 days and reaches the wetlands, agriculture fields, stubble fields in India. The present study recorded these birds reach at satlana wetland in September to October in flocks of 1200-1600 and leave in February to March. The result of the current study showed that satlana harbored high diversity and species composition because of the ideal habitat condition of the study area for avifauna. In conclusion these migratory birds inhibited the wetland area for winter month and showed local diurnal migration which requires conservation attention.

Key words : Demoiselle crane, bird, diversity, richness, wetlands, Jodhpur.

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INTRODUCTION

Wetlands are ecosystems intermediate between aquatic and terrestrial systems, which are permanently or seasonally covered with shallow water (Mitsch and Gosselink, 1986). The habitat features of the wetland system have helped to flourish a variety of living organisms includes all major groups of animals including birds. Wetlands are an important area for birds and in supporting their species diversity and regulating the ecological web (Mitsch and Gosselink, 1986; Guadagnin *et al*, 2005). Wetland habitats in the India and whole world have great ecological significance for avifauna. They occupy almost all places of the highest altitudes, high peaks, deserts, jungles, seas, caves etc.

The Thar Desert of Rajasthan is the heaven for avian diversity, particularly the migratory birds. Birds are one of the most significant indicators of the health of environments such as rural ponds because they respond to major factors and can be observed relatively easily (Koskimies, 1989). The eternal attachment of Demoiselle to Thar Desert is due to their conservation is etched in the religion, faith, culture, and attitude of local people (Gehlot *et al*, 2020).

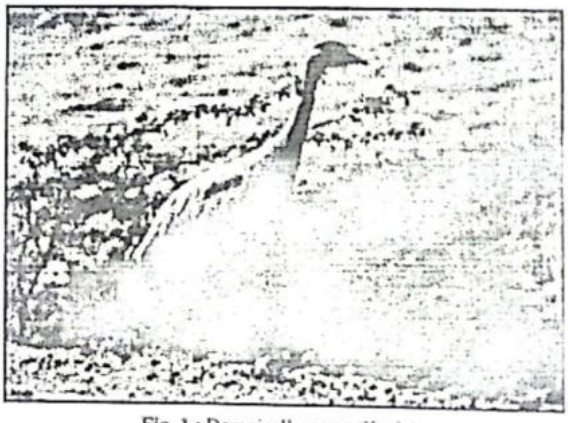

Fig. 1 : Demoiselle crane (Kurja)

The affinity of Jodhpur pulls these migratory birds to the Marwar region, the availability of food grains. Favorable temperature, climate and area surrounded by historical places means safety to them, after harvesting the fields the entire chain of food pulls them up here