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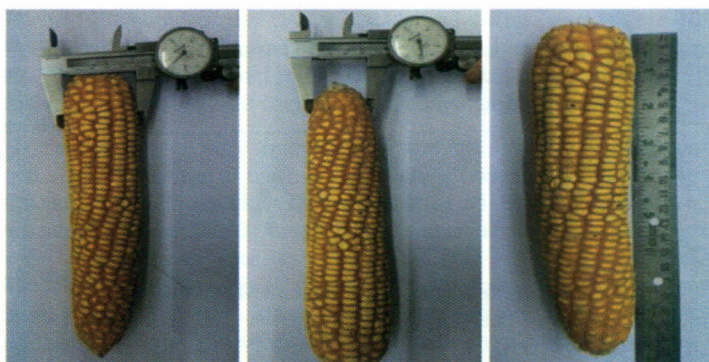
CSIR-National Institute of Science Communication And
Information Resources, CSIR
New Delhi, INDIA

CONTENTS

Rural Development Technology

- 11 **Design, Development and Evaluation of Lever type Maize Sheller** An investigation was carried out to design, develop and evaluate the performance of manually operated Lever type Maize Sheller (LMS). It consisted of a handle, guiding rod, supporting rod, spring loaded ram, maize cob guiding cylinder, shelling blade, buffer, collection chamber, shutter and frame. Performance of developed LMS was statistically compared with Tubular Maize Sheller (TMS) in terms of throughput capacity, shelling capacity, shelling efficiency, unshelled seeds and damaged seeds percentage at different maize cob length. The overall throughput capacity and shelling capacity was found to be 44.63 kg cobs/h and 33.90 kg seeds/h with LMS which was almost 3 times more as compare to TMS. The overall shelling efficiency of 96.34% and 99.45% was observed with LMS and TMS respectively. The unshelled seeds of 3.66% with LMS and 0.55% with TMS were observed.

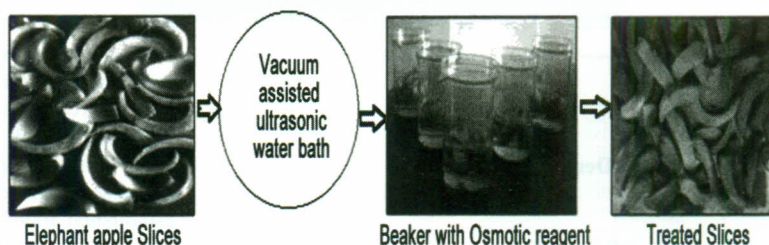
B M Nandede, M L Jadhav, A S Dhimate, D S Thorat & V S Shinde



a) Largest diameter of cob b) Smallest diameter of cob c) Length of cob

- 17 **Ultrasound Pre-treated Osmotic Dehydration of Elephant Apple (*Dillenia indica*) Slices** Osmotic dehydration of elephant apple fruit slices was optimized using a Box-Behnken design. Sugar concentration, immersion time and drying air temperature were chosen as the experimental input variables. These were optimized by estimating the desirable osmotic properties and by evaluating the phenolic compounds, antioxidant activity and rehydration ability. The regression coefficients of all the valid response models have been determined and the possible effect of variables at individual and interactive levels has been analyzed. Osmo-air dried elephant apple slices with acceptable quality could be produced by subjecting the raw slices to sugar syrup dipping at 60°Brix, for 4h followed by air drying at a temperature of 55°C.

Smurthimaye Mishra, Kalpana Rayaguru & Prakash Kumar Nayak



Mechanical Engineering

- 23 **Correlations for Fins with Impacting air Jets type Solar Air Heater**

Abhishek Kumar Goel & S N Singh

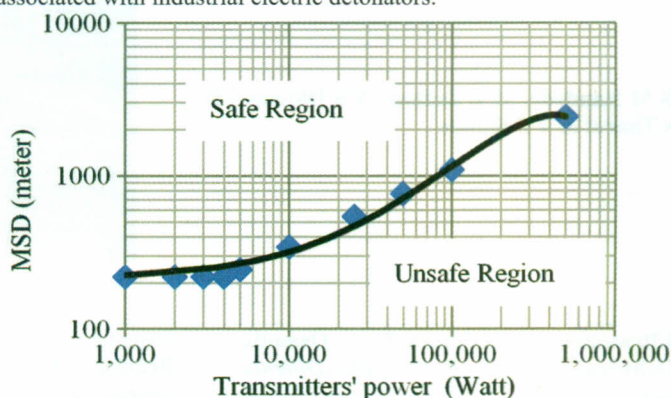
Experimental investigation has been conducted on a collector for non-cross flow configuration. The structure incorporates fins with impinging air jets below the absorber surface. The main aim is to examine the significance of implicating both the methods on heat transfer and thermal performance of the apparatus. Testing covers a prescribed range of operating and geometrical parameters such as, fin spacing ($w = 0.03$ and 0.06 m), stream-wise pitch (3 cm and 6 cm), dimensions of jet (circular in shape having diameter (D_j) = 6 mm, 8mm and 1cm), mass flow rate of air ($\dot{m} = 0.056$ – 0.112 kg.s⁻¹) and ($Re = 5700$ – 11700) respectively. An appreciable augmentation in thermal performance is noticed by mutual use of fins and air jets. The experimental data collected is further processed to develop correlations for Nusselt number in conjunction with fin and jet parameters of the set up for both the techniques separately.

Mining Engineering

- 27 **An Empirical Modeling and Evaluation Approach for the Safe use of Industrial Electric Detonators in the Hazards of Radio Frequency Radiation**

Jitendra Kumar Singh, Sujit Kumar Mandal & Gautam Banerjee

In the modern era of communication technologies use amplitude modulation (AM) and frequency modulation (FM). The transmitting antenna of radio, TV, radar, mobile phones, wireless data acquisition systems and global positioning systems are the key sources of radio frequency radiation hazards. The transmitting antennas of these communication devices generate electromagnetic fields (EMFs). Under such conditions, electric detonator wires work as receiving antenna and pickup sufficient energy from electromagnetic fields to initiate an accidental explosion. There have been several instances of accidental firing of detonators by radio frequency pickup. In this study an attempt has been made to minimize such explosions and to provide a basis for the assessment and simulation of the radio frequency radiation hazard parameters associated with industrial electric detonators.



Computer Science & Information Technology

- 34 **Optimizing Plastic Extrusion Process via Grey Wolf Optimizer Algorithm and Regression Analysis**

Aslan Deniz Karaoglan

One of the most widely used methods in the production of plastic products is the extrusion process. There are many factors that affect the product quality throughout the extrusion process. Examining the effects of these factors and determining the optimum process parameters which will provide the desired product characteristics; is important for reducing costs and increasing competitiveness. This study is performed in a manufacturer that produces plastic cups. The aim is to optimize extrusion process parameters of this company in order to achieve 1.15 mm thickness at the produced plastic sheets. For this reason, in order to be able to model the problem as an optimization problem through regression modeling, the thicknesses of the sheet generated with different process parameters were observed during the production processes. Then, considering the desired 1.15 mm sheet thickness, the established model is optimized by running the grey wolf optimizer (GWO) algorithm through the model.

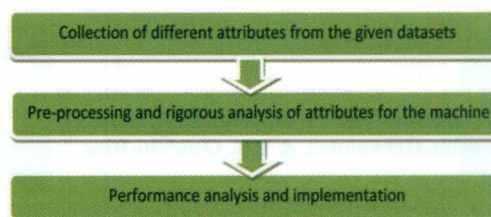
CONTENTS

- 42 **India's Rank and Global Share in Scientific Research: how Publication Counting Method and Subject Selection can Vary the Outcomes?**

Vivek Kumar Singh, Parveen Arora, Ashraf Uddin & Sujit Bhattacharya
- During the last two decades, India has emerged as a major knowledge producer in the world, however different reports put it at different ranks, varying from 3rd to 9th places. The recent commissioned study reports of Department of Science and Technology (DST) done by Elsevier and Clarivate Analytics, rank India at 5th and 9th places, respectively. On the other hand, an independent report by National Science Foundation (NSF) of United States (US), ranks India at 3rd place on research output in Science and Engineering area. Interestingly, both, the Elsevier and the NSF reports use Scopus data, and yet surprisingly their outcomes are different. This article, therefore, attempts to investigate as to how the use of same database can still produce different outcomes, due to differences in methodological approaches. The publication counting method used and the subject selection approach are the two main exogenous factors identified to cause these variations. The implications of the analytical outcomes are discussed with special focus on policy perspectives.
- 51 **Deep Learning Approach to Recognize COVID-19, SARS and Streptococcus Diseases from Chest X-ray Images**

Kamal Kant Verma & Brij Mohan Singh
- Corona virus disease (COVID-19) became pandemic for the world in the year 2020 and large numbers of people are infected worldwide due to the rapid widespread of this infectious virus. Pathological laboratory testing of a large number of suspects becomes challenging and producing false-negative results. Therefore, this paper aims to develop a deep learning based approach for automatic detection of COVID-19 infection using medical X-ray images. The proposed approach is used for the fast detection of COVID-19 along with other similar diseases such as Streptococcus, and severe acute respiratory syndrome (SARS) positive cases. A 2D-convolution neural network (2D-CNN) is used to recognize the graphical features of X-ray image's dataset of COVID-19 positive, Streptococcus and SAR Spatients. The proposed approach is tested on the COVID-chest X-Ray dataset. Experiments produced individual accuracies of COVID-19, Streptococcus, SARS disease and normal persons are 100%, 90.9%, 91.3%, and 94.7% respectively and achieved an overall accuracy of 95.73%. From the experimental results, it is proved that the performance of the proposed approach is better as compared to the mentioned state-of-art methods.
- 60 **A New Efficient Method for the Detection of Intrusion in 5G and beyond Networks using ML**

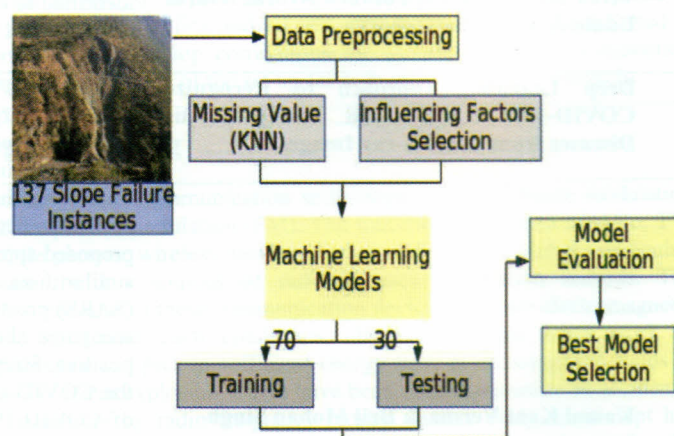
Vikash Yadav, Mayur Rahul & Rishika Yadav
- The 5G networks are very important to support complex application by connecting different types of machines and devices, which provide the platform for different spoofing attacks. Traditional physical layer and cryptography authentication methods are facing problems in dynamic complex environment, including less reliability, security overhead also problem in predefined authentication system, giving protection and learn about time-varying attributes. In this paper, intrusion detection framework has been designed using various machine learning methods with the help of physical layer attributes and to provide more efficient system to increase the security. Machine learning methods for the intelligent intrusion detection are introduced, especially for supervised and non-supervised methods. Our machine learning based intelligent intrusion detection technique for the 5G and beyond networks is evaluated in terms of recall, precision, accuracy and f-value are validated for unpredictable dynamics and unknown conditions of networks.



66 **Machine Learning Techniques to Predict Slope Failures in Uttarkashi, Uttarakhand (India)**

Poonam Kainthura & Neelam Sharma

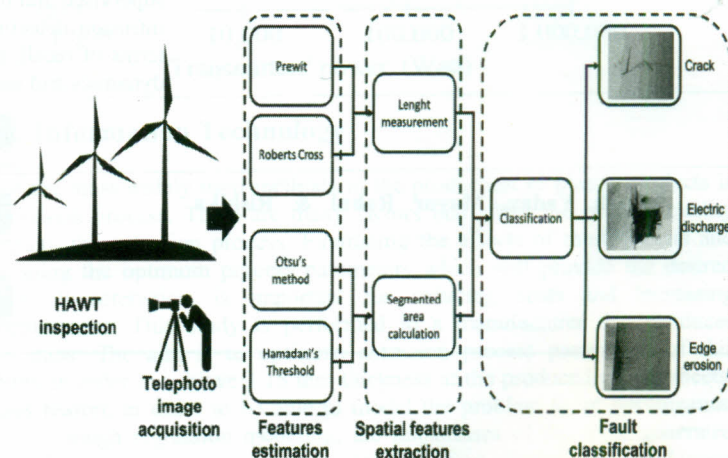
Uttarkashi region is highly prone to landslides because of its geological structure. The exact occurrence of these landslides events is difficult to predict due to its complex mechanism and dependence on the number of triggering factors. Moreover, the behavior and prediction of unstable slopes are of high importance failing of which otherwise can have a devastating impact. This research work aims at studying and modeling slopes with the help of supervised machine learning models: Support vector machine, Back propagation, Random Forest, and Bayesian Network models. To train and test these models a total of 629 instances are taken. Moreover, the independence of individual features is studied with the help of multicollinearity analysis. The capability of considered methods was evaluated using various performance evaluation metrics.



75 **Novel Method for Wind Turbines Blades Damage Classification using Image Processing**

M A Garduño-Ramón, E Resendiz-Ochoa, L A Morales-Hernandez, & R A Osornio-Rios

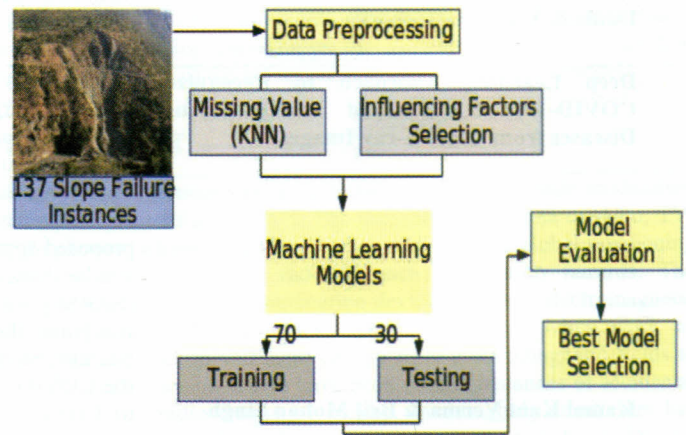
Wind turbine generators are spreading around the world due to its advantages over fossil fuels. Structural monitoring of them is important to increase operation and reduce maintenance times. Visual inspection is highly influenced by the human factor due to the working conditions. Image processing supported by vision systems offers high advantages reducing times, being the software and processing algorithms, which generates added value. In this paper, a novel method for wind turbines blades damages analysis is presented using image processing and a classifier based on dimensional features. The image acquisition is performed using a reflex camera with a telephoto and geo-location enabled. The faults analyzed include cracks, edge erosion, and electric discharge.



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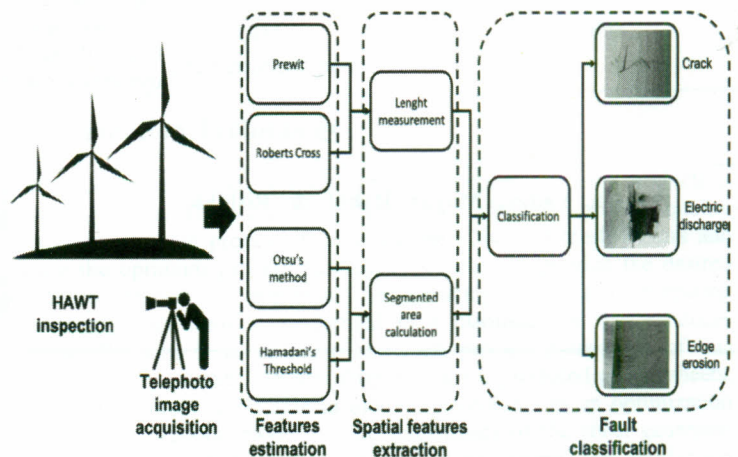
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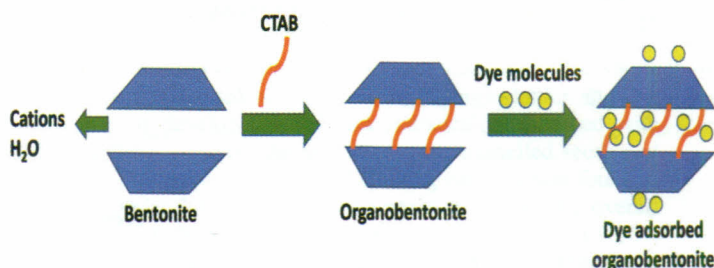
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Earth, Environment & Atmospheric Sciences

80 **Organobentonite as an Efficient and Reusable Adsorbent for Cationic Dyes Removal from Aqueous Solution**

In the present study, cetyltrimethylammonium bromide (CTAB) was used to modify raw bentonite (Ben) through the replacement of exchangeable cations to form CTAB modified bentonite (CTAB-Ben). Both Ben and CTAB-Ben were characterized using scanning electron microscopy (SEM), X-ray diffraction (XRD), Fourier transform infrared (FT-IR) spectroscopy and Brunauer-Emmet-Teller (BET) analysis. Adsorption potential of Ben and CTAB-Ben were explored for the removal of two cationic dyes i.e. Rhodamine B (RB) and Crystal violet (CV) from aqueous solutions. The maximum dye adsorption capacity of CTAB-Ben was found to be 93.15 and 14.76 mg g^{-1} for CV and RB, respectively. The adsorption data of both the adsorbents was better explained by Freundlich isotherm whereas the pseudo second order (PSO) model better fitted the kinetics data. Regeneration studies revealed that CTAB-Ben could be reused upto five adsorption-desorption cycles.

Pooja Patanjali, Indu Chopra, Abhishek Mandal & Rajeev Singh

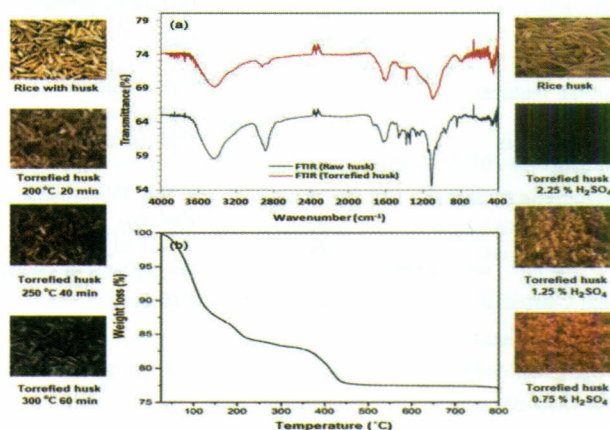


Energy Technology & Management

87 **A Study on the Torrefaction of Rice Husk as an Attempt to Enhance Its Energy Content**

Torrefaction refers to the thermal and chemical treatment of organic substances (at atmospheric pressure, between 200–300°C, under inert conditions). The objective of this study is to torrefy the rice husk of Ethiopian origin, after a pretreatment with dilute sulfuric acid in order to enhance its energy density. The torrefaction temperature, holding time, and acid concentration investigated in this study were (200, 250, and 300°C), (20, 40, and 60 min) and (0.75, 1.50, and 2.25 g/L), respectively. Box-Behnken experimental Design (BBD) was applied for optimization using Design-Expert ® Version 7 software (Stat-Ease Inc., Minnesota, and United States).

Dejene Mandefro & S Anuradha Jabasingh



Author-Reader Platform

91 **Instructions to Contributors**