SOUVENIR
of
INTERNATIONAL CONFERENCE
on
MACHINE VISION
&
AUGMENTED INTELLIGENCE
(MAI - 2021)

February 11 - 14, 2021

@IIITD JABALPUR

INTERNATIONAL CONFERENCE ON MCHINE VISION & AUGMENTED INTELLIGENCE (MAI - 2021)

OUR SPEAKERS

MR. HARINARAYAN CHARI MISHRA
IG INDORE ZONE

DR. ABAHY JERE
CHIEF INNOVATION OFFICER
MINISTRY OF EDUCATION
GOVT. OF INDIA

PROF. AKBAR S AKBARI
UNIVERSITY OF LEEDS BRACKET, UK

DR. BRUHANPH MALLIK
UNIVERSITY OF LEEDS BRACKET, UK

PROF. PHALGUNI GUPTA
VICE CHANCELLOR, GLA UNIVERSITY

PROF. GEORGE GIAKOS
MANHATTAN COLLEGE, USA

PROF. PRABHAT MUNSHI
IIT KANPUR

MR. NITIN JAIN
GE HEALTHCARE

KAMIYA KHATTER
SPRINGER

SPARC
Scheme for Promotion of Academic and Research Collaboration

11th-14th FEBRUARY 2021

CONFERENCE CHAIR'S MESSAGE

Using computers and computing power to augment human intelligence, is avery worthwhile and noble cause in the technological world today. I am

Personally very happy to see that a conference on machine vision and augmented intelligence is being organized, by Prof. Manish Bajpai and Prof. Koushlendra Singh, at IIIT Jabalpur. It represents a confluence of two streams which use the power of computing to enhance human capability: the power to discern details and features through computer vision and the power to think like a human would, at least to an extent, through augmented intelligence. The detailed themes chosen for this conference are also very apt, they address the current need, after the challenges that the pandemic has posed, for the human race.

Both Prof. Bajpai and Prof. Koushlendra are known to me, as very capable and active researchers in the areas touched upon in the conference themes. I am glad that they are making this effort to bring many experts in the subject together and multiply the work being done in our nation, on this theme. Many of the technical thoughts that I can anticipate, will be expressed during the deliberations of the conference, will inspire researchers and professionals to take our beloved nation one more step towards 'Atmanirbhar Bharat', bringing indigenous capability and competence into our students, faculty and professionals. My very best wishes for this event and prayers, that it remain in the memories of those who participate, for a very long time to inspire and rejuvenate mentally.

Warm regards,
VIKRAM M. GADRE,
PROFESSOR, IIT BOMBAY.

MESSAGE FROM THE COORDINATOR

On behalf of the organizing committee of **MAI 2021**, we welcome you to the virtual mode of the conference which is organised at **IIITDM Jabalpur from 11-14, 2021**.

The conference brings together the academicians, researchers, industry people and students to come together and discuss the current state-of-the-art developments of the fields. The conference will provide a benchmark and platform to the **"AATM NIRBHAR BHARAT"** by using modern augmented intelligence. The conference theme encompasses all industrial and non-industrial applications in which a combination of hardware and software provide operational guidance to devices in the execution of their functions based on the capture and processing of images. Today, manufacturers are using machine vision and Augmented Intelligence based metrology to improve their productivity and reduce costs. Machine vision and Augmented Intelligence integrates optical components with computerized control systems to achieve greater productivity from existing automated manufacturing equipment. This will become very useful to improve the efficiency in different field like **security, crime detection, forensic, Inventory control, Accident control over National Highways** etc. The conference will continue the tradition of the world's leading experts giving keynote speeches, high quality tutorials, panel discussions, workshops, tutorials, and products and prototype demonstration, social events, and fun. We are preparing a galore of surprises, which we will gradually reveal as the date draws closer.

As a part of the conference, we are also organizing ONE-day workshop on **"Artificial Intelligence (AI): Opportunities and Challenges in India"** on **Feb 11, 2021**. The focus of the workshop is to exchange the knowhow of the field and government policies in the field of AI.
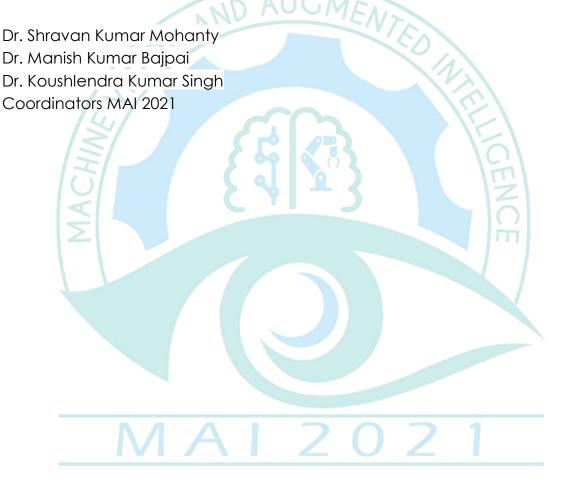
We would like to express our heartfelt gratitude to **Prof. Sanjeev Jain**, Director IIITDM Jabalpur for his continuous encouragement and support. We would also like to express our sincere thanks to the Dean, R&C **Dr. Dinesh K. Vishwakarma** and head of the CSE discipline **Dr. Atul Gupta** for their continuous support in organising the conference.

Our sincere thanks to **Prof. George Giakos, Prof. Akber S. Akbari, HariNarayan Chari Mishra,** I.P.S, Inspector General Indore Zone**, Dr. Abhay Jere,** Chief Innovation Officer, MoE, **Jaydeep Majumdar**, Executive Director B.E.L and other speakers for their benign support and thorough participation in the conference.

We would like to extend our sincere thanks to Miss Kamiya Katter, Springer and IEEE MP Section for technical support. We are happy to inform you that two journals namely **S.N Computer Science** and **International Journal of Information Technology** have gladly accepted our proposal to publish the extended version of the presented papers. The organising committee would also like to thanks the sponsors **DRDO, SPARC, CSIR.**

We hope that you had a thrilling experience at the conference and found **MAI 2021** a rewarding opportunity in advancement of knowledge as well as a way to generate unique global collaborative opportunity.

Dr. Shravan Kumar Mohanty
Dr. Manish Kumar Bajpai
Dr. Koushlendra Kumar Singh
Coordinators MAI 2021

MAI 2021 SCHEDULE

DAY 1, FEB 11, 2021

0930 – 1030 Hr	Inauguration
1030 – 1120 Hr *Session Chair: Dr. Kusum Kumari Bharti (IIITDM Jabalpur)* *Link:*	*Talk by Chief Guest Mr. Joydeep Majumdar, Executive Director, Bharat Electronics Limited, Gazhiabad*
1130 – 1200 Hr	High Tea
1200 – 1250 Hr *Session Chair: Dr. Koushlendra Kumar Singh (NIT Jamshedpur)* *Link:*	*Mr. Abahy Gere, Chief Innovation Officer, Ministry of Education, Govt. of India (Invited Talk)*
1250 – 1340 Hr *Session Chair: Dr. Koushlendra Kumar Singh (NIT Jamshedpur)* *Link:*	*Mr. Harinarayanchari Mishra, Inspector General of Police, Indore (Invited Talk)*
1340 – 1500 Hr	Lunch
1500 -1600 Hr *Session Chair: Dr. Ranjeet Kumar (VIT Chennai)* *Link:*	*Dr. Nitin Jain, GE Health Care (Invited Talk)*

Technical Session: Artificial Intelligence in Healthcare *Session Chair: Dr. Atul Gupta (IIITDM Jabalpur)* *Co-Session Chair: Abhay Kumar (NIT Patna)* *Link:*	

1600 – 1645 Hr	Application of Internet of Things (IoT) in monitoring hospital equipment *Barath Kumar Babu and Bhoomadevi A*
	Diabetes Analysis Using Machine Learning Techniques *Lokesh Malviya, Sandip Mal, Praveen Lalwani and Jasroop Singh Chadha*
	Alzheimer's Disease Diagnosis using Structural MRI and Machine Learning Techniques *Samir Yadav and Sanjay Sutar*

DAY 2, FEB 12, 2021

0930 – 1030 Hr *Session Chair: Dr. Manish Kumar Bajpai (IIITDM Jabalpur)* *Link:*	*Prof. George Giakos, Manhatten College, USA (Invited Talk)*

Technical Session: Deep Learning: Theory and Applications *Session Chair: Prof. Aparajita Ojha (IIITDM Jabalpur)* *Co-Session Chair: Dr. Anil Kumar Soni (GGU, Bilaspur)* *Link:*		**Technical Session: Image Processing and Computer Vision** *Session Chair: Dr. Puneet Gupta (IIT Indore)* *Co-Session Chair: Dr. Bhaskar Mandal (NIT Patna)* *Link:*	
1045 – 1145 Hr	A Transfer Learning-based Multi-Cues Multi-Scale Spatial-Temporal Modelling for Effective Video-based Crowd Counting and Density Estimation using a Single-Column 2D-Atrous Net *Santosh Tripathy and Prof. Rajeev*	1045 – 1145 Hr	Walking motion simulation of human walk by solving inverse kinematics *Astha Verma, Vijay Bhaskar Semwal and Koushlendra Kumar Singh*

	Srivastava		
	NVM Device based Deep Inference Architecture using Self-Gated Activation Functions (Swish) **Afroz Fatima and Abhijit Pethe**		Performance Analysis of Machine Learning Based Breast Cancer Detection Algorithms **Sanjay Kumar, Akshita Na, Shivangi Thapliyal, Shiva Bhatt and Naina Negi**
	Stock Market Predictions using FastRNN, CNN and BiLSTM Based Hybrid Model **Konark Yadav, Milind Yadav and Sandeep Saini**		A New Compact Color Feature for Distinguishing Computer Graphic Images from Photo Graphic Images **Sasithradevi. A, S. Mohamed Mansoor Roomi and Nirmala Paramanandham**
	Deep Convolutional Neural Network based Hard Exudates Detection **Deepa R and Narayanan N K**		Static Gesture Classification and Recognition using HOG feature parameters and KNN and SVM based Machine Learning Algorithms **Sheena C V and Nk Narayanan**
	Technical Session: Deep Learning: Theory and Applications *Session Chair: Dr. Deeptendu Kumar Roy (NIT Meghalaya)* *Co-Session Chair: Dr. Ranjeet Kumar (VIT Chennai)* *Link:*		**Technical Session: Image Processing and Computer Vision** *Session Chair: Dr. Pritee Khanna (IIITDM Jabalpur)* *Co-Session Chair: Dr. Vaibhav Prakash Singh (MNNIT)* *Link:*
1200 – 1300 Hr	Deep Learning-based Malicious Android Application Detection **Vikas Malviya and Atul Gupta**	1200 – 1300 Hr	Surya-namaskar pose identification and estimation using no code Computer Vision **Ujjayanta Bhaumik, Siddharth Chatterjee and Koushlendra Kumar Singh**
	Classification of Land Cover and Land Use using Deep Learning **Suraj Kumar, Suraj Shukla, Keshav Kumar Sharma, Koushlendra Kumar Singh and Akber Sheikh Akbari**		Improved performance guarantees for Orthogonal Matching Pursuit and application to dimensionality reduction **Munnu Sonkar, Latika Tiwari and C.S. Sastry**
	Hybrid Features-enabled Adaptive Butterfly Based Deep Learning Approach for Human Activity Recognition **Anagha Deshpande and Krishna Warhade**		Transparent Decision Support System for Breast Cancer to determine the risk factor **Akhil Kumar Das, Dr. Saroj Kr. Biswas and Dr. Ardhendu Mandal**
	Diabetes Prediction using Deep Learning Model **Nishq Desai, Utkarsha Na, Krishna Kalpesh Patel, Avanish Sandilya and Kanchan Lata Kashyap**		Histogram-based Image Enhancement and Analysis for Steel Surface and Defects Images **Ranjeet Kumar, Anil Kumar Soni and Aradhana Soni**
1300 – 1400 Hr		Lunch	
1400 – 1500 Hr *Session Chair: Dr. Koushlendra Kumar Singh (NIT*		*Prof. Akbar S Akbari, Dr. Bruhanph Mallik University of Leeds Bracket, UK (Invited*	

Jamshedpur) *Link:*		*Talk)*	
Technical Session: Deep Learning: Theory and Applications *Session Chair: Dr. B. K. Singh (NIT Jamshedpur)* *Co-Session Chair: Dr. Nikhil Agarwal (IIIT Nagpur)* *Link:*		**Technical Session: Image Processing and Computer Vision** *Session Chair: Prof. D.A Khan (NIT Jamshedpur)* *Co-Session Chair: Dr. Vikash Malviya (Symbiosis, Pune)* *Link:*	
1515 - 1615 Hr	Object Detection Using YOLO Framework for Intelligent Traffic Monitoring *Amitha I C and Narayanan N K*	1515 - 1615 Hr	An Approach for Denoising of Contaminated Signal using Fractional Order Differentiator *Koushlendra Kumar Singh, Ujjayanta Bhaumik, Anand Sai and Kornala Arun*
	A Convolutional Neural Network Model to Predict Air and Water Hazards *Dhalia Sweetlin J, Akshayarathna A and Divya Darshini K*		Density-Assessment for breast cancer diagnosis using deep learning on mammographic image: A brief study *Shaila Chugh, Sachin Goyal, Sunil Joshi, Anjana Pandey and Mukesh Ajad*
	Deep Learning in Quadratic Frequency Modulated Thermal Wave Imaging for Automatic Defect Detection *Gopi Tilak V, Ghali V. S., Naik R. B, Vijaya Lakshmi A and Suresh B*		Three Dimensional Fractional Operator for Benign Tumor Region Detection *Saroj Kumar Chandra, Abhisek Shrivastava and Manish Kumar Bajpai*
	Detection of Acute Lymphoblastic Leukemia by Utilizing Deep Learning methods *Surya Sashank Gundepudi V, Charu Jain and Venkateswaran N*		Non-destructive fusion method for image enhancement of eddy current sub-surface defect images *Anil Kumar Soni, Ranjeet Kumar, Shrawan Kumar Patel and Aradhana Soni*

DAY 3, FEB 13, 2021

0930 – 1030 Hr *Session Chair: Dr. Nitin Jain, GE Healthcare* *Link:*		*Prof. Prabhat Munshi, IIT Kanpur* *(Invited Talk)*	
Technical Session: Cryptography and Image Security *Session Chair: Dr. V B Semwal (MANIT Bhopal)* *Co-Session Chair: Dr. Vikash Malviya (Symbiosis, Pune)*		**Technical Session: COVID-19: Theory and Practice** *Session Chair: Dr. Ambuj Pandey (IISER Bhopal* *Co-Session Chair: Dr. Lokpati Tripathy (IIT Goa)*	
1045 – 1145 Hr	Supervised Machine Learning-Based DDOS Defense System for Software Defined Networks *Gufran Siddiqui and Sandeep Shukla*	1045 – 1145 Hr	Mathematical Model with Social Distancing Parameter for Early Estimation of COVID-19 spread *Avaneesh Singh, Saroj Kumar Chandra and Manish Kumar Bajpai*
	Digital Watermarking Based Image Forensics Technique *Sanjay Kumar and Binod Kumar Singh*		Modeling and Predictions of COVID-19 Spread in India *Saurav Karmakar, Dibyanshu*

			Gautam and Purnendu Karmakar
	Feature Optimization of Digital Image Watermarking using Machine Learning Algorithms ***Manish Rai, Sachin Goyal and Mahesh Pawar***		Automatic Diagnosis of Covid-19 using Chest X-ray Images through Deep Learning Models ***Siddharth Gupta, Palak Aggarwal, Sumeshwar Singh, Shiv Ashish Dhondiyal, Manisha Aeri and Avnish Panwar***
	Secure Color Image Encryption Method using Chaos ***Rajiv Ranjan Suman, Bhaskar Mondal, Sunil Kumar Singh and Tarni Mandal***		CORO-NET: CNN Model to Diagnose COVID-19 Disease using Chest X-ray Images ***Rachi Jain and Devendra Kumar Meda***
	Technical Session: Cyber Security and Social Network Analysis ***Session Chair: Dr. Ruchir Gupta (IIT Varanasi)*** ***Co-Session Chair: Dr. Sudhanshu Jha (C U Allahabad)*** ***Link:***		**Technical Session: Augmented Intelligence: Theory and Applications** ***Session Chair: Dr. Kanchan Lata Kashyap (VIT Bhopal)*** ***Co-Session Chair: Dr. Lucky Agrawal (VIT Chennai)*** ***Link:***
1200 – 1300 Hr	A new Adaptive Inertia Weight based Multi Objective Discrete Particle Swarm Optimization Algorithm for Community Detection ***Ashutosh Tripathi, Mohona Ghosh and Kusum Bharti***	1200 – 1300 Hr	An IoT Enabled Smart Waste Segregation System ***Subham Divakar, Abhishek Bhattacharjee, Vikash Kumar Soni, Rojalina Priyadarshini, Rabindra Kumar Barik and Diptendu Sinha Roy***
	Social Media Big Data Analytics: Security Vulnerabilities and Defenses ***Sonam Srivastava and Yogendra Narain Singh***		Groundwater Modelling by Artificial Neural Networks of Parts of Yamuna River Basin ***Saad Moeeni, Naved Ahsan, Mohammad Sharif and Asif Iqbal***
	An Efficient Algorithm for Preprocessing of Web Log Data ***Vipin Jain and Kanchan Lata Kashyap***		Omni-Directional Zeroth Order Resonator (ZOR) Antenna for L-Band Applications ***Komal Roy, Rashmi Sinha, Chetan Barde, Sanjay Kumar and Prakash Ranjan***
	Predicting Depression by Analyzing User Tweets ***Abhay Kumar and Kumar Abhishek***		Study of Communication Pattern for Perfect Difference Network ***Sunil Tiwari, Rakesh Kumar and Manish Bharadwaj***
1300 – 1400 Hr		Lunch	
1400 – 1500 Hr ***Session Chair: Dr. Saroj Kumar Chandra (Galgotia University)*** ***Link:***		***Ms. Kamiya Khatter, Springer (Invited Talk)***	
	Technical Session: Cyber Security and Social Network Analysis ***Session Chair: Dr. Sraban Kumar Mohanty (IIITDM Jabalpur)*** ***Co-Session Chair: Dr. Prakash Ranjan (IIIT Bhagalpur)***		**Technical Session: Augmented Intelligence: Theory and Applications** ***Session Chair: Dr. Shyam Lal Gupta (HPU Shimla)*** ***Co-Session Chair: Dr. Buddhadev Pradhan (NIT Durgapur)***
1515 - 1615	Sentiment Analysis of Reviews Related to Novels	1515 - 1615	Candidate Set based Method for Ear Localization and Validation

Hr		Hr	
	Anant Saraswat, Abhay Kumar and Kumar Abhishek		*Ayushi Rastogi, Ujjayanta Bhoumik, Chhavi Choudhary, Akber Sheikh Akbari and Koushlendra Kumar Singh*
	A pluggable system to enable fractal compression as the primary content type for World Wide Web *Bejoy Varghese and Krishnakumar S*		Computer aided Malaria Detection via Deep Learning and Computer Vision *Kartik Kumar, Gaurav Chandiramani and Kanchan Lata Kashyap*
	Visualizing and Computing Natural Language Expressions: Through A Typed Lambda Calculus λ *Harjit Singh*		Modelling India road traffic using concepts of fluid flow and Reynolds number for anomaly detection *Varun Kumar, Alankrita Kakati, Mousumi Das, Aarhisreshtha Mahanta, Puli Gangadhara, Chandrajit Choudhury and Fazal Talukdar*
	Classification of Idioms and Literals using Support Vector Machine and Naïve Bayes Classifier *Briskilal J and Subalalitha C N*		Embedded Vision Based Intelligent Device for the Visually Impaired *Mohamma Farukh Hashmi, Sasweth Rajanarayanan and Avinash Keskar*

Day 4, Feb 14, 2021

0930 – 1030 Hr *Session Chair: Dr. Kusum Kumari Bharti (IIITDM Jabalpur)*		*Prof. Phalguni Gupta, GLA University (Invited Talk)*	
Technical Session: Soft Computing ***Session Chair: Prof. P K Singh (IIITM Gwalior)*** ***Co-Session Chair: Dr. Shail Pandey Kumar (NIT SURAT)***		**Technical Session: Brain Computer Interface** ***Session Chair: Prof. R B Pachori (IIT Indore)*** ***Co-Session Chair: Dr. Nikhil Agrawal (IIIT Nagpur)***	
1045 – 1130 Hr	Multi-agent Based GA for Limited View Tomography *Raghavendra Mishra and Manish Kumar Bajpai*	1045 – 1130 Hr	Feature Extraction and Comparison of EEG Based Brain Connectivity Networks using Graph Metrics *Mangesh Kose, Mithilesh Atulkar and Mitul Kumar Ahirwal*
	Genetic Algorithm based Resident Load Scheduling for Electricity Cost Reduction *Jeyaranjani J and Devaraj D*		A Machine Learning Model for Automated Classification of Sleep Stages using Polysomnography Signals *Santosh Satapathy, Hari Kishan Kondaveeti, D Loganathan and Sharathkumar S*
	Stochastic gradient descent with selfish mining attack parameters on Dash Difficulty adjustment algorithm *Jeyasheela Rakkini and Geetha K*		Epileptic Seizure Prediction from Raw EEG Signal using Convolutional Neural Network *Ranjan Jana and Imon Mukherjee*
1130 – 1200		**Valedictory**	
High Tea			

Study of Communication Pattern for Perfect Difference Network

Sunil Tiwari, Manish Bhardwaj, Rakesh Kumar Katare
Department of Computer Science, A.P.S. University Rewa (M.P) India
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ABSTRACT: The paper presents two studies, first connectivity of perfect difference network and second illustrates a method to identify its communication patterns using set theory and algebraic structure in perfect difference network. They are becoming pervasive in parallel and distributed architecture. A well-defined pattern makes efficient use of scarce communication resources such as nodes providing minimum diameter, high bandwidth with a minimum degree. In this paper, we study communication patterns of next-generation interconnection network Perfect Difference Network.

KEYWORDS: *Interconnection Network, Perfect Difference Network, Perfect Difference Set, set theory, Network Flow, Image Processing*

Simulation of Groundwater level by Artificial Neural Networks of Parts of Yamuna River Basin

Saad Asghar Moeeni[1], Mohammad Sharif[1] , Naved Ahsan[1,2] Asif Iqbal
[1]Department of Civil Engineering, Jamia Millia Islamia, New Delhi
[2] Piro Tech, New Delhi

ABSTRACT: The main aim of this research article is to compare the different algorithm of Artificial Neural Network and for prediction of groundwater level feed forward back propagation network was applied for Baberu Block of Banda Districts which comes under Yamuna River Basin. An optimal design is completed with four different algorithms Levenberg Marquardt, Gradient Descent, Scaled Conjugate Gradient and Bayesian Regularization. The data regarding Training of ANN is obtained from Recharge and Discharge data while groundwater level data was used for output layer.On comparison with different algorithm best algorithm comes to Levenberg Marquardt algorithm.

KEYWORDS: Algorithm, Baberu, Recharge, Discharge, Groundwater

Feature Extraction and Comparison of EEG Based Brain Connectivity Networks using Graph Metrics

Mangesh Ramaji Kose[1], Mithilesh Atulkar[2], Mitul Kumar Ahirwal[3],
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ABSTRACT: Human brain with enormous number of interconnected neurons forms a complex network. Various techniques have been introduced by neuroscientists for analyzing the functionality of human brain using different neuroimaging techniques. The recent trend for the brain functionality analysis uses the concept of brain connectivity network. Brain connectivity network represents the association between functionally independent regions while performing cognitive tasks or in diseased condition. This study implements the Electroencephalogram (EEG) signal-based brain connectivity network (BCN) corresponding to epilepsy diseased as well as healthy subjects. The BCN constructed for diseased as well as healthy subjects are analyzed by calculating graph-based metrics. Two types of graph metrics are calculated; i) Graph metrics dependent on numbers of nodes; ii) Graph metrics independent of numbers of nodes. Finally, the importance score is calculated for each metrics and these metrics are compared to identify the best graph based metric for identification of epilepsy diseased subject. On the basis of importance score obtained using decision tree regressor it is found that participation coefficient metric from node dependent type of metrics assigned maximum importance score.

KEYWORDS: EEG, BCN, Graph Metrics, Decision Tree Regressor.

Stock Market Predictions using Fast RNN, CNN and BiLSTM Based Hybrid Model

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ABSTRACT: Accurate predictions of the stock values in fast fluctuating high-frequency financial data is always a challenging task. In this work, we aim to develop deep learning based hybrid model for live predictions of stock values. The proposed model is a hybrid deep learning model by utilizing the best features of Fast Recurrent Neural Networks (Fast-RNN), Convolutional Neural Networks (CNN), and Bi-Directional Long Short Term Memory (Bi-LSMT) models, to predict abrupt changes in the stock prices of a company. For training and validation, we have considered the 1-minute time interval stocks data of four companies for a period of one day. The model is aimed to have a low computational complexity as well so that it can be run for live predictions as well. The model's performance is measured by Root Mean Square Error (RMSE) along with computation time. The model outperforms

ARIMA, FBProphet, and other hybrid systems for live predictions of stock values.

Mathematical Model with Social Distancing Parameter for Early Estimation of COVID-19 spread

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ABSTRACT: COVID-19 is well known to everyone in the world. It has spread around the world. No vaccine or antiviral treatment is available till now. COVID-19 patients are increasing day by day. All countries have adopted social distancing as a preventive measure to reduce spread. It becomes necessary to estimate the number of peoples going to be affected with COVID-19 in advance so that necessary arrangements can be done. Mathematical models are used to provide early disease estimation based on limited parameters. In the present manuscript, a novel mathematical model with a social distancing parameter has been proposed to provide early COVID-19 spread estimation. The model has been validated with real data set. It has been observed that the proposed model is more accurate in spread estimation.

NVM Device based Deep Inference Architecture using Self-Gated Activation Functions (Swish)

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ABSTRACT: A Non-Volatile Memory (NVM) device based deep inference architecture and a novel design of Swish activation function using analog components is proposed in this paper. The deep neural network is built using the 1T-1RRAM crossbar structure. This paper presents the importance of activation functions in analog hardware, compares the proposed Self-Gated

activation function with the existing designs in literature and implements a deep inference architecture using multiple datasets. The design has been evaluated for total power (peak), operating voltage, resistance characteristics, speed and the results indicate that, the self-gated activation functions with RRAM device outperforms Sigmoid & ReLU functions with memristors. The total power (peak) of the activation function circuit reduced by 83.4% and the operating voltage by 60% compared to sigmoid with memristors and on/off ratio by 23.49 compared to ReLU with memristors. The performance analysis of the inference architecture on iris, balance scale and bank note authentication datasets have also been demonstrated. The observed classification accuracy of iris and bank note authentication datasets is 100% and 99.87% on the balance scale dataset. The analog hardware design of the deep neural network has been implemented in UMC 180nm technology node and the network has been trained offline using MathWorks®-MATLAB.

KEYWORDS: activation functions, deep neural networks, inference, NVM, RRAM.

Development of Universal Polynomial Equation for all the Sub-phases of Human gait

Astha Verma[1], Vijay Bhaskar Semwal[2], and Koushlendra Kumar Singh[3]
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ABSTRACT: Calculating the joint parameters values which place the end-effector of a manipulator to the given(desired) Cartesian position of the end effector is called the inverse kinematics (IK) problem. The Human leg is considered as 3 link manipulator. Inverse kinematics of a human leg is that, we already know the Cartesian position/goal position of movement of leg and we need to find the set of joint angles of leg during movement to place the human leg effector in the specified goal. Real-time computation of joint angles is used for analysis in clinical, sport and rehabilitation condition. In this work, we present the main aim on finding a real time inverse kinematics algorithm for a 3 link kinematic leg in plane by using musculoskeletal model of open in, which provides fast and accurate solution of inverse kinematics. But model based method for gait generation is not applicable for existing humanoid robots that cannot move when the grounds are not smooth .So it is difficult to develop a correct and accurate human like model for those robots. So these limitations lead to development of general polynomial equation which can be used alternatively for human walk. The contribution

of this research work is to design the universal polynomial equation for all sub-phases of gait.

KEYWORDS: Bipedal Polynomial Function Experimental markers Gait cycle Joint angle Model markers Trajectory.

Application of Equipment Utilization Monitoring System for ICU Equipments Using Internet of Things (IoT)

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ABSTRACT: In healthcare, remote monitoring reduces manual clinical documentation and enhances monitoring of patients which creates the need of IoT in healthcare. IoT-based equipment utilization monitoring systems remotely monitor equipment like monitors, ventilators, infusion and syringe pumps. This can be done by using a Raspberry Pi device which acts like a mini computer to capture data from equipment using a driver in JSON format. This study is designed to identify the reported reasons that contributed to availability as well as utilization of medical devices in the respective hospitals. In order to apply IoT in healthcare, every process of the department must be understood. Once the process is understood it can be improved with IoT-based health systems. RTLS is a disruptive IoT technology that can be used vastly in the field of Healthcare. IoT in healthcare has over 100 different used cases and RTLS is one among them. Different POC's were done based on RTLS in MGM Healthcare Pvt. Ltd as a part of this study. Doctors, staff nurses, equipment, etc. can be tracked using the RTLS device which makes it simpler for the non-clinical department to function smoothly.

KEYWORDS: Internet of things, ICU, Equipment, Utilization

Suryanamaskar pose identification and estimation using no code Computer Vision

Ujjayanta Bhaumik[1], Siddharth Chatterjee[2], Koushlendra Kumar Singh[3]

[1]Sustainable Living Labs, Singapore
[2]TheMathCompany, India
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ABSTRACT: Suryanamaskar, also known as a salute to the sun, is a yoga exercise that comprises seven different poses and 12 asanas dedicated to

the Hindu God of the Sun, Surya. Suryanamaskar provides a range of health benefits like making muscles stronger and helping in regulating blood sugar levels. Here Microsoft Lobe has been used to analyze Suryanamaskar poses. The poses are detected in real-time by the developed software, as one does Suryanamaskar in front of the camera. The classifier identifies the pose as one of the following: Pranamasana, Hastauttanasana, Hasta Padasana, Ashwa Sanchalanasana, Dandasana, Ashtanga Namaskara, or Bhujangasana.

KEYWORDS: Deep learning, Suryanamaskar, Yoga, artificial intelligence, pose detection

Performance analysis of Machine Learning Based Breast Cancer Detection Algorithms

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ABSTRACT: Breast Cancer has now been a threat to the lives of countless women. This growth of breast tissue is metastatic and therefore grows rapidly, infecting other body parts too. The probability of survival is high only if the tumor is detected in an early stage, the higher the stage, lower are the chances of survival of the patient. The presence of a minor tumor could be missed by the human eye, but the machine Learning algorithms scan mammograms deeply and are able to detect even the smallest tumor. This work is a performance analysis of three Supervised Machine Learning Algorithms namely, Convolutional Neural Networks (CNN), Random Forest (RF) and Support Vector Machine (SVM), on two distinct datasets i.e. Breast Cancer Wisconsin (Diagnostic) dataset and Breast Histopathology Images dataset. Univariate feature selection methods have been applied to select ten features in Breast Cancer Wisconsin (Diagnostic) dataset and Wrapper Feature Selection methods have been applied to select three instances containing ten features in the Breast Histopathology Images dataset. The results exhibit that RF is the best suited algorithm for the Breast cancer Wisconsin (Diagnostic) dataset with an accuracy of 98.91%, while CNN is suitable for Breast Histopathology Image Dataset with an accuracy of 92.4%. Further, the effectiveness of this machine learning model is tested using the k-fold cross-validation technique.

KEYWORDS: Breast cancer, classification, support vector machine, convolutional neural networks, random forest.

A Review on Digital Watermarking based Image Forensic Technique

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ABSTRACT: Due to the advancement of the internet and image correcting software, the problem of integrity and authenticity of the image has become crucial. Forensics of digital image plays a crucial part in verifying the integrity and authenticity of computerized images. Digital watermarking is one of the computationally efficient techniques to verify the digital image's integrity and authenticity. In this work, an overview of various image forensic techniques is briefly discussed. In this work, an overview of digital watermarking techniques is presented as well. Further, various issues and challenges of digital watermarking and image forensics technique based on the digital signature is also discussed. The overall aim of this work is to provide researchers with a comprehensive view of different aspects of image forensics based on digital watermarking. This survey will enable researchers to apply efficacious watermarking techniques to verify the authenticity and integrity of digital images.

KEYWORDS: Image Forensics, Digital Watermarking, Integrity, Authentication, Watermark.

Study of Communication Pattern for Perfect Difference Network

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ABSTRACT: The paper presents two studies, first connectivity of perfect difference network and second illustrates a method to identify its communication patterns using set theory and algebraic structure in perfect difference network. They are becoming pervasive in parallel and distributed architecture. A well-defined pattern makes efficient use of scarce communication resources such as nodes providing minimum diameter, high bandwidth with a minimum degree. In this paper, we study communication patterns of next-generation interconnection network Perfect Difference Network

KEYWORDS: *Interconnection Network, Perfect Difference Network, Perfect Difference Set, set theory, Network Flow, Image Processing*

An Approach for Denoising of Contaminated Signal using Fractional Order Diffrentiator

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ABSTRACT: Calculus of integer order is more than a part of our daily life. As the order deviates to the fractional realm, things become much more interesting. The current work proposes a novel method for denoising of contaminated signals by use of fractional order derivative based differentiator. The Riemann-Liouville definition has been used for fractionalising the differentiator. The designed methodology produces a fractional order differentiator to treat different nature of signals and experimentally establishes its findings. The proposed method has been also compared with different techniques available in the literature. The results that have been obtained through the experiments seem promising. KEYWORDS:: Riemann-Liouville, Savitzky Golay Differentiator, Signal Re-construction, Polynomial Approximation

KEYWORDS: Riemann-Liouville definition, Denoising, Differentiator

Static Gesture Classification and Recognition using HOG feature parameters and KNN and SVM based Machine Learning Algorithms

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ABSTRACT: The paper analyzes the effectiveness of Histogram Oriented Gradient (HOG) features in Static Hand Gesture Recognition (SHGR) using K Nearest Neighbor (KNN) and Support Vector Machine (SVM) classifier. The experiment is carried out on a database of ten different static gestures that are built on environmental conditions that are limited. Histogram Oriented Gradient is extracted from the segmented gestures after performing various color image enhancement on the original database. For the both classifier KNN and SVM, 80% of the extracted features is used for training and remaining 20% are used for testing. For KNN an average recognition accuracy of 96% is obtained. On the other hand, for SVM an average recognition accuracy of 98% is obtained on the same set of training and test data and found that SVM classifier gives better performance than KNN classifier

Multiagent Based GA for Limited View Tomography

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ABSTRACT: Computer tomography (CT-Scan) is a noninvasive method two knows the internal structure of the objects. The reconstruction methods have a wide range of applications, i.e., engineering as well as medical application. This article presents a limited view reconstruction method via a multivalent based genetic algorithm (MAGA). Here, we use dynamic crossover and mutation rates. This article uses two dynamic crossover and mutation rates model, namely, DHM/ILC and ILM/DHC. Both methods produce approx. identical results. The proposed algorithm compares with other reconstruction methods and produces good results in terms of average error and SSIM.

A Transfer Learning-based Multi-Cues Multi-Scale Spatial-Temporal Modelling for Effective Video-based Crowd Counting and Density Estimation using a Single-Column 2D-Atrous Net

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ABSTRACT: Crowd count and density estimation (CCDE) is an emerging research area which is a useful tool for crowd analysis and behavior modelling. The existing video-based CCDE approaches utilize spatial-temporal modelling for the CCDE. However, these approaches fail to address some of the major issues, such as scale-variation because of perspective distortion in the frame and volume of frames and minimization of background influence during spatial-temporal modelling. To attain these issues, we are motivated to design a transfer learning-based multi-cues multi-scale spatial-temporal modelling for video-based CCDE. The proposed model utilizes a pre-trained Inception-V3 to extract multi-scale features for four different video-frames cues such as color frame, the foreground map of the frame, volume of the frame, and volume of foreground maps. The foreground maps are obtained by utilizing the Gaussian Mixture Model. The extracted multi-cue

multi-scale features are then concatenated and fed into a single-column 2D-Atrous Net. The 2D-Atrous net estimates the crowd density by regression on the ground-truth density maps. The experiments are conducted on two datasets, namely, the Mall and Venice. The model outperforms the state-of-the-art techniques and yields an effective CCDE model by achieving better MAE and RMSE.

KEYWORDS: Crowd count and density estimation, crowd analysis, Multi-Scale Features, Inception-V3, Atrous-Net.

Modeling and Predictions of COVID-19 Spread in India

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ABSTRACT: COVID-19 pandemic is a worldwide task because of its excessive unfold and alarming mortality rate. The capability to forecast this scenario might permit the authorities to modify their plan and guidelines accordingly. Researchers worldwide are using different outbreak prediction models for COVID-19 to make informed decisions and implement applicable control measures. However, we should not use epidemiological models in India as they do not provide desired predictions as a vast country with a different socio-economic status and dynamically varying cases of infection in different loca-tions. Thus, because of high variability and lack of evidence, epidemiological models have shown low reliability. This paper provides a comparative study of the Time Series, Deep Learning, and Mathematical models to forecast the COVID-19 outbreak as an alternative to epidemiological models. It also in-cludes a modified version of Levitt metrics in order to predict the peak. This re-search experiments with various methods having different structure and pa-rameters to model the outbreak, based on the findings presented here and the complex virtue of the COVID-19 pandemic across India.

KEYWORDS: COVID-19 · Deep learning · Time series prediction · Mathematical model · MLP · LSTM · Levitt metrics

A Machine Learning Model for Automated Classification of Sleep Stages using Polysomnography Signals

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ABSTRACT: Sleep staging including wake (W), non-rapid eye movement (NREM), and rapid eye movement (REM) which helps to analyze the depth of the sleep patterns. To describe the sleep behaviour of the subject is one of the important steps during the diagnosis of the various sleep-related disorders. The best way of analyzing sleep staging is obtaining the polysomnography (PSG) signals recordings from the patients. Therefore in this proposed study develops an automated sleep staging system that uses electroencephalogram (EEG), electrooculogram (EOG), and electromyogram (EMG) signals. In this study both linear (time and frequency) and non-linear features are extracted from the preprocessed signals. Additionally, we also obtain the feature selection techniques to find out the most suitable features using the ReliefF feature selection algorithm. Finally, the selected features are classified through the Random Forest (RF) classification model. In the proposed study we evaluated the proposed model using two different subgroups namely subgroup-I (SG-I) and subgroup- III (SG-III) data of the ISRUC-Sleep dataset under AASM sleep scoring rules. The proposed research work is evaluated on two subgroups of ISRUC-Sleep datasets The results of the model provide the highest classification accuracy of 98.40%, 98.49%, 98.31%, and 98.52% with the SG-I dataset, similarly, for the SG-III dataset, the reported accuracy reached 97.96%, 98.67%, 98.40% and 98.46% with using random forest classification techniques. The proposed machine learning model is ready for the diagnosis of the different types of sleeprelated disorders and can be managed with huge polysomnography records. The performance of the proposed sleep staging classification of five sleep states (CT-5) shows the overall classification accuracy of 98.99%,98.75%,98.17%, and 99.14% using single-channel EEG, EMG, EOG, and EEG+EMG+EOG respectively. It has been seen that the achieved results of the proposed model reveal that the proposed methodology provides better sleep staging analysis incomparable to the existing contributions

KEYWORDS: Sleep staging, Polysomnography Signals, Feature Screening Random Forest

Improved performance guarantees for Orthogonal Matching Pursuit and application to dimensionality reduction

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ABSTRACT: In Compressed Sensing (CS), Orthogonal Matching Pursuit (OMP) is a popular solver for recovering the sparse solution of an un-derdetermined system. The performance guarantees of OMP involving coherence based arguments are known to be pessimistic. The present work aims at improving the performance guarantees via precondition-ing. Since the systems Ax = y and GAx = Gy have the same set of solutions both analytically and numerically for an invertible and well- conditioned matrix G, while singling out the conditions, we determine G via a convex optimization problem in such a way that the performance guarantees of OMP get improved. Alongside the proof of concept, we demonstrate the implications of proposed improved bound towards di- mensionality reduction by considering the reconstruction of a signal from a small set of its linearly projected samples.

KEYWORDS: Compressive Sensing, OMP algorithm, Preconditioning, improved recovery guarantees

Epileptic Seizure Prediction from Raw EEG Signal using Convolutional Neural Network

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ABSTRACT: Epileptic seizure is an event of epilepsy patients due to sudden electrical impulses generated in brain. Seizure causes unconsciousness, which worsen the life style of epilepsy patients. The classification of normal state and the state before a seizure event of the epilepsy patients is the main objective of seizure prediction. In our proposed method, a Convolutional Neural Network is used for automatic features extraction from raw EEG signal and the classification of states. The achieved classification accuracy is 93.8% using sample duration of 1-second EEG signal. Finally, a majority voting of continuous 120 samples is considered to get better sensitivity and specificity of the prediction method. The proposed method provides sensitivity of 97.35%, specificity of 93.49% with false prediction rate of 0.0651. It predicts seizure 10 minutes in advance to avoid life threats of epilepsy patient which is one of the most efficient among the state-of-the art works.

KEYWORDS: Convolutional neural network, CHB-MIT dataset, majority voting, preictal state, raw EEG signal, seizure prediction

Deep Convolutional Neural Network based Hard Exudates Detection

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ABSTRACT: Exudates detection is a main step in diabetic retinopathy diagnosis. Hard Exudates will be seen as yellow coloured deposit with clear borders. Automatic exudate detection is not possible yet as there is no good software available. In this paper Hard Exudate detection which is the moderate stage detection of diabetic retinopathy is performed . Here we use Deep Convolutional Neural Network as classifier and conduct experimental study by using DIARETDB1 database. Sensitivity 100% and Accuracy 98.88% obtained .

KEYWORDS: Hard Exudates, Classification, Deep CNN, Accuracy**.**

Transparent Decision Support System for Breast Cancer (TDSSBC) to determine the risk factor

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ABSTRACT: Breast Cancer (BC) is fatality cancer for women but rarely man. Many automated systems have developed for early diagnosis of BC applying different Machine Learning (ML) Techniques but lack of explaining their decision to justify the rules. The medical sector is finding into an automated decision support system for determining the major risk of BC. This paper proposes a medical expert system named Transparent Decision Support System for Breast Cancer (TDSSBC) to manage BC by determining the Major Risk factors. The proposed TDSSBC adopts the white-box NN model which named "Rule Extraction from Neural Network (NN) applying Classified and Misclassified data" (RxNCM) for rule extraction from the BC database. In this system, the generated rules are justifiable from neural networks (NN) for risk factor decision of Breast Cancer (BC). 10-fold cross-validation is employed to check the performance of the system with the opposite two exiting systems (RxNCM) and (RxREN).

KEYWORDS: Machine Learning, Decision Support System, Neural Network, Breast Cancer**.**

A new Adaptive Inertia Weight based Multi Objective Discrete Particle Swarm Optimization Algorithm for Community Detection

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ABSTRACT: A multi objective discrete particle swarm optimization (MODPSO) algorithm is useful in accurately identifying communities in a network by avoiding the pitfalls of modularity optimized discrete PSO algorithms. Inertia weights in a PSO can be used to guide the flight of particles in PSO by modifying step size of the particles. In this paper we present a new adaptive inertia weight based MODPSO and compare it with other good inertia weight approaches by applying them on three real world datasets. Our algorithm demonstrates consistently best results among various inertia weight strategies in three real world datasets with maximum Q (modularity score) values of 0.457, 0.527728 and 0.60457 for Zachary's Karate Club, Bottlenose Dolphins and American College Football datasets respectively. Adaptive inertia weight strategy is able to perform consistently by adaptively determining the step size of the velocity update equation. To the best of our knowledge, this is the first such attempt to explore adaptive inertia weight technique with MODPSO in the field of community detection in complex networks.

KEYWORDS: Community detection; Multi Objective Optimization; Discrete Particle Swarm Optimization; Complex Networks; Inertia Weight Strategies; Adaptive Inertia Weight.

A Secure Color Image Encryption Scheme based on Chaos

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ABSTRACT: With current explosion of the Internet, transmission of sensitive personal data also increased signi_cantly. Large volumes of color images and multimedia data transferred over the insecure channel are prone to unintentional disclosure. The privacy and integrity of such data is especially important and can be assured by encrypting them. In this paper,we propose a scheme based on permutation and di_usion to encrypt color images. We use chaotic Du_n map to generate pseudo-random numbers. Encrypted image is obtained by performing permutation as well as diffusion of the image pixels using these numbers. The proposed scheme demonstrates potential cryptographic strength in the test results that includes correlation coe_cient, entropy, PSNR, UACI and NPCR. This scheme is scalable to very large images.

KEYWORDS: chaos, color image encryption, Du_n map, multimedia security

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Diabetes Prediction using Deep Learning Model

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ABSTRACT: A fully automatic diabetes detection system is presented in this work. The proposed detection system includes the pre-processing of features, training, and testing stages. Initially, input data is normalized by applying the Z-score method. After that, a sequential deep learning model is applied for diabetes prediction. Further, validation of the proposed work is performed by using PIMA diabetes dataset. The validation of the proposed model is done by using train-test split and 10-fold cross validation techniques. The validation results of the proposed work is compared also with various machine learning models namely logistic regression, support vector machine, random forest, and k-nearest neighbour. The highest 96.10% of training and 96.06% of testing accuracy is obtained with proposed model.

KEYWORDS: Diabetes, Deep Learning, PIMA, Machine Learning

Object Detection Using YOLO Framework for Intelligent Traffic Monitoring

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ABSTRACT: This paper presents a new real-time intelligent traffic monitoring system. To perform the vehicle detection a filtered You Only Look Once (YOLO) is used. The pre-trained YOLO framework can detect 80 objects. The proposed system is tested for 3 classes of vehicles such as bus, truck, and car. After extracting the three categories, to obtain the count of that vehicle in each lane checkpoint is assigned. The count is used to control the real-time road traffic signal. The system is tested with three different publicly available traffic videos. In the present work, we have used Kernel Correlation Filter (KCF) tracker, and the object retrieval accuracy is obtained. Experimental results show that YOLO and KCF outperform Scale Invariant Feature Transform (SIFT) and Region-based Convolutional Neural Network (RCNN) with KCF tracker, and Maximally Stable Extremal Regions (MSER) and faster RCNN with KCF tracker.

KEYWORDS: Intelligent traffic monitoring, vehicle detection, vehicle tracking, vehicle counting.

A Convolutional Neural Network Model to Predict Air and Water Hazards

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ABSTRACT: Air and Water pollution are becoming major causes of concern especially in the poorer parts of the world, like India. While long-term ideas are present to repair the damage done, short-term preventive measures to keep ourselves safe from harm due to pollution have become necessary, as well. Existing and upcoming research has aimed to find accessible methods of accurately predicting the safety of the water or air being consumed. This project proposes a small-scale simulation of what could be a more complex, large-scale Convolutional Neural Network model that aims to detect basic breathability of air and drinkability of water. On the technical end, the CNN model employed in this project uses various layers to process images supplied by the end user on a web application platform, and predict based on the input image.

KEYWORDS: Drinkability, Breathability, Hazard , Convolution Neural networks

Deep Learning in Quadratic Frequency Modulated Thermal Wave Imaging for Automatic Defect Detection

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ABSTRACT: Machine learning and artificial intelligence became a revolutionary trend in various non-destructive testing (NDT) techniques. Among various NDT techniques, infrared thermography with quadratic frequency modulated thermal wave imaging gained interest in the recent past due to its excellent depth scanning and depth resolution capabilities. Though machine learning is recently introduced in QFMTWI, defect detection and characterization through deep learning architectures is a novel area to be explored. The present article introduces one-dimensional convolutional neural network based GoogleNet architecture for automatic defect detection in quadratic frequency modulated thermal wave imaging modality. Experimentation is carried out over a mild steel sample with flat bottom holes of different sizes at varying depths. The automatic defect detection capability of the proposed architecture is compared with conventional feature separation based defect detection techniques and existing machine learning approaches in QFMTWI. Comparative analysis suggests that the proposed deep learning architecture efficiently detects defects and enhances their signature.

KEYWORDS: Deep learning, GoogleNet, Automatic defect classification and Quadratic frequency modulated thermal wave imaging.

Omni-Directional Zeroth Order Resonator (ZOR) Antenna for L-Band Applications

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ABSTRACT: In this paper Omni-directional ZOR antenna is presented which finds its application for L-Band. L-band covers frequency range from 1-2 GHz and used for various applications such as radar, satellite, Global Positioning Systems (GPS), telecommunications use and terrestrial communications. The proposed antenna design is based on one of the applications of Composite Right Left-Handed Transmission Line (CRLH-TL). Antenna design is a combination of two Split Ring Resonators (SRR) in which outer ring combination are of circular shape and inner ring combination is a square shape. The unit cell of proposed structure comprises of metallic patch at the top of dielectric substrate FR4. The overall dimension of proposed antenna is 12 mm × 12 mm. The -10 dB bandwidth achieved is 20 MHz ranging from 1810

MHz to 1830 MHz with respect to the center frequency of 1820 MHz. The results obtained in this paper is simulated using Ansys-HFSS 19.1v which is based on Finite Element Method (FEM). To prove the Omni-directional radiation pattern uniform current distribution and 2-D plots are plotted. Beta vs Frequency plot is portrayed which confirms the ZOR behavior of the antenna. Mesh size is kept λ/20 mm so that results obtained are much presized. The proposed antenna is fabricated and tested inside the Anechoric-chamber, the measured and the simulated results are almost similar to each other.

Detection of Acute Lymphoblastic Leukemia by Utilizing Deep Learning methods

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ABSTRACT: Leukemia is a deadly illness that compromises the lives of numerous patients throughout the world. Leukemia does not shape strong tumors, yet, structures a huge number of anomalous white platelets which group out the ordinary platelets. Deep Learning algorithms are largely employed in the treatment of leukemia, for detecting if leukemia is present in a patient. This paper proposes two different classification models for detection of Acute Lymphoblastic Leukemia (ALL) utilizing ALL-IDB2 dataset which consists of microscopic images of blood. Hybrid AlexNet and Machine Learning based ALL detection model comprises three-stages which are image pre-processing, feature extraction using AlexNet, a pre-trained convolutional neural network, and classification, employing SVM, kNN, XGBoost and Decision Trees. Subsequently, the AlexNet based detection model employs image pre-processing after which both feature extraction and classification are performed using AlexNet. Results show that the second detection model performs better than the first with 100% accuracy in classification.

KEYWORDS: Acute Lymphoblastic Leukemia, Deep learning, Image processing

Feature Optimization of Digital Image Watermarking using Machine Learning Algorithms

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ABSTRACT: Machine learning implied an active and productive work in digitalized watermarking. The digital image watermarking always faced security threats during communication over the network- the possibility of threats minimized with the process of feature optimization using machine learning algorithms. The ML algorithms provide the facility of pattern generation in digital image watermarking. Now a day's various ML algorithms are used in digital images watermarking, such as support vector machine, KNN, and PNN. In this work study, the feature optimization-based digital watermarking approaches for the protection of watermark in multimedia data. The used algorithms of machine learning in digital watermarking focus on the security strength of data. The strength of security depends on the imperceptibility and robustness of the watermark. The imperceptibility of the image indicates the value of the image similarity index of the watermark image. For the quality improvement of a digital image, watermarking proposed ensemble-based algorithms for the optimization and pattern generation of watermarking. Our defined discussed algorithms implemented in software and used a reputed image dataset for the watermarking process. For the validation of proposed algorithms measured some standard parameters value. The value of parameters signs that the proposed algorithms are compared good than DWT, KNN, and PNN.

KEYWORDS: Digital Watermarking, Machine Learning, DWT, KNN, PNN, Optimization, Robustness.

Diabetes Classification Using Machine Learning and Deep Learning Models

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ABSTRACT: Diabetes is one of the high risk medical diseases, in which, blood sugar levels gets higher. It is one of the leading causes of increase in deaths, worldwide. In 2040, the world's diabetic patients will hit 642 million approximately, according to the rising morbidity in recent years. This leads to an observation that one of the ten adults in the future will suffer from diabetes. This motivates researchers to adapt both machine learning and deep learning for early diagnosis of diabetic patients. Significant number of data mining and machine learning techniques has applied on diabetes dataset for risk prediction of disease. The objective of this paper is to analyze all the famous machine learning techniques namely, Random Forest, Decision Trees, K-nearest neighbor, Gradient Boosting, Support vector machine and Extra Trees on well known diabetic patient's dataset PIMA. Thereafter, deep learning model ANN is also applied for comparative analysis. From the obtained results, it is observed that extra tree classifier

outperforms other algorithms having an accuracy of 81.16% along with a good AUC score of 81%. In addition, ANN (Artificial Neural Network) obtains an accuracy of 73.58% on test dataset, which is quite low as the dataset is small.

KEYWORDS: Healthcare, Machine Learning, Deep Learning, Big Data Analytics, Diabetes Mellitus

Classification of Idioms and Literals using Support Vector Machine and Naïve Bayes Classifier

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ABSTRACT: With the large amount of text data being populated on World Wide Web (WWW), Text classification becomes one of the most inevitable pre-processing techniques in any text processing application. There exist many text classification scenarios such as Sentiment analysis spam detection, Information Extraction and intent detection. Intent detection is one of the most complex text classifications which have many facets such as using polysemy words, metaphors, idioms and phrases etc. This paper attempts to classify idioms and literals. Idioms are those which convey an indirect meaning of the words present in it whereas, literals are those text which are identical to idioms but convey the direct meaning of the words in them. This paper has attempted to do this classification using Machine Learning algorithms namely, SVM and Naïve Bayes classifier. The classifiers are tested using a data set that is annotated by around 3 domain experts and consists of 735 idioms and 735 literals. SVM achieved an accuracy of 87.30 % and Naïve Bayes achieved an accuracy of 82.09%.

KEYWORDS: Idiom and Literal Classification, SVM, Naïve Bayes, Text Classification, Natural Language Processing.

Modeling Indian road traffic using concepts of fluid flow and Reynold's number for anomaly detection

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ABSTRACT: At present road traffic anomaly detection is becoming a necessity. However, there are no databases available for Indian road traffic scenario and hence there are almost no significant work done for anomaly detection in Indian road traffic. This work attempts to take first step towards solving this problem using a limited video surveillance database, captured locally by the authors. This paper draws equivalence between fluid flow and traffic movement, and anomalies in road traffic and turbulent flow. Taking this path, the reported work further computes a measure of state of the flow, equivalent to Reynold's number. On visual correlation of the traffic scene in the video frames with the plots of the equivalent parameter calculated from the frames show promising results. The proposed method, equivalence of various fluid motion concepts with the traffic motion and the experimentation process with the thus results obtained are described in this paper. The results obtained show the equivalence between fluid motion and road traffic flow.

KEYWORDS: Reynolds's number, Indian-road-traffic, road-traffic, vehicle-traffic, anomaly, detection.

Computer aided Malaria Detection based on Computer Vision and Deep Learning approach

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ABSTRACT: This work describes an automatic system for malaria detection. Red blood corpuscles infected with malaria parasites of Giemsa-stained segmented cells of thin-blood smeared slides are taken as input images. Initially, image processing techniques such as image resizing and bilateral filtering technique for noise removal, are applied. Further, deep learning-based convolution neural layer network models are proposed for malaria detection. Additionally, alongside comparison with other approaches and methodologies, comparison of various traditional machine learning algorithms is also done. Results show that the proposed model demonstrated in this work performs the best on the given input images with the highest accuracy of 95%, specificity score of 93.2% and sensitivity score of 96.8%.

KEYWORDS: Malaria, Image Processing, Computer Vision, Deep Learning, OpenCV, TensorFlow.

Embedded Vision based Intelligent Device for the Visually Impaired

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ABSTRACT: Computer Vision, a branch of Artificial Intelligence has been showing tremendous potential in solving day to day problems. The world has been tuning itself to the language of embedded systems. Dedicated, distributed and intelligent systems are making lives easier. The important things about intelligent embedded systems have started becoming more important. Computer Vision is achieved using deep learning, one of the most computationally expensive domains in computing. Deploying a computer vision solution in the form of deep learning models on single board computers that work with constrained resource allocation is indeed a challenge. The problem that this work takes aims to help visually impaired people by augmenting the way they interact with their surroundings. The proposed systems aims to make use of Embedded Vision- Computer Vision deployed on a single board computer like the Raspberry Pi, to recognize and convey emotions, age and gender of a person in front of a visually impaired person to him as audio output. Wide ResNet is used to implement a age and gender classifier, while emotion classification uses a mini Xception Net with ImageNet weights, fine-tuned over the FER-2013 dataset. The reasons for selecting the respective algorithms and their deployment on the hardware shall be discussed. The system helps in adding more behaviour to the way a visually impaired person interacts with his or her peers. A few critical hardware deployment strategies that the work entails shall also be discussed.

KEYWORDS: Deep Learning, Computer Vision, Transfer Learning, Embedded Systems.

Genetic Algorithm based Resident Load Scheduling for Electricity Cost Reduction

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ABSTRACT: Demand Response (DR) is the strategy adopted by electric utility company to shift the energy consumption plan hours to the off-peak period. Usually, the optimization models of DR plan to cut down the energy consumption at peak period to reduce the customer cost of electricity. The need of the problem is the real-time optimization that focuses on residents with uncompromised electricity usage and reduced cost. With the advent of

smart meters the customers can participate in the Dynamic Demand Response (DDR) program offered by the utilities. In this paper the task of optimal load scheduling is formulated as the optimization problem and an improved genetic algorithm is applied to solve this problem. The performance of the proposed approach has been evaluated by the load data set and the simulation results are reported.

CORO-NET: CNN Architecture to Diagnose COVID-19 Disease using Chest X-ray Images

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ABSTRACT: Under the global pandemic of COVID-19, the use of artificial intelligence (AI) to analyze chest X-ray images for COVID-19 diagnosis and patient triage is becoming more important. For the prevention and treatment of Covid-19, early detection is in demand. Nowadays, deep learning techniques are gaining increasing importance in the medical diagnosis field by their X-ray images. This paper aims to introduce a deep learning technique based CORO- NET architecture to diagnose COVID-19 automatically from chest X-ray images. We evaluated the CORO-NET architecture on the COVID-19, normal and pneumonia chest x-ray images. The model achieved an accuracy of 96.15%. Experimental results show that our CORO-NET architecture achieves state-of-the-art performance. In this research, we have used the Flask web framework to create a graphical user interface (GUI) and then hosted it on the cloud. This GUI helps users easily predict Covid-19, normal, and pneumonia disease by uploading chest x-ray images.

KEYWORDS: Coronavirus, COVID-19, AI, CORO-NET, CNN, Deep Learning, X-ray Image, Data Augmentation, GUI.

Stochastic Gradient Descent with Selfish mining attack parameters on Dash Difficulty Adjustment Algorithm

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ABSTRACT: A selfish mining attack allows miners to gain more block mining rewards since they release the secretly mined blocks in public only when the honest miners release their mined blocks. The computation work of the honest miners gets wasted. The profitability of selfish mining attacks with different cryptocurrencies such as bitcoin, bitcoin cash, monero, dash, Zcash, Litecoin,

and their corresponding difficulty adjustment algorithms has already been explored in previous works. Here the study of the profitability of selfish mining attacks with the dash difficulty adjustment algorithm is considered with gradient descent, mini-batch descent, and stochastic gradient descent algorithms which have not been explored in previous works. Here using stochastic gradient descent, the minimum error percentage of 21.9% is achieved.

KEYWORDS: Dash, relative gain, gamma, alpha, difficulty adjustment algorithms.

Histogram-based Image Enhancement and Analysis for Steel Surface and Defects Images

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ABSTRACT: In the industrial and domestic application, iron and steel manufacturers are a move towards automation in several ways like production, inspection, and delivery of products. In this chain-process, quality inspection of steel/iron plats or rods is very necessary to deliver the quality product and its life. At present, visual inspection using the image processing technology is utilized for surface quality or defect visibility. Here, the visual inspection system gives breakthrough low-cost solution as compare to other methods like non-destructive testing (NDT) testing. However, image quality is also a matter of concern to inspect the surface quality of the material. In this paper, an analysis of image visual quality enhancement techniques based on histogram processing is presented for the steel surface and defect images such as rolled-in scale (RS), patches (Pa), crazing (Cr), pitted surface (PS), inclusion (In) and scratches (Sc) on the steel surface. Further, different enhancement techniques are validated with an approximation quality metrices and visual analysis process for original and enhanced images. This analysis illustrates these techniques are suitable for image quality enhancement of grayscale steel surface images as tested on 12 images of 6 different defect subjects from Northeastern University (NEU) surface defect database of 1800 images. In the automation process, image quality help to extract accurate information from images in different applications like segmentation and features extraction for classification or detection of defects of healthy surface condition. These advantages are clearly illustrated

in the results and its analysis that claim the suitability of histogram-based image enhancement technique for steel images.

KEYWORDS: Steel surface defect, surface image, defect image, histogram analysis, image enhancement.

Predicting Depression by Analysing User Tweets

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ABSTRACT: Even in the modern era, where communication with other Humans does not seem to be a costly affair, Depression still serves as a global problem. Despite Depression being recognised as a severe disease by many international bodies and organisations, counteractions against it do not even solve the problem by a fractional per cent. The core problem lies in predicting Depression since it lacks any specific test, unlike other diseases that show physical changes. Social media is a great tool to analyse the thought process and individual opinions when addressing a large part of the human population. A supervised classifier model has been developed, which helps predict Depression by analysing the user's textual data over Twitter.

KEYWORDS: Depression, Twitter, Social Media, Supervised classifier, text pre-processing.

Alzheimer's Disease Diagnosis using Structural MRI and Machine Learning Techniques

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ABSTRACT: Alzheimer's disease (AD) is a growing disorder that destroys memory and other critical mental functions. There is no such specific test to diagnose AD; only a few parameters like patient's clinical history, neuroimaging, EEG, neuropsychological and laboratory tests, etc. can be used to identify it. Therefore, it is essential to _nd a new approach and more accurate diagnostic techniques and to follow treatment results. In this work, we have discussed different Machine Learning (ML) methods for AD diagnosis. We used a total of 199 patients' magnetic resonance images (MRI) data, with 86 have diagnosed with AD. Three dimensional T1-weighted MRI of every patient percolated within regions of interests (ROIs). Based on the volumetric features extracted from every ROI, we used three different

classifier models to classify the patients and finally evaluate them in the classification of whole-brain anatomical MRI to distinguish between patients with and without AD. The results demonstrate the effectiveness of using volumetric measurements to diagnose AD with high accuracy, which gives a potential for early detection of AD. These Results also suggested that ML methods can support the clinical investigation of AD. The results confirm that the volumetric measurements of different regions of the brain can be electively used in AD diagnosis and provide a potential for early detection of AD.

KEYWORDS: Alzheimer's disease Structural MRI SVM classification random forests

Supervised Machine Learning-Based DDoS Defense System for Software-Defined Network

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ABSTRACT: Software-Defined Network (SDN) is a network architecture that decouples the network control logic from data forwarding logic. SDN allows networking devices to be monitored and controlled by a centralized controller. Unfortunately, this opens up avenues for adversaries to launch distributed denial of service attack (DDoS) on SDN infrastructure. The DDoS attack in the SDN domain will exhaust the CPU cycles of the controller, TCAM memory in the data plane, and also implicitly degrade the bandwidth of the control-data plane. Therefore, we develop a framework to detect DDoS attacks with high accuracy, high detection, and low false positives as early as possible. We proposed a framework that periodically monitors and evaluates the behaviour of all hosts within a network using a set of 30 features. The proposed framework handles the system's false alarm to minimize the impact of the system's response toward benign connection(s) using a scoring scheme. The system's response will prevent an attacker from using any resources, and also frees any allocated resources. The experiment results show that our proposed system accurately detects the attacks. Also, experiment results indicate the success of the system scoring scheme in handling the false-positive cases.

KEYWORDS: Openflow, Software-Defined Network, Machine Learning, Distributed Denial of Service Attacks.

A pluggable system to enable fractal compression as the primary content type for World Wide Web

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ABSTRACT: This paper presents a comparative performance evaluation of three different image compression techniques for content type in World Wide Web. One is based on fractal compression technique and the other two are JPEG and Portable Network Graphics (PNG). It is due to the unavailability of Fractal based compression as an image type, a pluggable system to prove its feasibility and superior performance has been developed. Study includes the development of a test system to convert and upload the raw image as fractal compressed image to the major content delivery networks. A mobile application for downloading the rendered image is also developed for the client side system. The present system utilizes a Reinforcement Learning (RL) algorithm to reduce the encoding time required to compress an image by using classical Iterative Function System (IFS). The algorithm also employs modi_ed Horizontal-Vertical (HV) partitioning scheme and upper bounded scaling, translation and shifting parameters. The empirical analysis proves that the usage of fractal compressed images can be a promising method for reducing the network traffic, and hence transmission bandwidth of content delivery networks.

KEYWORDS: Content Delivery Networks, Fractal Compression, Image Compression, World Wide Web

A Machine Learning Model for Automated Classification of Sleep Stages using Polysomnography Signals

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ABSTRACT: Sleep staging including wake (W), non-rapid eye movement (NREM), and rapid eye movement (REM) which helps to analyze the depth of the sleep patterns. To describe the sleep behaviour of the subject is one of the important steps during the diagnosis of the various sleep-related disorders. The best way of analyzing sleep staging is obtaining the polysomnography (PSG) signals recordings from the patients. Therefore in this proposed study develops an automated sleep staging system that uses electroencephalogram (EEG), electrooculogram (EOG), and electromyogram (EMG) signals. In this study both linear (time and frequency)

and non-linear features are extracted from the preprocessed signals. Additionally, we also obtain the feature selection techniques to find out the most suitable features using the ReliefF feature selection algorithm. Finally, the selected features are classified through the Random Forest (RF) classification model. In the proposed study we evaluated the proposed model using two different subgroups namely subgroup-I (SG-I) and subgroup- III (SG-III) data of the ISRUC-Sleep dataset under AASM sleep scoring rules. The proposed research work is evaluated on two subgroups of ISRUC-Sleep datasets The results of the model provide the highest classification accuracy of 98.40%, 98.49%, 98.31%, and 98.52% with the SG-I dataset, similarly, for the SG-III dataset, the reported accuracy reached 97.96%, 98.67%, 98.40% and 98.46% with using random forest classification techniques. The proposed machine learning model is ready for the diagnosis of the different types of sleeprelated disorders and can be managed with huge polysomnography records. The performance of the proposed sleep staging classification of five sleep states (CT-5) shows the overall classification accuracy of 98.99%,98.75%,98.17%, and 99.14% using single-channel EEG, EMG, EOG, and EEG+EMG+EOG respectively. It has been seen that the achieved results of the proposed model reveal that the proposed methodology provides better sleep staging analysis incomparable to the existing contributions

KEYWORDS: Sleep staging, Polysomnography Signals, Feature Screening Random Forest

Application of Equipment Utilization Monitoring System for ICU Equipments Using Internet of Things (IoT)

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ABSTRACT: In healthcare, remote monitoring reduces manual clinical documentation and enhances monitoring of patients which creates the need of IoT in healthcare. IoT-based equipment utilization monitoring systems remotely monitor equipment like monitors, ventilators, infusion and syringe pumps. This can be done by using a Raspberry Pi device which acts like a mini computer to capture data from equipment using a driver in JSON format. This study is designed to identify the reported reasons that contributed to availability as well as utilization of medical devices in the respective hospitals. In order to apply IoT in healthcare, every process of the department must be understood. Once the process is understood it can be improved with IoT-based health systems. RTLS is a disruptive IoT technology that can be used vastly in the field of Healthcare. IoT in healthcare has over

100 different used cases and RTLS is one among them. Different POC's were done based on RTLS in MGM Healthcare Pvt. Ltd as a part of this study. Doctors, staff nurses, equipment, etc. can be tracked using the RTLS device which makes it simpler for the non-clinical department to function smoothly.

KEYWORDS: Internet of things, ICU, Equipment, Utilization

Mathematical Model with Social Distancing Parameter for Early Estimation of COVID-19 spread

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ABSTRACT: COVID-19 is well known to everyone in the world. It has spread around the world. No vaccine or antiviral treatment is available till now. COVID-19 patients are increasing day by day. All countries have adopted social distancing as a preventive measure to reduce spread. It becomes necessary to estimate the number of peoples going to be affected with COVID-19 in advance so that necessary arrangements can be done. Mathematical models are used to provide early disease estimation based on limited parameters. In the present manuscript, a novel mathematical model with a social distancing parameter has been proposed to provide early COVID-19 spread estimation. The model has been validated with real data set. It has been observed that the proposed model is more accurate in spread estimation.

KEYWORDS: Corona Virus; COVID-19; Mathematical Modelling; Epidemic.

Histogram-based Image Enhancement and Analysis for Steel Surface and Defects Images

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ABSTRACT: In the industrial and domestic application, iron and steel manufacturers are a move towards automation in several ways like production, inspection, and delivery of products. In this chain-process, quality inspection of steel/iron plats or rods is very necessary to deliver the quality product and its life. At present, visual inspection using the image processing technology is utilized for surface quality or defect visibility. Here, the visual inspection system gives breakthrough low-cost solution as compare to other methods like non-destructive testing (NDT) testing. However, image quality is also a matter of concern to inspect the surface quality of the material. In this paper, an analysis of image visual quality enhancement techniques based on histogram processing is presented for the steel surface and defect images such as rolled-in scale (RS), patches (Pa), crazing (Cr), pitted surface (PS), inclusion (In) and scratches (Sc) on the steel surface. Further, different enhancement techniques are validated with an approximation quality metrices and visual analysis process for original and enhanced images. This analysis illustrates these techniques are suitable for image quality enhancement of grayscale steel surface images as tested on 12 images of 6 different defect subjects from Northeastern University (NEU) surface defect database of 1800 images. In the automation process, image quality help to extract accurate information from images in different applications like segmentation and features extraction for classification or detection of defects of healthy surface condition. These advantages are clearly illustrated in the results and its analysis that claim the suitability of histogram-based image enhancement technique for steel images.

KEYWORDS: Steel surface defect, surface image, defect image, histogram analysis, image enhancement.

Social Media Big Data Analytics: Security Vulnerabilities and Defenses

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ABSTRACT: Recently, social networks have turned out to be core components of Internet lives, and their popularity is growing day-by-day. The social media platforms generate exceptionally high dimensional datasets that pose novel risks to their users due to the ability to access a large amount of personal information. The most challenging concern is to maximize the power of social media big data analytics while identifying and mitigating the security

vulnerabilities, effectively. This paper identifies and evaluates the security vulnerabilities at different stages of social media analytics i.e., data acquisition, preprocessing, data representation, analysis and presentation. The identified security threats in the analytics process promote the exploration of innovative technologies and testing practices that pave the way for future research and practice. In line with this motivation this paper suggests defense measures for social media big data analytics framework security vulnerabilities.

KEYWORDS: Social Media Data • Big Data • Security Vulnerabilities • Defenses

Deep Learning-based Malicious Android Application Detection

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ABSTRACT: Mobile applications are the most popular medium for delivering soft-ware services to the masses nowadays. In the cyber and virtual world, the security of mobile applications has become a critical issue today. Android is the most used operating system. We reviewed various attacks and maliciousness detection research works and found that permissions alone are not capable of discovering malicious intents of mobile applications. Here, we propose an LSTM network-based classification approach to make use of opcode sequences to investigate the maliciousness of mobile applications. We achieved an accuracy of 0.99 and an F1-score of 0.72, which shows the effectiveness of opcodes sequences to detect Android applications' maliciousness.

KEYWORDS: Opcodes, Android Security, Deep Learning.

Automatic Diagnosis of Covid-19 using Chest X-ray Images through Deep Learning Models

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ABSTRACT: Since December 2019, Covid-19 has impacted the daily life of people across the World. There are presently 24,495,193 active cases and they are still increasing. The only available solution to cope up with the

pandemic is efficient monitoring of the infected people. The techniques like RT-PCR that relies on checking the genetic expression of coronavirus are time consuming. An automated early diagnosis method for a Covid-19 patient is utmost required. In this work, the radio graphic images along with prevalent Artificial Intelligence (AI) methods specially Deep Learning (DL) methods have been used in priority, to detect Covid-19. In this work, DL based automated techniques are employed to process the chest x-ray images for the detection of Covid-19. The authors investigated the capabilities of the three pre-trained CNN models that is VGG16, VGG19, Inception V3 for extracting the features from Covid-19 positive, pneumonia, and normal chest x-rays. Lastly, various ML classifiers are used to classify the Covid-19 positive images. The results obtained important biomarkers related to coronavirus disease. The accuracy of 97% is obtained using VGG16 and Inception V3.

KEYWORDS: Deep Learning, Image Classification, VGG16, VGG19, Inception V3, Logistic Regression

Three Dimensional Fractional Operator for Benign Tumor Region Detection

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ABSTRACT: Cancer has become one of the most serious threats to human society. The mortality rate is increasing day by day due to cancer. More than 100 categories of cancer have been reported till now. Cancer has been divided into two stages namely benign and malignant in their life cycle. Benign is an early stage in the cancer development cycle. It is completely curable under the complete surgical exclusion. Malignant is an advanced stage in cancer development life cycle. It can be cured by radiotherapy and/or chemotherapy. So the complexity involved in diagnosis increases from benign to malignant. Benign cancer cells have similar characteristics to surrounding non-cancerous cells. Hence, its detection and segmentation become a di_cult task. In the present manuscript, a fractional operator is being presented to detect benign tumor region. A comparative study has been also performed to check the accuracy of the proposed work. It has been found that the proposed work provides higher accuracy as compared to other state-of-the-arts methods.

KEYWORDS: Fractional calculus, Cancer detection, Brain tumor detection, Numerical head phantom

An Efficient Algorithm for Web Log Data Preprocessing

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ABSTRACT: At present, the internet has become the main source of information. Users can get a vast amount of information from the internet. Various automatically generated web log information while accessing the information from websites can be collected. Web usage mining which is an application of data mining can be utilized to extract useful information from the weblog. This extracted information can be used for the prediction of web user behaviour. This weblog data is a text file that contains noisy, duplicate, and irrelevant data in an unstructured format. Thus, the removal of irrelevant data from the weblog file is required for better user behaviour prediction. In this paper, an efficient algorithm for preprocessing of weblog data is proposed. Total 82.08% data deduction has been observed by utilizing the proposed algorithm.

KEYWORDS: Web mining, Web usage mining, Pre-processing, Pattern Discover, Data Cleaning

Visualizing and Computing Natural Language Expressions: Through A Typed Lambda Calculus λ

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ABSTRACT: Lambda λ is an ABSTRACTion and a method which provides logical explanation for studying various domains of knowledge cross-disciplines. Semantics, which is a branch of linguistics, has been well known for discussing a typed lambda λ calculus. Coppock and Champollion (2019) have beautifully been elaborated a sense of natural language expressions through various moods including a lambda λ calculus. We glad to adopt their proposal here and have been trying to understand the computation part in terms of generating algorithm. While on the other hand, we able to find out some predicate based (complex and compound) cases and others during the investigation.

KEYWORDS: Natural language, semantucs-syntax interface, Lambda operator λ, and etc.

Non-destructive fusion method for image enhancement of eddy current sub-surface defect images

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ABSTRACT: Eddy current (EC) testing is extensively used non-destructive technique for detection and sizing of defects in the metallic material. Detection of sub-surface defects is difficult due to the limited penetration of EC in metallic material. To overcome the difficulty of sub-surface defect detection, image fusion methodologies have been studied and used. Factional derivative based image fusion methodology is proposed in this paper for improving the quality and information of the sub-surface defect images. For this studies, EC images of deep sub-surface defects are generated by using two ferrite core shielded different diameters EC probe. The performance of the proposed fusion algorithm is compared with the commonly used non-destructive testing (NDT) fusion algorithms by using the image metrics such as signal to noise ratio (SNR) and entropy. Proposed fusion methodology has shown better performance as compared to other methodologies with 13.64 dB improvement in the SNR and an improvement of 0.65 in the entropy.

KEYWORDS: Image fusion, stainless steel, nondestructive testing (NDT), eddy current testing.

Histogram-based Image Enhancement and Analysis for Steel Surface and Defects Images

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ABSTRACT: In the industrial and domestic application, iron and steel manufacturers are a move towards automation in several ways like production, inspection, and delivery of products. In this chain-process, quality inspection of steel/iron plats or rods is very necessary to deliver the quality product and its life. At present, visual inspection using the image processing technology is utilized for surface quality or defect visibility. Here, the visual inspection system gives breakthrough low-cost solution as compare to other methods like non-destructive testing (NDT) testing. However, image quality is also a matter of concern to inspect the surface quality of the material. In this

paper, an analysis of image visual quality enhancement techniques based on histogram processing is presented for the steel surface and defect images such as rolled-in scale (RS), patches (Pa), crazing (Cr), pitted surface (PS), inclusion (In) and scratches (Sc) on the steel surface. Further, different enhancement techniques are validated with an approximation quality metrices and visual analysis process for original and enhanced images. This analysis illustrates these techniques are suitable for image quality enhancement of grayscale steel surface images as tested on 12 images of 6 different defect subjects from Northeastern University (NEU) surface defect database of 1800 images. In the automation process, image quality help to extract accurate information from images in different applications like segmentation and features extraction for classification or detection of defects of healthy surface condition. These advantages are clearly illustrated in the results and its analysis that claim the suitability of histogram-based image enhancement technique for steel images.

KEYWORDS: Steel surface defect, surface image, defect image, histogram analysis, image enhancement.

Ear Localization and Validation Using Ear Candidate Set

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ABSTRACT: Ear biometrics has been found to be a good and reliable technique for human recognition. Initially ear biometrics could not gain popularity because there were doubts about its uniqueness. But, it started to gain momentum after a theory which came into existence and which said that it was very unlikely for any two years to be completely identical in all respects. The implemented methodology consists of steps such as pre-processing, feature extraction and matching based on the selected features. Our technique determines the extent to which these features support matching. The proposed work has been carried out on on a dataset containing 60 images for analysing their features and matching of the source image with the dataset images. The results have been obtained on the basis of images correctly classified. The system accuracy telling us the extent to which matching could be performed on the basis of selected features.

KEYWORDS: Color based skin segmentation, Ear Biometric, Feature extraction

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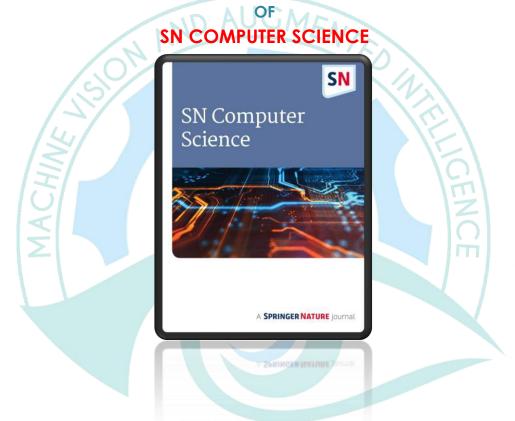## OUR COLLABORATOR

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