12th International Conference on
Soft Computing for Problem Solving
(SocProS 2023)
Moving Towards Society 5.0
11-13th August 2023
Department of Applied Mathematics And Scientific Computing
Indian Institute of Technology Roorkee, Roorkee, India

Book of abstracts

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12th International Conference on Soft Computing for Problem Solving Moving Towards Society 5.0

(SocProS-2023)

August 11 -13, 2023

SOUVENIR CUM BOOK OF ABSTRACTS

Editors

Prof. Millie Pant
Prof. Kusum Deep
Prof. Atulya Nagar

Organized by

APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
INDIA

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प्रो॰ के॰के॰ पंत
निदेशक

Prof. K.K. Pant
Director

Director's message

I am delighted to learn that the 12th International Conference on Soft Computing for Problem Solving, SocProS 2023, is being organized at IIT Roorkee during August 11-13, 2023. On this occasion I extend my sincere wishes to the organizing committee for successfully holding this mega event. I trust that the conference would provide an enriching and rewarding experience to the national as well as international audience.

(Prof. K. K. Pant)
Director, IIT Roorkee

अनुप्रयुक्त गणित एवं वैज्ञानिक कम्प्यूटिंग विभाग
भारतीय प्रौद्योगिकी संस्थान रूड़की
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प्रो. मिली पंत, विभागाध्यक्ष
Prof. Millie Pant, Head of the Department

Ref. No. SocProS 2023 *Dated:10th August,2023*

Message from the Head of the Department

Department of Applied Mathematics and Scientific Computing (D-AMSC), formed in 2022, is one of the youngest departments of IIT Roorkee and is located at the Saharanpur campus of IIT Roorkee. It offers PhD and MTech in Applied Mathematics and Scientific Computing.

D-AMSC proudly organizes the International Conference on Soft Computing for Problem Solving (SocProS 2023) during August 11 – 13, which is 12th in the series of SocProS conferences and is the 1st international conference conducted by the Department.

SocProS conferences are cross disciplinary in nature, where the focus is on the application of soft computing techniques in diverse domains. Trending topics like Artificial Intelligence and Data Science forms an important component of SocProS series. It aims to bring together the young as well as seasoned researchers of diverse domains on a common platform where they can share their ideas and can gain knowledge from the experts.

I hope this SocProS 2023 would be a fruitful experience for all the participants of SocProS 2023. I heartily welcome all the keynote speakers, invited speakers and delegates from all across the globe to participate in this conference. I hope you will enjoy the conference and the campus.

Millie Pant
(Prof. Millie Pant)

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FROM THE DESK OF THE HONORARY CHAIR

Dr. Chander Mohan,
Prof. Emeritus,
CSE Dept.

Dear Delegates,

It is my pleasure, privilege, and honor to be associated as the Honorary Chair of the 12th International Conference on Soft Computing for Problem Solving (SocProS 2023) being held during August 11-13, 2023, and which is being organized by the Department of Applied Mathematics and Scientific Computing, Indian Institute of Technology Roorkee. I take this opportunity to welcome you all to this Conference on behalf of Organizing Committee and on my own personal behalf.

SocProS 2023 is the 12th conference in the Series of International Conferences organized by it, and is a well-planned effort in collaboration with Prof. Atulya Nagar, UK who has teamed up with Prof. Kusum Deep and Prof. Millie Pant, IIT Roorkee, and Dr. Jagdish Chand Bansal from South Asian University, New Delhi to bring this Conference to reality. IIT Roorkee has very kindly agreed to host it.

A lot of care has been taken to maintain academic standards in the entire conduct of SocProS 2023. This includes double–blind peer review of the submitted papers with the help of an international team of experts using Morozoff's Conference Management Tool. The proceedings of the conference are being published by Springer. Springer is also sponsoring several awards during the conference for which we are thankful to them.

The day of the Conference has now finally arrived. I am happy to observe that many international keynote speakers and invited speakers will be addressing the gathering. The participating delegates are from different parts of the world.

I wish you all a fruitful experience and hope that you will enjoy the Conference and benefit academically from its varied academic spectrum.

I wish the Conference to be a grand success.

Chander Mohan
Honorary Chair SocProS 2023

Message from Convenors of SocProS 2023

We are delighted to extend a very warm welcome to you to this Twelfth edition of the International Conference on Soft Computing for Problem Solving (SocProS 2023). The series has gone from strength to strength and after having visited a number of prestigious places, it is a proud moment for us as conveners that we are hosting this series as a mega Conference back here at Indian Institute of Technology Roorkee (IITR) from where it was originally launched in 2011. As an already established practice, the proceedings will be published by Springer and will include more than 150 articles and presentations by practitioners and academics covering a remarkable breadth and depth of topics. Building upon great success at the previous versions of the conference, the 'Moving Towards Society" emphasis on the theme continues to develop and grow. Aimed at practitioners, but open to all, this theme consists of a range of talks and events designed to promote the exchange of ideas and experiences relevant to practice and real-world applications reporting and capturing the impact of research to the real-world problems. As has been a well-established tradition, the technical programme is complemented by a social programme that is similarly varied and includes a gala dinner to enjoy and celebrate our successes together. We are particularly delighted that a gathering like this is possible after the disruption that Covid-19 caused, and we hope that resumption of this scholarly exchange of ideas will be rewarding for us all.

We are particularly looking forward to the four plenary talks. The underlying philosophy motivating this conference, which has become a flagship forum in the area of Mathematics and Computer Science in general and in the area of Soft Computing in particular, has been to bring together researchers who apply, besides conventional traditional computing techniques, soft and other novel computing paradigms to problems and situations that have hitherto been intractable, complex, highly nonlinear and difficult to solve. Soft Computing is an innovative field of research in which one of the main inspirations for problem solving is based on, for example, natural or biological systems that tend to be decentralised, are adaptive and are known to be environmentally aware, and as a result they have survivability, scalability and flexibility properties. In addition to work on traditional serial computers, these researchers also exploit methods of efficiency with parallel computing techniques and tools to achieve high performance computing capabilities in their work.

Previously held at many cities of India and at Liverpool Hope University, UK this twelfth event continues to promote established as well as young bright, early-career researchers, to share variety of expertise and experience of eminent academics participating in this event to help generate research which has 'real impact' i.e. useful and productive research beyond academics - research not just for consumption by other academics but perhaps with usefulness in science, technology, medicine, enhancing the quality of life, economy, etc. It is for this reason that this forum attracts participation from academics, researchers, industrial partners as well as entrepreneurs and is intended to spark a collision between technical and inventive minds.

Many leading experts from all over the world will be participating in the event to connect, learn about new research and gain insights into the latest trends. This excitement packed

event will feature presentations, keynote speakers and networking opportunities that will address some of today's most relevant topics, such as big data, medical informatics and bio-informatics, cloud computing, and artificial intelligence, machine learning, and their novel applications to real-world problems. The conference will also examine current trends that affect people's work and life.

There are two further key features of this conference series that make this a unique event – i.e. these events are "go-green" environmentally friendly conferences where emphasis is on the quality of academic endeavour rather than spin and gloss; and these events see participation from large number of young researchers and particularly women scientists which is an important aspect if we are to increase female participation in STEM (Science, Technology, Engineering, and Mathematics) areas.

Conferences like these are only possible thanks to the arduous work of a great many people and the successful organisation of SocProS 2023 has required the talents, dedication and time of many volunteers and dedicated support from sponsors. Firstly we give our sincere thanks to all our colleagues on the Organising Committee for their hard-work, dedication, and support throughout the year. Next, we thank the many stream organisers for inviting, persuading and cajoling authors to present their work at the conference. We are incredibly grateful to the sponsors and exhibitors who have supported the conference despite the continuing tough economic conditions. The aforementioned contributions have created an excellent and stimulating programme of events which we hope everyone will enjoy. We are ever grateful to the Springer Plc. for their dedication and professionalism in helping us produce what is an excellent and high-quality proceedings. We are also grateful and extend our thanks to you all, the delegates, for helping to make this event a success. We hope SocProS 2023 will live long in the memories. It was our great honour and pleasure to accept the responsibilities and challenges of Conference General Chairs and Conveners. We hope that the conference will be stimulating, informative, enjoyable and fulfilling experience for all.

We wish you a very productive conference and helpful networking.

Prof. Millie Pant, IIT Roorkee
Prof. Kusum Deep, IIT Roorkee
Prof. Atulya Nagar, Liverpool Hope University, UK

About IIT ROORKEE (Venue of SocPros 2023)

The Indian Institute of Technology Roorkee at Roorkee has culminated from the oldest technical institution of the Indian sub-continent, established as the "Roorkee College of Engineering" in 1847 and rechristened as the "Thomson College of Civil Engineering" in 1854. Due to its numerous contributions towards the development of the country for over 100 years, this temple of learning was elevated to the status of a University, i.e. the University of Roorkee, the first technical university of India in 1949. This University of Roorkee was converted to IIT Roorkee by the Government of India on September 21, 2001, thereby further elevating it to an Institute of national importance. Over the years, it has built up and maintained an excellent academic reputation. The outstanding achievements of its alumni are a testimony to this. The IIT Roorkee has academic departments in the areas of Engineering, Sciences, Architecture and Planning, Management studies, Humanities and Social Sciences besides many Centres of higher education and research. In addition, IITR has a Campus located at Saharanpur and an Extension Centre at Greater Noida.

About Saharanpur Campus of IIT Roorkee

Indian Institute of Technology Roorkee, Saharanpur Campus, formerly known as the School of Paper Technology was established by the Government of India in 1964, with an aid from the Royal Swedish Government. This school was managed by a Society created by UP Government until its merger with the University of Roorkee (now IIT Roorkee since 2001) in 1978. Presently, the campus has three departments:

- Department of Paper Technology
- Department of Polymer and Process Engineering
- Department Applied Mathematics and Scientific Computing

Saharanpur Campus is well planned Campus acquiring 25 acres of land with the distance of around 50 KM from the Roorkee campus. The three departments offer degree programs in MTech and PhD

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Plenary Speakers

Plenary Speakers 1: Vaclav Snasel

Vaclav Snasel is currently a Professor with the Department of Computer Science, VSB—Technical University of Ostrava, Czech Republic. He works as a Researcher and a University Teacher. He is also the Dean of the Faculty of Electrical Engineering and the Computer Science Department. He is the Head of the Research Programme IT4 Knowledge Management, European Center of Excellence IT4 Innovations. His research and development experience includes over 30 years in the industry and academia. He works in a multi-disciplinary environment involving artificial intelligence, social networks, conceptual lattice, information retrieval, semantic web, knowledge management, data compression, machine intelligence, neural networks, web intelligence, nature and bio-inspired computing, data mining, and applied to various real-world problems.

Plenary Speakers 2: Ali Safaa Sadiq (Ali)

Ali Safaa Sadiq (Ali) is an Associate Professor in Cybersecurity and research leader of the Cyber Security Research Group in the department of Computer Science at Nottingham Trent University. Ali is also a senior IEEE member and adjunct staff at Monash University and an honorary Associate Professor at the Centre for Artificial Intelligence Research and Optimisation, Torrens University Australia. Ali has served as a senior lecturer in Intelligent Networks

at the University of Wolverhampton, and a lecturer at the School of Information Technology, Monash University, Malaysia. Previously he has also served as a senior lecturer at the Department of Computer Systems & Networking Department, Faculty of Computer Systems & Software Engineering, University Malaysia Pahang, Malaysia. Ali has completed his first degree in Computer Science in 2004, after that Ali had 5 years of industrial experience in Computer Science and Networking. Ali had his MSc and Ph.D. degrees in Computer Science in 2011 and 2014, respectively. Ali has been awarded the Pro-Chancellor Academic Award as the best student in his batch for both master and Ph.D. He has published several scientific/research papers in well-known international journals and conferences. He was involved in performing 5 research grant projects, whereby 3 of them being around network and security and the others in analysing and forecasting floods in Malaysia. Recently he has been involved as a co-investigator with a research project CYBERMIND that was funded £91k by Innovate UK Cyber Academic Start-up Accelerator 2020. Also, he has led (PI) a funded research project called Trust Me, which is funded in two phases by Innovate UK and DCMS. The project creates an innovative new platform to help AI developers and data scientists to add security, trust, and explain ability to their AI-based decisions. The first phase has been funded with £31,338k, while the second phase was funded with over £60k to develop the proof of concept. Ali could manage to develop a commercialised platform called TYMLO and launched a company named TYMLO Technology Ltd. He has supervised more than 5 Ph.D. students and 6 Masters students as well as some other undergraduate final year projects. He is currently working on funded projects named Drive with Confidence: A Safe and Secure Driving System to Mitigate Remote Vehicle Hijacking Risks, and PRAVE: Proactive Authentication and Verification Embedded Model for Critical Cyber-Physical Systems with a total fund of £130k. His current research interests include Cybersecurity, Wireless Communications, and AI applications in the Internet of Things and the Internet of Vehicles.

Plenary Speakers 3: Seyedali Mirjalili (Ali)

Professor Seyedali Mirjalili (Ali) is the founding director of the Centre for Artificial Intelligence Research and Optimization at Torrens University Australia. He is internationally recognized for his advances in Optimization and Swarm Intelligence, including the first set of algorithms from a synthetic intelligence standpoint - a radical departure from how natural systems are typically understood - and a systematic design framework to reliably benchmark, evaluate, and propose computationally cheap robust optimization algorithms.

Ali has published over 300 publications with over 40,000 citations and an H-index of 70. As the most cited researcher in Robust Optimization, he has been on the list of 1% highly-cited researchers and named as one of the most influential researchers in the world by Web of Science for three consecutive years since 2019. In 2020, he was ranked 21st across all disciplines and 4th in Artificial Intelligence & Image Processing in the Stanford University's list of World's Top Scientists. In 2021, The Australian newspaper named him as the top researcher in Australia in three fields of Artificial Intelligence,

Evolutionary Computation, and Fuzzy Systems. Ali is a senior member of IEEE and an associate editor of several AI journals including Neurocomputing, Applied Soft Computing, Advances in Engineering Software, Computers in Biology and Medicine, Healthcare Analytics, Applied Intelligence, and IEEE Access. His research interests include Optimization, Swarm Intelligence, Evolutionary Algorithms, and Machine Learning.

Plenary Speakers 4: Brij B. Gupta

Brij B. Gupta received the Ph.D. degree from the Indian Institute of Technology Roorkee, Roorkee, India, in 2009. He is also a Visiting/Adjunct Professor with several universities worldwide, including Macquarie University, Sydney, NSW, Australia, Symbiosis International University, Pune, India, Lebanese American University, Beirut, Lebanon, and the Center for Interdisciplinary Research, University of Petroleum and Energy Studies, Dehradun, India. He has published over 400 papers in journals/conferences, including 30 books and eight patents with over 14000 citations. He is a Distinguished Research Scientist with Login Radius Inc., San Francisco, CA, USA, which is one of leading cybersecurity companies in the world, especially in the field of customer identity and access management. His research interests include information security, cyber physical systems, cloud computing, block chain technologies, intrusion detection, AI, social media, and networking.

Invited Speaker

Prof. Sudesh Kaur Khanduja, FTWAS, FNA, FASc, FNASc currently holds the position of INSA Honorary Scientist at IISER Mohali, in addition to being an Emeritus Professor at the Centre for Advanced Study in Mathematics, Panjab University, Chandigarh. She has been recognized with numerous awards and honors, including the prestigious Srinivasa Ramanujan Medal from INSA in 2022. Graduating as one of the top students in both her undergraduate and postgraduate studies at Panjab University Chandigarh, she obtained her PhD in Mathematics from the same institution in 1978. With an extensive teaching experience spanning 46 years, she has published nearly 100 research papers, supervised 13 PhD students, and served as the Principal Investigator for 7 projects. She holds positions on the referee boards of esteemed journals such as Journal of Algebra, Communications in Algebra, Journal of Algebra and its applications, Proceedings of American Mathematical Society, Manuscripta Mathematica, and Indian Journal of Pure and Applied Mathematics. Furthermore, she serves as a reviewer for Zentralblatt für Mathematik. Prof. Khanduja has also taken on the role of Coordinator for the NBHM research awardees test and NBHM M.A/M.Sc. scholarship test from 2003 to 2010, and has been guiding students through the Summer Research Fellow-

ship Program of Science Academies since 2008. She actively participates in programs that promote the advancement of mathematics and has organized and delivered keynote speeches at prestigious conferences in India and abroad. Her research interests lie in the fields of Algebra, Algebraic Number Theory, and Valuation Theory.

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1. MIM-ViT: Deepfake Detection using Masked Image Modelling and Vision Transformer

Paper Id 5

Sameer Kavthekar[1], Shreya Vaidya[1], Vishwesh Pujari[1], Sunil Mane[1]
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Abstract: Over the last decade, deep learning has become one of the fastest-growing fields in computer science. It finds applications in several sectors, such as Healthcare, Agriculture, Financial Services, and Crime Investigation. However, with the rapid development of Generative Adversarial Networks in 2017, the concept of deepfakes emerged. The term deepfake refers to an artificially synthesized image or video generated using techniques like Face Swapping and Face Expression Reenactment. Such face manipulation techniques have become highly refined, making deepfakes impossible to detect by the naked eye. Deepfake videos can potentially be used for various malicious purposes. Spreading misleading news via politicians or celebrities is one such example. Such ill-intended videos can exacerbate the increasingly prevalent problem of false information online. Therefore, being able to differentiate between real and fake videos is crucial. This work proposes a solution based on Masked Image Modelling using Auto-Encoders and Vision Transformers to tackle the problem of Deepfake Detection. The solution consists of two sub models working in parallel, namely the Multiscale Vision Transformer and the Masked Autoencoder, ConvNeXt. A novel facial quality detection algorithm is developed, which helps improve the data quality by overcoming the challenge of misrepresented facial data. The proposed model, MIM-ViT, achieves competitive results on popular datasets like the Deepfake Detection Challenge Preview and

Face Forensics++ with a test accuracy of 80.22% and 98.1% along with an Area Under the Receiver Operating Characteristics score of 84.48% and 99.8% respectively. The proposed model generalizes well and performs competitively on unseen data, achieving an AUCROC score of 68.21%.

Keywords: Deepfake Detection, Convolutional Neural Network, Vision Transformer, Deep Learning, Masked Image Modelling, Social Cybersecurity.

2. Hough transform generalization for detecting fuzzy lines

Paper Id 7

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Abstract: In this paper, we investigate a technique, namely fuzzy Hough transform, to detect fuzzy geometrical entities like fuzzy lines. We extend the classical Hough transform technique using Zadeh's extension principle. Our proposed technique demonstrates and analyzes the α-cuts of the fuzzy lines present in the images. In addition, we describe a generalized version of the fuzzy Hough transform. Specifically, we present an analysis of the fuzzy Hough transform to recognize vague/imprecise lines from the images. The fuzzy Hough transform technique identifies fuzzy lines by a voting procedure. Sequentially, a concept of similarity measure between two fuzzy lines using the fuzzy Hough transform is delineated. Moreover, we implement the proposed technique in real images to detect fuzzy lines and similarity measures between two fuzzy lines.

Keywords: Fuzzy numbers, Fuzzy lines, Classical Hough transform, Fuzzy Hough transform.

3. KSK' Algorithm for Optimizing DCS Performance using 'R'

Paper Id 10

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Abstract: Distributed computing refers to the solution to a problem using distributed systems of autonomous and heterogeneous computers that are important for communication, networking, and workstation functioning. Distributed computing helps multiple computers to solve the same problem and through it, problem-solving is achieved by communicating and performing tasks in a distributed environment. This system helps in performing computational tasks much faster than single computers. The objective of the problem present in this paper is to develop an algorithm named 'KSK' to obtain overall optimal cost with reliability. Here, the algorithm for the optimization problem presented is executed in the open-source R programming language. A comparison between the developed 'KSK' with the existing 'GBY' algorithm has also been discussed. The aim is that the optimal combination in this distributed computing system provides low processor execution cost and low program service cost as well as reliability.
Keywords: Distributed Computing System (DCS), Task Execution Cost (TEC), Processor Communication Cost (PCC), Open-Source Language, GBY- Gulati Bhatia Yadav.

4. A Knee-based Multi-Objective Optimization for Gait Cycle of 25-DOF NAO Humanoid Robot

Paper Id 11

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Abstract: A multi-objective optimization problem finds multiple optimal solutions represented on a Pareto front (PF), for conflicting objectives. Focusing on the "knee" region (KR) of the PF is preferred to targeting the entire PF since there is a significant degradation in one objective for a minor gain in another outside the KR. This paper applies two knee-finding methodologies– angle- and utility-based methods within the elitist non-dominated sorting genetic algorithm (NSGA-II), to address a multi-objective optimization problem of a 25 DOF NAO humanoid robot's gait cycle. The objectives are minimizing power consumption and maximizing dynamic balance margin. The single support phase exhibits a single KR, whereas the double support phase shows two KRs. This research demonstrates a knee-based multi-objective optimization algorithm to reduce the burden on decision-makers in selecting the most preferred solutions. It compares two knee-finding techniques and provides insights into a practical robotics problem for different gait cycle phases.
Keywords: NAO humanoid robot, multi-objective optimization, decision making, NSGA-II, knee-based evolutionary algorithm.

5. Estimating Severity for Knee Osteoarthritis Radiographs using Deep Learning and Machine Learning Algorithms

Paper Id 12

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Abstract: Knee Osteoarthritis (OA) is a degenerative joint condition that affects the knees. This is a common source of incapacity in the elderly, and it produces excruciating pain and suffering in the smooth moment of the knee joints. If osteoarthritis is discovered early on, it can be treated and the patient can recover. Late diagnosis, on the other hand, may result in lifelong impairment or joint replacement. Also, manual detection takes time and requires highly skilled professionals. In the current work, several radiographic characteristics were retrieved from deep learning networks such as VGG16, VGG19. Finally, Machine Learning (ML) classifiers were employed to categorize the severity of the Osteoarthritis stage. The results show that using Artificial Intelligence (AI) techniques, the doctors may detect and provide in-time treatment to the patient.
Keywords: Knee Osteoarthritis, Deep Learning, Machine Learning.

6. IoT Based Smartbin For Smart Campus

Paper Id 13

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Abstract: Garbage disposal and waste management have become some of the biggest issues faced by India in recent decades, compounded by a huge increase in waste production. With hygiene now a top priority in the wake of the COVID-19 outbreak, it is crucial to find innovative ways to dispose of waste. One promising solution is to install contactless smart dustbins in homes, public areas near transportation hubs, offices, schools, hospitals, and other relevant locations. This project drew inspiration from the Indian government's Swachh Bharat Mission. The intelligent trash cans will be built using a microcontroller-based platform equipped with the Internet of Things (IoT), and blockchain, allowing them to store data in database columns with unique identifiers. These features will enable an SMS alert system to notify the janitor department when bins are full, making the smart dustbin more advanced than previous technologies. Additionally, the proposed model will be able to identify the type and quantity of waste disposed of in various regions and recognize patterns in individual garbage disposal. The ecosystem of smart bins will be seamlessly integrated into the network and able to alert authorized waste disposal staff when they need to be

emptied.
Keywords: Smart Bin, waste management, wireless sensor network, clean environment, Internet of Things, Blockchain.

7. Knee-Osteoarthritis Detection Using Deep Learning

Paper Id 15

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Abstract: Arthritis is a condition that causes pain, stiffness, inflammation, and other symptoms in one or more joints. It is more common in older adults and tends to worsen with age. There are different types of arthritis, but osteoarthritis is the most prevalent. A study discusses the use of Convolutional Neural Networks (CNN) for detecting Knee-Osteoarthritis. CNN is a deep learning algorithm that can analyze data and classify images accurately, like the human brain. The purpose of this study is to classify different knee x-ray images to predict the severity of the disorder, allowing for early detection and lifestyle changes to prevent the disease from worsening. An online tool has been developed to diagnose knee osteoarthritis and provide remedies based on various K-grade predictions. This tool can help patients understand their knee's condition and take necessary measures to manage the disease.
Keywords: CNN, Deep learning, knee osteoarthritis, Artificial neural networks.

8. A Hybrid Method for Named Entity Recognition in Kumauni Language using Machine Learning.

Paper Id 17

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Abstract: Named Entity Recognition (NER) identified entities in a text according to specified rules. Machine interpretation, question answering, and automated summarization are among NER's numerous NLP applications. Language barriers make identifying people harder. They recognized words having various meanings or uses in other formulations. Writing similar words might be tough. Finding unlabeled terms is difficult. To mitigate these challenges in this research, a novel fusion chain model for NER in Kumauni Language using Machine Learning (ML) is proposed. A fusion of Convolution Neural Network (CNN)

with Bidirectional Long- and Short-Term Memory (LSTM) and Conditional Random Field (CRF) is utilized as the proposed model for training and testing in which Support Vector Machine (SVM) is used for tagging. Finally, for measuring the performance of the proposed model the performance metrics are calculated. The results show that the precision, recall, and F-measure of the proposed model with skip gam embedding is 76%, 75%, and 75.5%, and with Glove embedding the precision, recall, and F-measure of the proposed model is 78%, 62% and 69.08% in both the cases the proposed model performs better than other conventional approaches.

Keywords: Named Entity Recognition (NER), Machine learning, Convolution Neural Network, Conditional Random Field, Long- and Short-Term Memory.

9. Implementation of Basic Mathematical Operations on Openpower-isa of Libresoc.

Paper Id 21

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Abstract: In this era, it is observed that electronic system gadgets are developed every day with the most upcoming features which are beneficial and convenient for users. SOCs, Softcores, and Softprocessors play a vital role in developing such systems. Softcore is the digital circuitry that is implemented using logic synthesis. One such Softcore used by authors here is Libresoc. This Softcore precisely focuses on designing a SOC which contains all the functionalities of 3D GPU, CPU, and VPU. The main reason for choosing Libresoc as the base softcore is that it uses Openpower ISA 3.0. The main objective of the proposed solution is to implement basic mathematical operations such as Addition, Subtraction, Multiplication, and Division on the decoder test cases of Openpower-ISA. This solution can act as the base for further development of SOCs with high-end features.

Keywords: System on Chip, Softcores, Opensource tools, Openpowerisa, integrated Circuit, Decoder test cases.

10. Machine Learning-Based Node Localization in IoT-Assisted WSN: An Initial Framework for Real-Time Applications

Paper Id 26

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Abstract: In the age of the Internet of Things (IoT), the utilization of intelligent devices has surged. These devices are sensor-equipped, heterogeneous devices, making wireless sensor networks (WSNs) the underlying technology of IoT, which can be referred to as IoT-assisted WSNs, to monitor physical environments. These networks are designed to collect data and perform specific tasks, with location information being a highly desirable task for achieving efficiency in achieving goals. However, traditional localization techniques are inadequate in dealing with the dynamic nature of sensor nodes. Machine learning (ML) has emerged as a promising solution to address these challenges in recent years. This paper presents a literature survey of various machine learning and localization techniques for IoT assisted WSN. The need for localization and machine learning techniques in IoT is also discussed in detail. Furthermore, an initial framework for implementing machine learning techniques in an IoT-assisted WSN environment for node localization is proposed.
Keywords: Localization, WSN, Machine Learning, IoT.

11. Aspect of Artificial Intelligence in Dealing with Mental Health Disorders in Adolescents

Paper Id 27

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Abstract: A comprehensive strategy to find and treat mental health problems in adolescents entails multiple sources of information. Combining various methodologies can help doctors and researchers gain a complete knowledge of adolescent mental health, and make effective interventions to address these issues. There are not only instances of publicly available, accessible apps for mental illness; they also include characteristics of apps related to research, issues amalgamation of mobile apps and digitize healthcare into clinical work and the amount of time spent in non-traditional settings. Clinical contexts can use technology like those of mental disorder, social support, and technology literacy. Good evaluation practices and understanding user requirements can all contribute to success. This review is based on a review of the research literature as well as the authors' clinical and administrative experience. Articles on telepsychiatry, mental health, mobile mental health, ambulatory monitoring, telemetry, and algorithms from 2012 and 2022 were searched.
Keywords: Mental Health Apps, Smartphone Apps, Wearables, Telepsychiatry, Ambulatory monitoring.

12. Implementing Blockchain Technology in Healthcare: An Overview, Key Requirements and Challenges

Paper Id 28

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Abstract: This research aims to develop a theoretical design for a healthcare app that utilizes Blockchain technology to manage patient and physician databases. The study identifies gaps in earlier models that primarily focused on the use of Blockchain in the finance and economic sectors. The ultimate goal is to create a smartphone app that will enable surgeons to manage their patients more efficiently and help patients compare costs, procedures, and pre/post-surgery preparations using Bitcoin as payment. The research involves a analysis of present literature on Blockchain technology in healthcare and space missions and uses a conceptual framework to develop the theoretical design. The results of the study include the development of a theoretical design for the healthcare app that could increase efficiency in patient management, cost savings, and simplify the payment process. The study hopes to encourage medical stakeholders to participate in the blockchain network, which could lead to increased network sustainability and security. Overall, the research highlights the potential benefits of Blockchain technology in healthcare, particularly in managing patient and physician databases, and proposes a design that could lead to increased efficiency and cost savings. The study aims to contribute to the existing conceptual framework for medical stakeholders and encourage their participation in the blockchain network.
Keywords: Blockchain, Medical Field, Healthcare, Patient Management

13. Path Planning for Autonomous Ground Vehicles by Applying Modified Harris Hawks Optimization Technique

Paper Id 29

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Abstract: Automated Guided Vehicles (AGV) have found extensive use in industry, particularly in port shipping, logistics, and warehousing. Finding the shortest path is the most crucial problem with the AGV. In this proposed work, a new optimization algorithm, i.e., the Modified Harris Hawks Optimization (MHHO) technique, has been applied for path planning problems. Simulation results show the proposed technique performs much better when compared with four other state-of-the-art techniques. The efficacy of the proposed MHHO technique has been verified with two working environments.
Keywords: Autonomous Ground Vehicles, Harris Hawks Optimization Technique, Path Planning, Working Environment.

14. Mathematical Modeling and Analysis of Spread of Crime in a Society

Paper Id 32

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Abstract: A crime is an act which is destructive not exclusively to the individual yet to the local area, society or state. Spread of crime can happen through interaction between non-criminal and criminals. Using an epidemiological approach, a non-linear mathematical model for the spread of crime in a society has been proposed and analysed in this paper. The threshold parameter is computed by employing the next generation matrix (NGM) technique. Two equilibrium points are obtained by analysis conducted: crime-free equilibrium and crime-persistent equilibrium. Stability of equilibria is obtained using the Jacobian matrix. The equilibrium analysis of the model shows that crime-free equilibrium is locally asymptotically stable if, crime is temporary and will disappear over time. On the contrary, if, the criminals number increases and the crime-persistent equilibrium is locally asymptotically stable. Numerical simulation is performed to check the influence of key parameters on the spread of crime in the society.
Keywords: Crime, Mathematical model, Simulation.

15. Glaucoma Classification using Improved Pretrained Model

Paper Id 33

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Abstract: The most common cause of blindness in the world is glaucoma. It can lead to a decline in eyesight and quality of life if not addressed within the stipulated time. In computer vision, convolutional neural networks (CNNs) have achieved a viable solution. The most standard glaucoma screening method is fundus imaging due to the compromises it makes between mobility, size, and price. In this paper, we utilized the RIM-1 DL dataset in two different versions: RIM-1 Hospital and RIM-1 Randomly. To enhance the image quality and increase accuracy, we used median filtering pre-processing techniques in this work. We also used fundus images to automatically diagnose glaucoma using six different Image-net-trained models (DenseNet121, DenseNet169, VGG19, InceptionV3, ResNet50, and MobileNetV2). The six CNN architectures mentioned above are modified using normalization, inception, and global pooling layers in the model with the pre-trained classification models. Results indicate that the DenseNet121 is the most accurate model in this work, improving accuracy in the RIM-1 Hospital dataset from 70.68 to 80.13 and in the RIM-1 randomly generated dataset from 79.31 to 87.67 after the models were fine-tuned.
Keywords: Glaucoma, CNN models, RIM-1, Pretrained modes, Fundus imaging.

16. Performance Optimization of a Waste Heat Operated Tri-Generation Cycle under Different Energy Situation

Paper Id 34

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Abstract: This research presents an integrated Goswami-absorption refrigeration cycle with twin absorber that can transform any leftover industrial waste heat into useful outputs like power generation, room cooling, and conditioning of eatables. The involvement of the above two sub-cycles in the current configuration offers the advantage of adjusting the cycle parameters to fulfil the energy requirements of either a residential or a cold storage building. The cycle is expected to produce greater proportion of power and sensible/room cooling when its application is dedicated for residential sites, whereas higher latent cooling is anticipated for cold storage sites. To adjust the cycle for the above two applications, it is required to calculate: (a) the optimum value of the input parameters and (b) the performance of the cycle in the intended operating situation. This is achieved by using dragonfly optimization algorithm for the objective functions favoring either the residential or the storage based applications. At the optimal input set for residential sites, the cycle delivers 24.33 kW of power, 5.79 kW of sensible/air cooling, and 13.52 kW of latent cooling/chilling. Similarly,

the cycle produced 4.03 kW of power, 1.41 kW of sensible/air cooling, and 34.69 kW of latent cooling/chilling at the optimal input set for storage sites. The cycle is found to be 3.66 times more efficient while delivering the above output for residential application than for storage application. Also, the cycle shows 6.23 kW lesser overall exergy destruction while supplying the above output for residential building than for storage building.
Keywords: Goswami cycle, absorption refrigeration cycle, industrial waste heat, residential building, cold storage building, dragonfly algorithm.

17. Organizational Supply Chain Risk Assessment Using Machine Learning and Back Propagation Neural Network

Paper Id 41

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Abstract: The application of machine learning and neural network research has led to the enhancement of the role played by back propagation neural networks in facilitating the management of supply chain risks within organizations. Organizational supply chain risk is typically harder to predict and requires more resources to identify, assess and mitigate the various risk factor. These risk factors continuously affect supply chain operations. Through this work, we analyze the supply chain risk factors and control the risk. In particular, a back propagation neural network (BPNN) along with a machine learning model is developed and tested. The results show that the proposed model effectively assesses the risk.
Keywords: Supply chain risk assessment, Artificial neural network, Machine learning, Time series, Supply chain Introduction.

18. An approach to find Critical Path using Trapezoidal Picture Fuzzy Numbers

Paper Id 44

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Abstract: One of the most challenging areas in supply chain management is to manage the links between suppliers and customers. More the number of players, more the com-

plexities. Critical path method (CPM), one of the project management techniques, helps to handle these complexities. Any delay in the Critical Path activities delays the project. For many projects in the actual world, we have to use human judgment for the estimation of the duration of activities. In this paper, we present a new approach in which activity time is taken as a trapezoidal picture fuzzy number (TPFN), which is an extension of the intuitionistic fuzzy set, and it is capable of analyzing the problems that contain uncertain and vague information. Also, in order to explain the approach, a numeric example is given with suitable graphical structure and tables.
Keywords: Project management, Picture fuzzy number; Fuzzy Critical Path; Score Function; Trapezoidal picture fuzzy number.

19. Comparative Analysis of Machine Learning and Deep Learning Algorithm for Automatic Sleep Staging using EEG Signals

Paper Id 46

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Abstract: The background and goal of this research are to address the significance of sleep in our lives and the impact of sleep disorders on our health. To analyze sleep problems, legitimate scoring of sleep stages is fundamental, and this is usually finished through a tedious visual survey of overnight polysomnograms by a human expert. However, this process can be improved with artificial intelligence algorithms. To accurately interpret the physiological signals associated with sleep disorders, it is essential to understand how changes in sleep stages are reflected in the signal waveform. With this knowledge, automated sleep stage scoring systems can be developed, which not only make the sleep order diagnosis more efficient but also provide insight into the amount of information about sleep stages that can be gleaned from a particular physiological signal. In this study, Single-channel electroencephalography (EEG) is the most commonly used sensory modality in sleep staging investigations, according to this study, because it closely adheres to sleep staging recommendations. A comparison between the Machine learning model and the Deep learning (CNN) model employing the 5-class sleep categorization was undertaken to tackle these difficulties. The Machine learning model involves pre-processing, feature extraction, and selection classification based on the Stacking model. The Deep learning algorithm consists in collecting and pre-processing a labeled dataset of EEG recordings, designing and training a CNN model to classify sleep stages, and testing the model on new data to evaluate its performance. The classification stages are based on Rechtschaffen and Kale (R and K) rules i.e., Wake, N1, N2, N3, and REM. Based on the obtained results, the Machine Learning (Stacking) algorithm has been found to achieve an accuracy of 97.80 %, and the Deep Learning (CNNs) algorithm has been found to achieve an accuracy of 63.30 %. The accuracy of the Deep Learning (CNN) algorithm can be improved using data augmentation techniques, optimizing hyperparameters,

and transfer learning, which will be considered in future work.
Keywords: Sleep stage classification, EEG, Machine learning, Deep learning.

20. Randomized shuffled hierarchical partitioning technique for enhancing efficiency of swarm algorithms

Paper Id 48

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Abstract: Hierarchical partitioning (HIER) is an efficient multi-population partitioning technique. By enhancing swarm algorithms' exploring capabilities, it improves their efficiency and aids them in evading local optima. Modified hierarchical partitioning (mHIER) was recently proposed to reduce the duplicity in HIER and guide the solutions towards better regions. In this paper, three modifications have been proposed to enhance efficiency of mHIER. The first modification is shuffling of sub-populations, which facilitates better information exchange across the entire population. Second modification is randomization which is introduced to help counter duplicity. It works by adding a new randomly generated solution every time local solutions are exchanged. The third approach, randomized shuffled hierarchical technique (RSHier) is a combination of these two. The three techniques are compared over bat algorithm, and RSHier is found to be the best. To establish the effectiveness of RSHier, it is further tested over four additional swarm algorithms: firefly algorithm, flower pollination algorithm, moth search algorithm and particle swarm optimization algorithm. Experimentation is done over 30 benchmark functions and CEC 2014 function set. Computational results establish RSHier as an efficient population partitioning technique to enhance the efficiency of different swarm algorithms.
Keywords: Hierarchical partitioning, Global optimization, Bat algorithm, Firefly algorithm, Moth Search algorithm, Flower Pollination algorithm, Particle Swarm Optimization algorithm.

21. Approximate Solution of Kawahara KdV and modified Kawahara KdV Equation by using RDTM

Paper Id 51

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Abstract: In this article, reduced differential transform method (RDTM) has been applied to obtain the approximate solution of the Kawahara KdV and modified Kawahara KdV equation. The results acquired through RDTM have been compared with the exact solitary wave solutions for Kawahara KdV and modified Kawahara KdV equation. Analysis of the results reveal that RDTM is quite efficient, reliable and optimistic method for solving various linear and non-linear partial differential equations. RDTM gives analytical approximation and in many situations exact solution. It reduces the cumbersome calculations which we have to do in other existing methods.
Keywords: Reduced Differential Transform Method (RDTM), Kawahara KdV equation, modified Kawahara KdV equation, Partial differential equation (PDE).

22. A Novel Approach to Solve the Interval-valued Fermatean Fuzzy Transportation Problem

Paper Id 52

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Abstract: In any decision-making process, it is commonly observed that decision makers often face difficulty in specifying precise or crisp values for parameters due to doubts or hesitation. This uncertainty regarding the parameters leads to ambiguity in the decision-making process. To handle the uncertainty of transportation problem related parameters, numerous approaches have been proposed in the literature. However, in most of the approaches, the parameters pertinent to the problems are either fuzzy/intuitionistic fuzzy or pythagorean fuzzy numbers. A recent concept of an interval-valued fermatean fuzzy numbers provides a robust framework than existing fuzzy numbers for handling uncertain and incomplete data in practical applications. The aim of this paper is to introduce a novel formulation of the transportation problem by utilizing interval-valued triangular fermatean fuzzy numbers to represent transportation costs, as well as the values of supplies and demands. We propose a fermatean fuzzy programming approach to solve the transportation problem with interval-valued triangular fermatean fuzzy numbers. The proposed approach relies on the score function of interval-valued triangular fermatean fuzzy numbers and the order relation of interval numbers. To demonstrate the effectiveness of the proposed approach, we finally solve an illustrative application example.
Keywords: Transportation problem, Fermatean fuzzy set, Interval-valued fermatean fuzzy number, Fermatean fuzzy programming, Optimal solution.

23. An ensemble of PSO and Artificial Electric Field Algorithm for Computationally Expensive Optimization Problems

Paper Id 53

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Abstract: Population-based optimization algorithms are extensively studied to address various types of optimization problems. Among them, the artificial electric field algorithm (AEFA) has gained popularity. However, AEFA still has limitations such as slow convergence speed, insufficient memory utilization, and limited search capabilities. To overcome these challenges, we propose a hybrid algorithm called particle swarm algorithm (PSO) and artificial electric field (PSAEF) that introduces a novel definition of Coulomb's constant. The new definition of Coulomb's constant in PSAEF enhances its exploration rate, enabling it to avoid local optima. Additionally, the algorithm incorporates knowledge of the global best solution to improve its exploitation phase and convergence rate. We evaluate the performance of PSAEF on a set of bound-constrained IEEE CEC benchmarks and compare the results with eleven state-of-the-art optimization algorithms. Extensive analyses and statistical testing, including the Wilcoxon signed-rank test, are conducted to validate the results. The experimental findings demonstrate that PSAEF outperforms other state-of-the-art algorithms in terms of accuracy and statistical significance. It achieves superior performance on 92% and 80% (average percentile) of the problems, respectively. The results indicate that the proposed hybrid algorithm exhibits enhanced search capabilities and faster convergence rates compared to other algorithms.

24. Dental Hand Gesture Recogniser

Paper Id 55

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Abstract: Dental Hand signs are used to converse with the dentist during dental operations. The signs displayed by the patient might not be noticed which may place the patient in fear and anxiety. The existing solutions have not automated these signs before and are not highly accurate. A vision-based approach is used to recognize and convert the dental hand signs displayed to voice. The input will be the image feed from the webcam and if a valid gesture is found, it is converted to voice in real-time. This model is tested for various dental hand gestures and American Sign Language (ASL) under different contextual factors

including background, lighting, hand size, and multiple signs. In comparison with the CNN model, the proposed model produces a higher accuracy and can handle dynamic gestures accurately.
Keywords: Dental Hand Signs, Mediapipe, Machine Learning, Gesture Recogniser, American Sign Languages, Convolution Neural Networks.

25. Popularity Prediction of Online Social Media Content: A Bibliometric Analysis

Paper Id 56

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Abstract: An online social network is a platform that enables individuals to interact with others who have similar backgrounds, preferences, activities, and associations. The number of features available and the format of each online social network range widely. Users of online social networks, such as Twitter, Instagram, Flicker, and Pinterest, have increased dramatically in recent years. Content sharing is the most popular feature of online social networks, used by both specific users and big enterprises. This study has used bibliometric methods to analyze the growth of the social media popularity prediction on online social network content from 2013 to 2022. The publications have been extracted from the dimensions database, and the VOS viewer software was used to visualize research patterns. The finding provides valuable information on the publication year, authors, author's country, author's organizational affiliations, publishing journals etc. Based on the findings of this analysis, researchers will be able to design their studies better and add more insights into their empirical studies.
Keywords: Popularity, Prediction, Online Social Networks, Bibliometric, VOS viewer.

26. A Prototype using Data Analytics for Crowd Management at Football Stadiums

Paper Id 58

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Abstract: The ever-growing population in cities and urban areas gives rise to the need to innovate ways for better crowd control and management to forestall potential hazards. There are several locations that have the capacity to contain crowds, especially in urban areas such as malls, places of worship, and sporting arenas. One of the sporting arenas

that continue to see large numbers of people in attendance, especially in the UK, is football stadiums. In football stadiums today, whilst the processes of managing crowds are continuously being improved upon, such as the use of turnstiles at gates, seat allocation, e-ticketing, provision of signages, and policing, the challenge yet exists as the occurrence of incidences that have led to loss of lives and property are still being recorded. The aim of this research was to investigate the use of new technologies to improve crowd management and visitor experience at football stadiums in the UK. Furthermore, a prototype of a mobile application was developed to facilitate this. A survey was conducted among stadium visitors and staff to assess certain parameters regarding the prototype design. The results gave a clearer insight into the required features of the prototype. These features include real-time notifications, finding friends and family at the stadium, reporting issues of violence, medical emergencies, and navigation features. A usability test and survey were administered to potential users of the application to verify the relevance of the application. The results obtained also outlined areas for future study in crowd management research.
Keywords: Crowd Management, Football stadiums, Data Analytics, Prototype.

27. Development of an autonomous driving car prototype using FPGA

Paper Id 59

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Abstract: An autonomous car is a vehicle that can operate and make decisions without human intervention. Our model is developed using DE10 NANO FPGA (Field Programmable Gate Array). FPGA is used to implement a range of functions, including sensor fusion, perception, decision-making, and control. Sensor fusion combines data from multiple sensors, such as cameras and lidar, to comprehensively view the vehicle's surroundings. OpenCV (Open Source Computer Vision Library) environment and Yolo algorithms were used for perception and decision-making. Perception involves analyzing the data to identify objects and their characteristics, such as their position, speed, and trajectory. Making decisions entails using this knowledge to choose the best course of action, such as accelerating, braking, or steering. Verilog HDL (Hardware Description Language) is utilized for controlling and the Python programming language is employed for the remaining aspects of the mode.
Keywords: Autonomous, Collision Avoidance, DE10 Nano FPGA, Raspberry Pi, CNN (Convolutional Neural Network), Detection, Sensors, OpenCV.

28. Smart Glasses and Virtual Assistance Guide for Detection of Disorientation for Dementia and Alzheimer's

Paper Id 60

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Abstract: A framework proposing smart glasses for detecting disorientation in dementia and Alzheimer's patients and guiding them to a safe place using virtual assistance is an innovative and promising solution that can help mitigate the challenges faced by patients suffering from these conditions. The technology involves the use of smart glasses embedded with a SIM (for independent internet connectivity) and sensors that can detect signs of disorientation and provide guidance to patients with an Augmented Reality (AR) enabled virtual assistant feature. The sensors embedded in the smart glasses can detect changes in the patient's environment, such as changes in lighting or temperature, and analyze the patient's movements to identify signs of disorientation. The embedded SIM will be useful as patients may or may not carry their phones while disorienting. The virtual assistant can then provide guidance to the patients, such as directions to a safe place. There were solutions available that could send an alert to the caretaker. By the time they could reach the location, it could be too late, as the patient may go through multiple risks, like a panic attack, and accidents etc., the proposed solution also, guides the patient The virtual assistant can also communicate with the patients and can guide them to the nearest safe location, along with the alert message sent to the caregivers. This technology has the potential to improve the quality of life of patients by enabling them to move around more safely and independently, while also reducing the burden on caregivers. It can also reduce the risk of accidents, such as falls or wandering, that can be dangerous for patients with dementia and Alzheimer's disease. Overall, the proposed framework shows a promising solution with the help of smart glasses for detecting disorientation in dementia and Alzheimer's patients and guiding them to a safe place using a virtual assistant that has the potential to significantly improve the lives of patients and their caregivers. The study shows the verification by approaching the patient's caregivers' feedback on the proposed solution.
Keywords: Smart Glasses, Disorientation, Alzheimer's and Dementia Patients, Virtual Assistance.

29. Fused Spectrogram Classification Using PCA and CNN for Machinery Fault Diagnosis

Paper Id 64

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Abstract: In this study, multimodal spectrogram fusion and deep learning approaches are proposed as a strategy for increasing the accuracy and resilience of machinery malfunction identification. To create two sets of 2D images, the method divides the dataset into two equal portions and applies the Continuous Wavelet Transform (CWT) and Short Time Fourier Transform (STFT) separately. A Principal Component Analysis (PCA) fusion approach is then used to combine these 2D images in order to identify the most pertinent and complementary characteristics. After that, a Convolutional Neural Network (CNN) model is applied to the combined spectrogram in order to conduct classification and learn complicated and abstract features. The suggested approach has a number of benefits, including enhanced feature extraction, greater accuracy, quicker processing, robustness to noise and artifacts, and transferability. The Case Western Reserve University (CWRU) dataset, which contains vibration signals from various fault states in rotating machinery, is used to illustrate the efficiency of the suggested method. The outcomes demonstrate that the suggested method outperforms existing methods for machinery failure diagnostics and achieves a high classification accuracy.
Keywords: Spectrogram, CWRU dataset, Dataset splitting, Continuous Wavelet Transform (CWT), Short Time Fourier Transform (STFT), Principal Component Analysis (PCA), Convolutional Neural Network (CNN).

30. Custom CDGNet Architecture for Precise Human Part Semantic Segmentation

Paper Id 66

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Abstract: Human body part segmentation is a task that involves labelling the pixels in an image with their corresponding body part classes. Since the human body has a hierarchical structure, and each part has a unique location, a technique called sample class distribution was developed to improve accuracy. This technique involves collecting and applying primary human parsing labels in both vertical and horizontal dimensions to exploit the position distribution of the classes. Combining these guided features generates a spatial guidance map and adds to the backbone network. To evaluate the effectiveness of this approach,

extensive experiments were conducted on a large dataset called CIHP, and the mean IOU, pixel accuracy, and mean accuracy metrics were used for evaluation. The proposed model (custom CDGNet) outperformed the baseline model and adjacent state-of-the-art techniques, achieving a 1.95% increase in pixel accuracy, 0.20% in mean IOU, and a 1.37% increase in weighted mean accuracy. This suggests that the sample class distribution technique may be valuable for improving human body part segmentation accuracy in images.
Keywords: Human Parsing, Human Semantic Part Segmentation, CIHP, Resnet 101.

31. Dissipative and Non-Dissipative Cell Balancing SoC Constant Current, Voltage Charging of Li-ion Battery for EV Application

Paper Id 67

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Abstract: In this paper, dissipative and Non-dissipative comparative analysis of five-cell balancing SoC constant current charging constant voltage charging of Li-ion batteries is introduced. Li-ion batteries are generally used in small-scale household electrical appliances, E-cars, automobiles, streetlights, aerospace, navigation lights, mobile phones, laptops, etc. Over-discharge and overcharge may diminish their lifecycle. A good Battery Management System (BMS) is required to address this difficulty since the energy storage cells are linked in series. The battery bundle's cells' responsibility and performance can be improved. The three basic components of the BMS are balancing, management, and protection. The most crucial aspect of the three is balancing. Cell unbalancing occurs as a result of continuous charging and discharging in the battery system. Proper cell balance can increase battery life. SoC charge-controlled Li-Ion batteries with 100 V nominal battery voltage and 50 Ah rated capacity are evaluated in MATLAB/Simulink using a battery bank consisting of five cells. According to the findings, the non-dissipative balancing of cells strategy outperforms the dissipative balancing strategy for lithium-ion batteries.
Keywords: Battery Management System, Dissipative balancing, Non-Dissipative balancing, State of charge, E-Vehicle.

32. Smart Home Automation System Using an IoT-Based Approach for Monitoring and Remote Control of Household Equipment

Paper Id 68

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Abstract: A smart home is an all-in-one solution that integrates Internet of Things (IoT) technology into our daily life to provide us with a more secure, pleasant, convenient, and energy-efficient living environment. Smart home appliances, in contrast to regular home appliances, might provide a temporary boost in mood. However, after acquiring a certain number of smart gadgets, we might not want to go back to our old way of life. These days, smart home systems and gadgets are designed with the user in mind and place an increased focus on interaction between the user and the system. A wide range of gadgets have been linked together using Internet and IoT technology such that lighting systems, temperature regulation, curtain control, surveillance & security system, audio and video equipment, computer and communication equipment, kitchen appliances, alarm clock, cleaning, etc. This paper proposes the system to handle everyday tasks, home appliances, and other smart home gadgets remotely using mobile phones, tablets, and touchscreen panels is a game-changer for the modern house. Many consumers are hesitant to take the initial step toward intelligent living due to the high upfront cost of installing smart home technology and the ongoing costs associated with maintaining it. As a result, this system will be committed to developing customized automation solutions to make the system useful, easy, and convenient that are both realistic and responsive to the needs of the users.
Keywords: IoT, Smart Home, Audrino Controller, Raspberry pi server.

33. Auto detection of field level dependencies in data workflow on a Distributed Platform

Paper Id 72

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Abstract: With the observed significant rise in the use of data across a variety of industries in the modern world, distributed systems are now required to process and consume Big Data. HPCC(High Performance Computing Clusters) systems is an open source data lake platform built for high-speed large volume data engineering. Enterprise Control Language designed(ECL), a declarative language specifically designed for huge data projects on HPCC Systems platform. Large amounts of data are processed on a regular basis using HPCC systems, In the proposed work an approach to understand and interpret the data flow within an ECL program is investigated. The current system renders an XML graph, which shows the operations at dataset level which can be viewed in the ECL Watch, an interactive web application developed by HPCC systems. As the data changes of individual fields within dataset are not represented, In the proposed work field level data and dependencies within datasets

are tracked and their changes and operations are visualized as a directed acyclic graph for a generic ECL program to understand it's data workflow. The core of this project relies on parsing the ECL IR(Intermediate Representation) emitted by the ECL compiler. The IR generated is transformed into graphical format. The system was tested against sample ECL programs available in ECL watch and other programs available in the platform regression tests and it provided a simple easy to comprehend data flow visualization.
Keywords: Parser, big data, distributed systems, HPCC systems, Graph Representation.

34. Hand Gesture Recognition Automation System

Paper Id 73

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Abstract: Our efforts were mainly focused to have machine and software interaction during this project. We were determined to build a small rotor car with miniature components and have it establish connection with our laptop through several media. Software is coded in Python and detects hand gestures, and our attempt was to amplify these gestures in the form of signals which are discussed later. The goal was to achieve mechanical movement of any nature or mechanical response using a nonmechanical approach. In this project, we drove a small mechanical rotor car using various small commands generated by our hand gestures hence achieving our objective and supporting our research. We discovered through this project that a machine–software interaction is possible and can be amplified beyond imagination. In this project let us explore one simple but fascinating possibility of such phenomenon.
Keywords: Hand gesture recognition, Automation System, Gestural interaction, Human Computer Interaction.

35. The Behavioral Factors Affecting Online Purchase Intention among Young Adults

Paper Id 77

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Abstract: Online purchasing has increased significantly among youth around the world due to the increase in the use and adoption of the internet. This study concentrates on the

consumer behavior of millennials in the Indian e-commerce market. The research focused on determining factors that influence the adoption of online shopping among youngsters. A conceptual model was built which helped in determining the effect of various online shopping factors namely behavioral stimuli factors, product-related factors, consumer concerns factors and service-related factors on purchase intention. To gather responses, a survey questionnaire was formulated and distributed. The survey was conducted on Indian people above 18 years and having online shopping experience. Cluster sampling was done to gather responses of the 18-34 age group. Confirmatory Factor Analysis was carried out to validate the fit of the proposed conceptual model. Spearman Correlation Analysis was conducted to determine the importance of potential online shopping factors. Return & Delivery and Claim Response Time were the most prominent concerns found in the study.
Keywords: Online Shopping factors, Millennials, Online Purchase Intention.

36. Workload Forecasting Model for Resource Management in Cloud Data Center

Paper Id 80

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Abstract: Cloud computing is a framework that can provide services to clients by virtually sharing resources in data centers. Studies suggest that predicting workload traits in advance can help in managing resources efficiently, resulting in saving power, reduced cost, and improved service performance. Accurate workload prediction methods estimate the number of resources to be allocated to each application in cloud data centers. We evaluate multiple machine learning and deep learning (ML and DL) algorithms for the prediction of workload patterns. We propose a DL-based model to predict workload, which results in improved decision-making for better management of resources. Two common evaluation metrics, MSE and RMSE, have been employed to analyze to verify the suggested workload prediction model. It is found that based on experimental results, the Long Short Term Memory (LSTM) algorithm performed exceptionally well, achieving the lowest RMSE value among all other algorithms tested for workload performance prediction.
Keywords: Cloud Computing, Workload Prediction, Deep Learning.

37. Beyond Traditional Metrics: Driver Drowsiness Detection Detection Systems Evaluation using Xception and ResNet152v2 Models

Paper Id 81

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Abstract: Drowsy drivers frequently cause car collisions on long roads around the globe. The lack of a system that can measure the level of drowsiness is the primary cause of accidents. Recent statistics indicate that drowsy drivers are to blame for an estimated 17.2% of fatal accidents. In a world where quick resolution is critical, this becomes a major problem. We can notify the driver and avoid accidents if a reliable and accurate fatigue detection system is available. This paper proposes a system capable of drowsiness detection in the present world, with the assistance of CNN models. We have used ResNet152v2 (92% accuracy) and Xception (94% accuracy) models and the MRL eye dataset. In order to determine which model is more accurate, we compared the false positives of the two approaches. Our research is likewise connected with driver tiredness, which makes use of face and eye detection to decide if a driver is sleepy. The drowsy driver system uses this approach to monitor the driver's video and sound an alarm if we observe that his eyelids are closed. If the eyes are open, the score we set is lower, whereas if they are closed, it is higher. For real-time applications, the developed system is a viable and dependable option.
Keywords: Drowsiness, Fatigue CNN, Xception, ResNet152v2, Alarm, Eyes Detection, MRL Eye Dataset, False Positive.

38. Unveiling the mystery of membrane potential in a neuron

Paper Id 83

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Abstract: The membrane potential is critical for neural processes and communication. This paper presents the implementation of simple mathematical analysis using the two differ-

ential equations of the conventional Morris Lecar model to study the dynamics of membrane potential under the influence of various parameters. The concept in this work is basic and straightforward, however, it brings forward significant facets of membrane potential. Simulation results show that firstly, it is an underdamped system and provides valuable information in terms of the rise time, peak time, and settling time. Secondly, it is found that both the membrane voltage and its second derivative increase simultaneously with the stimulating current. Thirdly, it is observed that an increase in calcium conductance causes both the membrane voltage and its double derivative to rise, ultimately leading to the generation of a nerve impulse, particularly in the case of double derivative of the membrane voltage. Fourthly, it is noteworthy that although the double derivative of the membrane potential decreases with an increase in potassium conductance but the dynamics of membrane potential increases with an increase in potassium conductance. Lastly, the analysis reveals that, even a slight deviation from the baseline temperature results in changes in the dynamics of both the membrane voltage and its double derivative, indicating that temperature also has a substantial effect on neuronal functions and communication mechanisms. This work, therefore, enhances the comprehension of the underlying neural mechanisms and aid in the development of effective therapeutic interventions.

Keywords: Membrane potential, Morris Lecar model, ion channel conductances, temperature, stimulating current.

39. A Cascading-Failure-Aware Distributed Computing System with Performance Sharing: Reliability and Robustness Analysis

Paper Id 86

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Abstract: In distributed computing systems, enhancing reliability has been a sig-nificant focus of research through various approaches such as task allocation op-timization, software and hardware redundancy, and performance sharing mecha-nisms. However, the issue of cascading failures poses a challenge to the reliabil-ity of such systems, as it involves a feedback loop leading to a complete system failure. This paper presents a comprehensive analysis of a distributed computing system that incorporates performance sharing, aiming to address the problem of cascading failures and improve system reliability. A model for evaluating the re-liability and robustness of the distributed system with cascading failures is pro-posed. By utilizing graph networks and simulation techniques, the dependability of the system is assessed, considering various attack and defense strategies. The research findings indicate that defending against cascading failures yields higher network robustness compared to inducing failures. Moreover, a strong correlation between robustness and reliability is observed, implying that enhancing the ro-bustness of the network leads to increased reliability of the distributed computing system. The proposed methodology and findings contribute to the

development of higher-quality distributed systems, particularly in the face of cascading failures. The research outcomes have significant implications for various applica-tions reliant on distributed systems, enhancing their performance and resilience.
Keywords: Distributed computing system, cascading failures, performance sharing, reliability, robustness, graph networks, simulation, network robustness..

40. A State-of-the-Art Review on Genetic algorithm and Particle Swarm optimization

Paper Id 87

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Abstract: The great interests of genetic algorithms (GA) and particle swarm optimization (PSO) in this study are chosen for psychoanalysis. This analysis will facilitate the fresh and serious researchers to offer a wider revelation of GA and PSO. The use of GA and PSO and the hybridization of GA and PSO in the previous some years to tackle different types of problems are presented with a brief description. More specially, this paper presented the existing research published between 2015 and 2022 on applications of GA and PSO and hybridization, improvement, and variants of GA and PSO in a different field. The real life application of GA and PSO in the fields of health care, environment, industry, commerce, and smart cities is tabulated. The advantages and disadvantages of GA and PSO are also discussed. The future research directions in the area of parameters for GA and PSO, population size, and hybridization of GA and PSO are also presented. This review will be supportive for interested and future investigators in the area of GA and PSO.
Keywords: Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Hybridization.

41. MineralVisio: A Deep Learning based Mineral Identification System

Paper Id 88

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Abstract: Mineral identification is a very challenging task. Existing approaches are expensive, involve human expertise and therefore are prone to errors. To overcome this challenge, deep learning technique is utilized to identify the minerals into relevant categories. The advantage of using Deep learning approach is that it is cost effective and also reduces

the error. The MineralVisio application as proposed in the research aims to create an identification tool for Silicate class of minerals that has 7 minerals, using Convolutional Neural Network (CNN) and utilizing the VGG16 and VGG19 architectures. The results of the study show that VGG16 had better accuracy as compared to VGG19. Here, along with the overall accuracy of the model, precision, recall and F1 score of each category has been computed to evaluate the performance of the model. Based on the findings, the research suggests the use of VGG16 for mineral identification in the mining industry. Overall, the MineralVisio initiative can be extended to several other mineral classes. It has the potential to revolutionize mineral identification, dramatically improving the mining industry's efficiency and accuracy.
Keywords: Mineral Identification, Classification, Convolutional Neural Network, VGG16, VGG19.

42. A Hybrid Approach for Depression Classification using BERT and SVM

Paper Id 98

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Abstract: Depression is a major global mental health issue that impacts millions of individuals. The complexity of depression symptoms makes it challenging to diagnose and treat effectively. Existing methods for depression diagnosis, such as clinical interviews and questionnaires, can be time-consuming, costly, and subject to human error. Therefore, there is a need for automated methods that can accurately and efficiently detect and classify depression from written long text. The objective of this research is to develop a machine learning algorithm that can accurately differentiate between individuals with depression and those without by analyzing their written language. To achieve this goal, a multi-model approach was used, combining Bidirectional Encoder Representations from Transformers (BERT) for feature extraction and Support Vector Machines (SVM) for classification. The dataset used for this study was the Reddit mental health dataset, which comprised 35,708 posts categorized as "not depression" or "depression", with their labels transformed into binary format (0 and 1 respectively). These sentences are long texts. Our approach involves using BERT to extract contextualized features from the text and SVM to classify the depression status based on those features. The performance of the model is assessed using metrics including accuracy, precision, recall, and F1 score. The results demonstrate that the multi-model technique using BERT and SVM can effectively classify depression in text with high accuracy around 92%, precision is 92.05%, recall is 91.94% and f1-score is also 92%. For academics and professionals involved in mental health and natural language processing, this paper offers useful insights.
Keywords: Mental Health, Depression, Machine Learning (ML), Natural Language Processing, Multi Model, BERT, SVM, Confusion Matrix.

43. Enhancing Word Sense Disambiguation Performance on WiC-TSV Dataset using BERT-LSTM model

Paper Id 99

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Abstract: WSD is a significant area of research in Natural Language Processing, as accurate disambiguation of word senses is crucial for many applications including text categorization, sentiment analysis, information retrieval, and machine translation. WiC (Word-in-Context) Target Sense Verification (TSV) dataset, a benchmark dataset for WSD is used. The paper proposes encoder decoder models employing transformers and other deep learning architectures, to perform the job of word sense disambiguation have been presented and examined in this study. BertTokenizer is used for tokenization purpose. The encoder model is constructed using a pre-trained BERT as a transformer. The decoder model uses LSTM, dense layers, and custom layers. To figure out the discrepancy between the expected probabilities and the actual binary labels, one uses the binary cross-entropy loss function. To reduce the loss, the Adam optimizer is employed. To enhance the deep learning-based models, experimental techniques, including word emphasis, data augmentation, and thresholding are used. Grid search hyperparameter tuning technique is used to find the optimal hyperparameters. The accuracy obtained for WiC-TSV dataset for BERTLSTM model, BERT-LSTM model with word emphasis, BERT-LSTM model with data augmentation and word emphasis are 78.7%, 79.9%, and 80.6% respectively. This implies BERT-LSTM model with data augmentation and word emphasis gives better accuracy for WiC-TSV dataset.
Keywords: Word sense disambiguation, Data Augmentation, Natural Language Processing (NLP).

44. Improved constructive heuristics to minimize total flow-time in distributed permutation flowshop scheduling problem

Paper Id 100

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Abstract: The distributed permutation flowshop scheduling problem (DPFSP) has piqued the interest of researchers in recent years due to its applicability in real-world scenarios. In this paper, we address DPFSP to minimize total flow-time, which is a relevant and important criterion for dynamic manufacturing environment but not much discussed for this problem. Since, the DPFSP is known to be NP-hard, we focus on approximate approaches and propose two constructive heuristics based on different techniques. To evaluate the effectiveness of the proposed heuristics, we test them on a benchmark set of 720 large-sized in-stances. A comprehensive computational analysis show that our heuristics solve the problem in a reasonable computational time and perform significantly better than the best performing constructive heuristics from the literature.
Keywords: Distributed permutation flowshop, constructive heuristics, scheduling, total flowtime, idle time.

45. Technological and societal aspects of India national security

Paper Id 101

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Abstract: National security is a dynamic matter of every nation, involving protection, freedom and the good quality of life of each individual. This article discusses three components of the national security, namely energy security, cyber security and social or cultural security. Legal aspects like e-courts and e-justice are also included in the article. Supercapacitors are an emerging energy storage device which have applications ranging from the on-chip energy storage, power supply during missiles launching to hybrid energy storage systems. Cyber governance and security in the integrated world through intelligent portals and systems is essential and directly coupled to the hardware including energy storage devices. Optical chips or infrastructure are a disruptive technology and will revolutionize the future of digitization. Brain, mind and related complex organ diseases can be treated with better and faster analysis due to the improvements in high-performance computing and cognitive science. Social and cultural security is a complex topic in a diverse democracy like India Caste based census, religious assets based unity and policy formulation have been discussed in the present article. The present article surveys and gives insights related to the above aspects of the national security requiring urgent technological intervention for next generations.
Keywords: Supercapacitor, e-governance, optics.

46. Unleashing Deep Reinforcement Learning: A Promising Alternative for Imbalanced Dataset Classification

Paper Id 103

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Abstract: Class-imbalanced datasets pose a significant challenge for classification tasks in supervised learning, as standard classification algorithms are designed under the assumption that the datasets have balanced class distributions. This can lead to biased models that perform poorly on minority classes. To address this challenge, several approaches have been proposed at both the data level and algorithmic level. In this research study, comparative analysis of Deep Reinforcement Learning (DRL) methods and Oversampling techniques (SMOTE, SVMSMOTE, ADASYN) along with Deep Learning (DL) algorithms have been performed on two benchmark imbalanced datasets - "Breakhis" and stroke prediction datasets. The experimentation has been carried out by taking different imbalanced ratios of 0.05,0.1,0.2, and 0.3 on the Breast Cancer training dataset and 0.05 imbalanced ratio on the Brain Stroke dataset. The comparison of DRL and Oversampling methods have been performed, and the results demonstrate that the DRL model outperformed oversampling techniques on all imbalanced ratios of the "Breakhis" dataset. For the Stroke prediction dataset, Oversampling techniques completely failed in classifying the minority class samples. These findings suggest that the Deep Reinforcement Learning algorithm presents itself as a promising alternative for imbalanced dataset classification in the medical domain and could potentially contribute to improving patient outcomes.
Keywords: Imbalanced Classification, Oversampling Techniques, Deep Reinforcement Learning.

47. MetroPT Predictive Maintenance Using Logistic Regression and Random Forest with Isolation Forest Preprocessing

Paper Id 115

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Abstract: The industry places significant emphasis on predictive maintenance, aiming to anticipate equipment breakdowns and minimize unscheduled downtime. This study

utilizes a vast dataset of sensor data to predict equipment failure by employing two well-established machine learning techniques: Random Forest and Logistic Regression. Initial data analysis involves identifying outliers and assessing their potential association with failure before creating the target variable. Model performance evaluation encompasses various criteria, including accuracy, precision, recall, and F1 score. The study's findings reveal that both the Logistic Regression and Random Forest models exhibit the capability to accurately forecast equipment failure, with the Random Forest model outperforming Logistic Regression in terms of accuracy and F1 score. These findings offer valuable insights for industries seeking to enhance their maintenance procedures and mitigate costly unexpected downtime.
Keywords: Predictive Maintenance, MetroPT, Random Forest, Logistic Regression, IQR, Cross Validation, Isolation Forest.

48. Pothole detection of road pavement by modified MobileNetV2 for transfer learning

Paper Id 120

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Abstract: Potholes are a type of pavement problem, locating potholes is important. Asphalt road repair and maintenance are essential for public safety. When planning preventive repairs for an infrastructure such as roads, it is crucial to first identify how good is the condition of the pavement. The damaged road has potholes, cracks, lanes, and shading. In this study, we have studied pothole detecting methods and created an accurate modified MobileNetV2 (MMNV2) methodology. This research proposes a modified MobileNetV2 model for feature extraction, image classification, and detection utilizing deep learning (DL) by implementing the transfer learning technique. Added five different layers to a pretrained MNV2 model to increase the model performance and classification accuracy for normal and pothole image identification. This approach developed a python model trained and evaluated on 1,300 pavement images. On combining transfer learning with deep neural network (DNN) design, this study results showed our MMNV2 method proved effective. This proposed modified MobileNetV2 model obtained 99.23% accuracy and 0.77% error rate with lesser parameters than previous models.
Keywords: Pothole Detection, Deep Learning, Deep Neural Network, Modified MobileNetV2, Transfer Learning.

49. Malware Classification Using Deep Learning Approaches

Paper Id 121

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Abstract: Detecting malware poses significant challenges due to the evolving sophistication of malicious software. Conventional detection techniques like signature-based methods and behavioral analysis have experienced diminishing effectiveness. To address this, a groundbreaking deep learning framework called Decomposition Training and Classification Network (DTC-Net) is introduced in this work. DTC-Net consists of three phases: feature extraction utilizing the VGG16 backbone network, data simplification through class decomposition, and classification using fully connected layers. Furthermore, a class composition layer enhances the accuracy of final categorization. Through extensive experimentation, the proposed DTC-Net demonstrates impressive performance, surpassing other state-of-the-art methods. It achieves remarkable results, including an F1-score of 95.364%, accuracy of 98.545%, precision of 94.737%, and recall of 96%. This research showcases the effectiveness of DTC-Net as an integrated and comprehensive deep-learning solution for accurate malware family classification.
Keywords: deep learning, malware detection, security model, artificial intelligence.

50. Identifying Outliers using Voronoi Circles

Paper Id 123

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Abstract: A new outliers detection technique has been proposed in this paper in context of Computational geometry. Empty circles, Voronoi diagram, and convex hull are used in this proposed new technique for anomalies detection. In context of empty circles, it is a fact that no data points are there inside the boundary of the circle. This fact played a vital role to find the outliers. It is obvious that most of the outliers reside within the circumference of the largest empty circle (LEC). We revealed that the circumference points of LEC and boundary points of the convex hull are likely to be the outliers of data sets. It is well known that the K-nearest neighbor (KNN) outlier finding method is very popular in the context of outliers finding. However, till now computational geometry has not been used in state-of-the-art outlier detection models. In this work, for the first time, we used computational geometry to detect outliers. Our algorithm is successfully implemented with PYTHON using various benchmark data sets. The experimental results establish the novelty and validity of the proposed method over the standard KNN technique.
Keywords: Computational Geometry, Empty Circles, KNN, Outliers.

51. Brain Tumor Detection by Fusion Techniques

Paper Id 124

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Abstract: Brain tumors are a serious medical condition, and their early detection is crucial for successful treatment and patient survival. Brain tumors can be detected and located using medical imaging techniques including MRI, CT, and PET. Brain tumor identification has been automated using machine learning techniques. However, they face several challenges, including image variability, small dataset size, inter-observer variability, and computational complexity. Researchers have created a variety of methods to solve these problems, including transfer learning, data augmentation, and ensemble learning. The study established a brand-new paradigm for classifying brain tumours from MRI scans. The proposed framework consisted of several stages, including noise removal, segmentation, data augmentation, feature extraction, and a network ThinNet15 classification network. Accuracy, precision, recall, and F-score were just a few of the performance criteria used to assess the framework and compare it to comparable models already in use. The outcomes demonstrated that the suggested framework outperformed the other models, achieving a remarkable accuracy percentage of 98.8372%. The results suggest that ThinNet15 is a promising architecture for image classification applications with limited resources. This research holds great potential for improving the diagnosis and treatment of brain tumors, with the use of non-invasive MRI imaging techniques.
Keywords: Brain Tumor Detection, Healthcare Application, Deep Learning Network, Biomedical, Disease Detection.

52. CNN-Based Model for Facial Expression Recognition using FER 2013 Dataset

Paper Id 125

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Abstract: Emotion Recognition is the idea or concept of determining various emotion states by building automated artificial intelligence systems. For the past many years, researchers from diverse fields such as computer science, anthropology, ethics have delved into this field and passionately work towards developing models and approaches. The primary approach to extract the emotion lying underneath is to recognise the facial emotion. With

the concept of Convolutional Neural Networks (CNN),different models have been trained to identify this aspect. This area has applications in diverse fields like health, safety, traffic, etc. We present in this project a CNN based model which is able to identify the seven basic emotions like anger, disgust, fear, happiness, sadness, surprise, and neutral.FER-2013 has been taken as the dataset and divided into training, testing, and validation set.After preprocessing the data, a CNN model is built and when tested against the dataset, is found to be giving satisfactory results with decent accuracy.

Keywords: Convolutional Neural Network (CNN), Deep Learning, Facial Emotion Recognition, Confusion Matrix.

53. Fault Prediction in Software Systems Using Saliency Maps in Machine Learning

Paper Id 127

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Abstract: Machine Learning exhibits an immense affluent pace in numerous compound works, analysis represents it may malfunction in extremely unanticipated circumstances. Increasing machine learning tools in protective overcritical production sources and escalating in estimating powerful prototypes and then evaluating non-failure possibility within the machine learning approach. This work is a depiction to train an epitome model to forecast a failure rate and to outlook the prime representation of flaws for putting in examples on the basis of their saliency map. Here, the PilotNet model is executed and assesses the early results of the failure predictor layout outwards on the emancipated automobile steering hand-held servo system as an instance of protective-complex applications.

Keywords: Fault Prediction, PilotNet, Saliency map, Autonomous Vehicle, Artificial Intelligence, Machine Learning, Deep Neural Networks.

54. On Two-Dimensional Approximate Pattern Matching Using Fuzzy Automata

Paper Id 130

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Abstract: Pattern matching has been extensively studied in the last few decades, owing to its great contribution in various fields such as search engines, computational biology, etc.

several real-life situations require patterns which allow ambiguity in specified positions. In this paper, one dimensional and two dimensional approximate pattern matching models have been constructed using fuzzy automata. The similarity function used in fuzzy automata enables the occurrence of all exact and similar one dimensional and two dimensional patterns. This kind of searching approximate patterns is not possible with regular search models. The time complexity of the proposed algorithm has also been analysed.
Keywords: Pattern Matching, Fuzzy Automata, Array Matching, Position Specific Approximate Pattern Matching.

55. Home Automation Using a Cloud Environment

Paper Id 134

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Abstract: Home automation is an exciting field allowing people to remotely control various household devices. This project uses a cloud environment and NodeMCU to achieve home automation. NodeMCU is an open-source firmware and development board based on the ESP8266 Wi-Fi module. It is widely used in Internet of Things (IoT) projects and is compatible with various sensors, actuators and other devices. A cloud platform is used to manage and control the home automation system. Many cloud service providers include AWS, GCP, Microsoft Azure, etc. The cloud platform offers various services such as databases, communication queues or storage, which can be selected according to the requirements. Use cases are defined and the system is designed accordingly. This includes the equipment used in the project. Sensors such as temperature, humidity, light, motion, or door/window sensors can be used to collect data. Devices such as relays, motors or LEDs are used to control devices. System implementation is done by writing NodeMCU code, configuring cloud services and integrating devices. The system has been tested, debugged and optimized to improve performance. System maintenance is essential after commissioning. This includes updating the software, fixing bugs or adding new features. The system may need to scale as additional devices or users are added.
Keywords: Home Automation, Cloud Computing, Centralized Control, Real-Time Access, Scalability, Compatibility, Cybersecurity, Smart Home, Energy Efficiency, Security, Convenience, Node-MCU (ESP8266), Arduino.

56. Detecting URL Phishing using BERT and DistilBERT Classifiers

Paper Id 136

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Abstract: In this paper, we investigate the use of transformer models, especially BERT and DistilBERT, for phishing URL detection. Such malicious URLs are a crucial part of phishing attacks, which trick users into disclosing personal information by sending them messages that seem to be from a trusted source. We suggest a novel method for URL phishing detection that uses developments in transformer-based natural language processing models. The primary goal of this study is to investigate the transformer-based models BERT and DistilBERT for the problem of URL phishing detection. The models' excellent effectiveness in detecting phishing attempts highlights their potential for use in cybersecurity. The DistilBERT model fared better than its competitors, exhibiting exceptional Accuracy, Precision, Recall, and F1-score metrics. The success of using cutting-edge NLP methods, particularly transformer models, to improve phishing detection systems.
Keywords: URL Phishing, DistilBERT, Transformer, Cybersecurity, Phishing Detection, Machine Learning, Deep Learning, Natural Language Processing.

57. An Efficient Credit Card Fraud Detection Using SMOTE Under Machine Learning Environment

Paper Id 137

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Abstract: Credit card fraud detection refers to the process of identifying fraudulent transactions made using a credit card. Credit card fraud can cause significant financial loss to both cardholders and financial institutions. If fraudulent transactions are not detected and stopped promptly, they can result in unauthorized charges and potentially lead to identity theft or credit card fraud rings. Therefore, to stop these frauds we need an important fraud detection system that detects them directly. This paper gives a comparative study before and after applying the SMOTE technique. In this paper, we've applied machine learning algorithms on an imbalanced dataset such as Random Forest Classifier, CatBoost Classifier, and Decision Tree using Synthetic Minority Oversampling Technique (SMOTE). So these models are applied to the data and the model performance is estimated based on quantitative measures such as accuracy and AUC ROC score. The research shows that using SMOTE accuracy of the Random Forest Classifier is 0.9996, CatBoost Classifier is 0.9979 and for Decision Tree the accuracy is 0.9926.
Keywords: Credit Card Fraud Detection (CCFD), CatBoost Classifier, Decision Tree, Synthetic Minority Over-sampling Technique (SMOTE), Random Forest Classifier (RFC).

58. In Hospital Mortality Risk Prediction for HF Patients Using SMOTE and Various Machine Learning Algorithms

Paper Id 138

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Abstract: Accurate prediction of mortality in ICU patients is crucial for timely intervention and appropriate medical services. Although various severity scores and machine learning models have been developed, accurate prediction of mortality remains challenging. This study aimed to address this challenge by validating the performance of commonly used classification models, namely Linear Discriminant Analysis, K-Nearest Neighbor, XG Boost, Decision Tree, and Random Forest, along with the Synthetic Minority Oversampling Technique (SMOTE) for predicting ICU mortality. The study utilized a comprehensive dataset consisting of 1177 cases from the MIMIC III database, which encompasses a wide range of patient characteristics and clinical variables. technique for predicting ICU mortality. The study was conducted on 1177 cases from the MIMIC III dataset. Results showed that the proposed models outperformed state-of-the-art approaches with 100% accuracy, F1 score, precision, recall, and AUC-ROC. This study demonstrates the effectiveness of these models for predicting ICU mortality.
Keywords: Classification, Decision Tree, Ensemble Learning, Heart Failure Prediction, Synthetic Minority Oversampling Technique (SMOTE).

59. A Comparative scrutiny on Machine Learning and Deep Learning Approaches for Fraudulent Transaction Discovery in Credit Card Data

Paper Id 139

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Abstract: Over the last few years, use of credit-card for online purchase has increased exponentially, which resulted in an increase in fraud related to it. It is very difficult to detect fraudulent transactions from the banking transactions. This paper presents a comparative analysis between machine and deep learning techniques for detecting fraudulent transactions in credit card data. To develop a better method for detecting fraud, we use actual "credit card" data and apply a DL model called Long and Short-Term Memory (LSTM). The efficiency of this approach is gauged with Logistic Regression and eXtreme Gradient Boosting algorithms of Machine learning. Experimental evaluation reveals that the proposed LSTM-based approach achieves the excellent outcome in terms of ROC-AUC (100%), Recall (100%), F1-score (99.97%) and accuracy (99.97%), precision (99.95%), surpassing the other methods. By utilizing the strengths of LSTM, which is particularly skilled at recognizing patterns and relationships over prolonged intervals in sequential data, the proposed approach effectively detects fraudulent transactions. This research demonstrates how DL techniques could improve fraud detection systems and provides valuable insights for creating effective models and improving security measures in real-time financial transactions. Study makes a great impact to the field of credit card fraudulent transaction detection by offering a comparative scrutiny of ML techniques with DL technique.
Keywords: Machine learning, Fraudulent transaction detection, Deep learning, Confusion Metric.

60. Ensemble Multi-Label Feature Selection using Weighted Harmonic Mean

Paper Id 140

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Abstract: The volume of data is expanding dramatically due to the rapid growth of technology and the digital revolution. As a result, feature selection has evolved into an important preprocessing task. However, each feature selection process has its own set of advantages and disadvantages. Ensemble approaches have been established to improve the stability and robustness of feature selection algorithms. We present a novel ensemble feature selection approach for multi-label data based on the weighted harmonic mean. To assess its performance, we use seven real-world datasets to compare our proposed method with four existing algorithms. The findings show that our strategy outperforms the others. In addition, we perform a stability analysis to show the robustness of our proposed ensemble technique. This analysis adds to the proof of our method's efficacy and reliability.
Keywords: Ensemble feature selection, Multi-label, Weighted harmonic mean, Feature ranking.

61. Mathematical Modeling of AIDS Prevention Measures Due to Opportunistic Infections

Paper Id 141

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Abstract: A study says that in most cases, if an HIV patient gets adequate treatment, the chances of transferring them to AIDS are reduced. In our paper, we have studied those less likely chances, where even after treatment; an HIV patient can have AIDS. This fact is not well described in earlier papers. Therefore, we have constructed a new and very little studied mathematical model, SITA, to study the dynamics of the infectious virus HIV, which can turn into AIDS disease. A system of nonlinear differential equations for the virus HIV causing AIDS disease by the SITA mathematical model is proposed. Transferring from HIV to AIDS is divided into four subclasses: Susceptible (S), Infected with HIV (I), Treated (T), and AIDS patients (A). HIV infection can be transmitted through vertical transmission in newly born infants through their mothers, which has been studied in our model. The present paper also includes the scenario where even after treatment, HIV patients can advance to AIDS. Local stability for disease-free equilibrium is studied. Local stability and global stability for Endemic equilibrium are discussed. A numerical simulation carried out establishes the fact that if the interaction between susceptible and infected increases, the infection spreads faster. $k1$ parameter showing the dynamics of the rate leaving the treated class and entering the AIDS class. The factors can be the other opportunistic infections and somehow the avoidance of taking treatment.
Keywords: HIV, AIDS, SITA model, Lyapunov function.

62. Enhancing Industry 5.0: Leveraging Data Analytics with IBM InfoSphere DataStage and Qlik Sense for Sustainable Entrepreneurship

Paper Id 146

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Abstract: This research paper explores the potential of enhancing Industry 5.0 through the integration of data analytics tools, specifically IBM InfoSphere DataStage and Qlik

Sense, for sustainable entrepreneurship. The study focuses on analyzing restaurant data from the popular platform Zomato to demonstrate how data analytics can drive sustainable practices in the food industry. By utilizing IBM InfoSphere DataStage for data integration and transformation and Qlik Sense for visualization and insights, the paper showcases practical examples and case studies of how businesses can optimize their operations, reduce environmental impact, and promote sustainable entrepreneurship in the context of Industry 5.0. The paper's findings underline the importance of employing data analytics to drive sustainable innovation in the restaurant industry, and its implications can be extended to other sectors as well.
Keywords: Data Analysis, ETL, Analytics, Visualization, Industry 5.0.

63. Power Quality Improvement of Grid Tied Hybrid Power System by Using ANFIS Controller

Paper Id 147

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Abstract: The primary objective of this paper is to inspect the fuzzy controller for MPPT in PV system integrated with a wind system and linked to the grid using a DC-DC converter and PWM rectifier. To address power quality issues, the proposed FUZZY MPPT algorithm is expected to provide precise and efficient MPPT tracking, thereby reducing power fluctuations in real-time applications. The use of a flyback converter with a single switch is expected to improve the system's efficiency. Moreover, the paper suggests using a multilevel inverter topology with multicarrier reference PWM technique to convert DC to AC with fewer power switches with a higher count of voltage stages at the output. The intended system will be simulated in MATLAB and compared with existing PI and Fuzzy controllers. The study will also validate the assessment of the flyback converter among the FUZZY set of rules and ANFIS controller through grid synchronization. The converter and inverter's performance will be tested using a DSPIC30F2010 microcontroller to ensure their proper operation.
Keywords: Asymmetrical Cascaded H-Bridge Multilevel Inverter (ASCHBMLI), MPPT (maximum power point tracking), ANFIS (adaptive neuro-fuzzy inference system), flyback, FLC (fuzzy logic control), and ANN (artificial neural networks).

64. Crypto-Encoding Multiple Medical Image Watermarking Technique for Electronic Health Record

Paper Id 151

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Abstract: Advancements in the Internet and communication technology has provided new ways to store, access, and distribute data in digital format. But these advancements have also introduced new challenges to protect information circulating over networks. One of them is to avoid the risks of inappropriate use of medical information circulating over networks. The transfer of medical information without any security techniques over the internet imposes a very low solitude to the patients and hence, the main objective of this work presented in this paper is to protect patient's Electronic Health Records (EHR) and scanned images from third party access and at the same time, it is very important to avoid degradation of medical information to avoid wrong decisions by the expertise clinicians, which is a major challenge for most of the researchers. And even though most of the medical providers are honest, few illegally increase the size of their bank accounts through fraudulent claims. On the medical basis has been reported worldwide, presenting the agencies with fake data of medical reports. Therefore, there is a need for systematic development of multiple watermarking techniques and their complete assessment through defining the parameter property such that they can offer a better complementary solution for achieving improved security. In the present work, a hybrid medical image watermarking system is proposed to provide authorization, authenticity, availability, confidentiality, data integrity, reliability, and reversibility of the patient information by maintaining a good quality of medical images in the health care systems.
Keywords: EHR, Multiple watermarking, Security, Reversibility, Integrity.

65. Metaheuristic and Exact Approaches for Cost Optimization in Multi-Echelon Multimodal Transportation Network

Paper Id 153

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Abstract: This study develops a framework for a multimodal transportation system comprising two different modes of transportation – airways and roadways within a multi-echelon supply chain network in B2C e-commerce platforms. In this study, an optimization model based on mixed integer quadratic programming was formulated that objectives to minimize the overall transportation cost for B2C e-commerce supply chain networks. The metaheuristic technique incorporating two varied approaches – exact optimization and a genetic algorithm was employed to provide the solution for this proposed optimization model of multimodal transportation system. This metaheuristic technique-based optimization model was tested on simulated data sets created to develop and analyse different case scenarios for the stated multimodal transportation problem. The comparative analysis of these two solution approaches is provided from the perspective of experimental performance as well as theoretical consideration. The findings of the study can be applied to multi-echelon multimodal transportation networks in real practices targeting overall cost reduction and profit maximization of the logistic services for B2C e-commerce platforms.
Keywords: Multimodal Transportation, E-commerce, Multi-Echelon Supply Chain, Metaheuristic Techniques, Exact Optimization, and Genetic Algorithm.

66. Successive Iteration Approach for Solvability of Second Order Semilinear Fuzzy Systems

Paper Id 154

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Abstract: The contribution of this research is to introduce a novel framework for determining the existence and uniqueness of a specific type of second order semilinear fuzzy systems (SOSFSs). The findings are derived through the implementation of the successive iteration approach and the theory of fuzzy numbers. Such numbers are characterized by normal, convex, upper semicontinuous, and compactly supported interval values in the domain EN. In order to showcase the practicality of the developed methodology, an illustrative example is presented.
Keywords: Fuzzy number, SOSFS; Successive iteration approach, Fuzzy solution.

67. Multi-Criteria Decision Making approach for Forest Fire Management: A case study of Uttarakhand

Paper Id 155

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Abstract: Forest fire is one of the greatest calamities that arise throughout the summer in Uttarakhand. Studying the key elements of a forest fire prevention strategy can assist to prevent long-term, severe environmental fire damage. In addition, forest fire management can be done by understanding the correlation of several relevant criteria responsible directly and indirectly for the occurrence of forest fires. The current study incorporates multi-criteria decision-making method (MCDM) techniques such as TOPSIS, Entropy, and CRITIC to examine the most effective criteria responsible for the forest fire of Uttarakhand province, India. As per results obtained from TOPSIS + EWM and TOPSIS + CRITIC method are same. Criteria C3, C16 and C2 found to be more effective while criteria C11, C10 and C8 depicted as less effective criteria for forest fire management.
Keywords: Multi-criteria decision making, forest fire, TOPSIS, sustainable development, sustainable environment.

68. Prediction of Breast Cancer Grade Using Explainable Machine Learning

Paper Id 156

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Abstract: The standards for the survival analysis of breast cancer are Cox Proportional Hazards and Kaplan Meier Survival model. Machine Learning has generated outputs at least, better than classical techniques, but they are ignored due to their lack of explainability and transparency, which are crucial for their acceptance in clinical settings for the prognosis and diagnosis of Breast Cancer. Explainable Machine Learning is a set of methods and strategies that allow a human to comprehend and believe machine learning results. In this study, the performance of the Cox Proportional Hazard classifier and the Extreme Gradient Boosting classifier in predicting the survival analysis is compared using microarray gene expression data from the National Center for Biotechnology Information. Results show that Extreme Gradient Boosting performs better than traditional Cox Proportional Hazard regression (c-index: 50.4), with a cindex of 97.7. The forecasts generated by the models are additionally explained using Shapley Additive explanation values. Specific genes had an impact on both the models' predictions and their intuitiveness. Finally, Extreme Gradient Boosting can generate explicit knowledge about how a model generates its forecasts, which is crucial in boosting confidence and encouraging the adoption of innovative machine-learning techniques

for the prognosis and diagnosis of breast cancer.
Keywords: Breast cancer, machine learning, explainable, Kaplan Meier, Cox proportional hazard, survival, extreme gradient boost.

69. Performance Analysis of Indian States and Union Territories for Covid-19 Management through DEA and Machine Learning

Paper Id 157

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Abstract: In this study, an analysis has been performed to assess the performance of 28 states and 8 union territories (UTs) of India against COVID-19 during the years 2020 and 2021. The study is done in three phases; first of all, the analysis has been done through Exploratory Data Analysis (EDA), to get general information about the data; in the second phase, the super-efficiency-data envelopment analysis (SE-DEA) model has been applied to evaluate the performance of states and UTs, and to segregate them into two classes: efficient and inefficient. Finally, in the third phase, an attempt is made to establish a link between the DEA and 5 supervised machine learning techniques viz. Logistic regression (LR), K nearest neighbors (KNN), Support vector machine (SVM), Naïve Bayes (NB) classifier, and Decision tree (DT) for analysis of the results.
Keywords: COVID-19, Super efficiency, supervised machine learning, literacy rate, India.

70. A Novel Approach for Traffic Rules Violation Detection Using Deep Learning

Paper Id 158

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Abstract: Traffic rules violation is a serious crime that can also lead to accidents if not followed. There is a possible occurrence of human errors (corruption, unclear vision due to

weather conditions) while monitoring the traffic, so Deep Learning models present a way to monitor traffic rules for 2-wheelers if the driver doesn't wear a helmet or triple rides. Within the context of this paper, we propose a model which can automatically detect and classify Indian vehicles from video recorded by a surveillance camera during frames extraction using the YOLOV3(You Only Look Once) model which consists of Darknet-53 as an architectural backbone that consists of 53 Convolutional Neural Network (CNN) layers. After performing object detection with vehicle classification, the model is supposed to segregate all the two-wheelers and perform helmet detection. For helmet detection, we proposed to build a custom trained model from two variations of YOLO models - YOLOV3 proposed by AlexeyAB Darknet, and YOLOV8 proposed by Ultralytics using transfer learning. During the comparative analysis, we found that YOLOV3 provides a mean Average Precision (mAP) of 55.86% with an average precision of 82% for a confidence threshold of 0.25, and the latest updated version of the YOLOV8 model which uses CSPDarknet53 produced an mAP of 96.09% with an average precision of 96.90% for SGD optimizer and initial and final learning rate of 0.01 and batch size of 8. After detecting helmets from two-wheelers, automatic number plate recognition is performed using a similar YOLOV3 model followed by image super resolution using ESRGAN Enhanced Super-Resolution Generative Adversarial Networks) followed by Optical Character Recognition (OCR) using the tool Pytesseract. The deep learning models trained for performing object detection and segmentation are developed using transfer learning methodology to enhance the performance of pre-trained YOLO weights files to perform detections with lesser computational costs.

Keywords: Traffic Violation, Helmet Detection, Deep Learning, YOLOV3, YOLOV8, ESRGAN, Pytesseract, Darknet.

71. Integrating Thermal Mechanisms with Machine Learning for Accurate State of Health Estimation in Lithium-Ion Batteries

Paper Id 160

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Abstract: Lithium-ion batteries have been a crucial contributor to the development of e-mobility, due to their high energy density, extended cycle life, and commercial needs. As efforts towards creating an eco-friendlier transportation system continue, lithium-ion batteries are expected to maintain their significance as a crucial component in achieving a sustainable future. However, Lithium-ion battery performance is significantly impacted by numerous factors including factors like thermal stress. Accurate estimation of state of health provides quantification of degradation caused to the battery. The ability of machine

learning (ML) techniques to analyze the behavior of nonlinear systems has received increasing attention. With the rise of big data and cloud computing, there is significant potential for ML technology to be utilized in the calculation of battery state of health. Purely Data Driven models cannot accommodate in-depth analysis of ageing mechanism. It is therefore essential to integrate machine learning techniques with physical mechanisms that affect battery health. This paper focuses on this existing challenge by proposing a novel method for improving machine learning model accuracy by inducting thermal stress component. In this paper, comparative analysis of nine different machine learning algorithms have been performed using two methodologies, results show significant improvement in the performance metrics when thermal stress inducted.
Keywords: Artificial Intelligence (AI), Machine learning (ML), Artificial neural network (ANN), State of health (SOH), Electric vehicle (EV).

72. CNN-Based Audio Word Comparison: Exploring MobileNet For Similarity Assessment

Paper Id 161

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Abstract: Deep learning approaches are heavily invested to develop the objective to improve speech communication and impairment problems. One such approach is to calculate the similarity between two audio files with the use of a Mel spectrogram and a convolutional neural network (CNN). The distinctive characteristics of a speaker's speech must be precisely identified to diagnose the difference in a spoken word. Mel spectrogram provides a time-frequency representation of the audio signal and the CNN-based MobileNet model is used to learn features from these time-frequency representations. To calculate the similarity score of audio files 30 words have been taken for the task to train the MobileNet model from the Google speech command data set version1. The model has been tested by real-time data collected by considering some benchmarks to prove whether this model is suitable for finding similarity scores in spoken words or not.
Keywords: Convolutional Neural Network, Mel spectrograms, similarity score, time-frequency representation.

73. A Novel Bi-Objective Credibilistic Mean-Semivariance Portfolio Selection Problem with Coherent Triangular Fuzzy Numbers

Paper Id 164

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Abstract: This study uses an extension of traditional triangular fuzzy numbers, called coherent triangular fuzzy numbers, to model the portfolio selection problem. The work proposed in this paper begins by introducing an analytical expression of credibilistic semivariance of coherent triangular fuzzy numbers. This expression is then used to formulate a novel bi-objective Mean-Semivariance (M-Sv) portfolio selection model incorporating several practical constraints, such as capital budget, bounds on assets allocations, cardinality, and no-short selling constraints. The proposed bi-objective M-Sv Model is solved using an MOEA with a built-in repair mechanism. An empirical analysis is carried out using monthly stock return data of 18 distinct stocks selected from the Nifty 50 Index of NSE, Mumbai, India, to show the performance stability of the model. The obtained results are compared with the considered benchmark of the Nifty 50 Index.
Keywords: Credibility Measure, Coherent Triangular Fuzzy Numbers, Mean-Semivariance Model, Portfolio Selection, Multi-Objective Evolutionary Algorithms.

74. Shuffled Flamingo Search (ShFSA) Algorithm

Paper Id 165

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Abstract: The Flamingo Search Algorithm (FSA) is a recently developed Nature Inspired (NI) metaheuristic optimisation algorithm inspired by Flamingos movement and foraging behaviour. FSA has depicted fine improvements in the convergence speed and solution quality of many standard NI algorithms. Since many Nature Inspired algorithms have shown improvements in results by hybridizing their exploration or exploitation heuristics with other NI heuristics, this paper proposes a novel hybridized Shuffled Flamingo Search Algorithm (ShFSA) which combines the exploration pattern of FSA with exploitation pattern of SFLA (Shuffled Frog Leaping algorithm). The proposed algorithm is tested on various unimodal,

multimodal and fixed dimensional bench marks functions to validate the efficiency. Detailed comparative analysis of generated results demonstrate that hybridized ShFSA has shown significant improvement in convergence speed and solution quality as compared to traditional FSA in number of standard functions.
Keywords: Optimization, Shuffled Frog Leap Algorithm, Flamingo Search Algorithm, Nature Inspired Algorithms, Swarm Intelligence.

75. Speech to Speech Translation using Transformer Neural Network

Paper Id 166

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Abstract: Speech-to-speech translation is a technology that allows peo- ple to speak in one language and have their words automatically trans- lated in another language. It can be used to facilitate communication between people who speak different languages, and it is often used in ap- plications such as language translation applications, language translation devices, and translation software for businesses and organizations. It can be useful in a variety of situations, such as traveling to a country where you don't speak the native language and communicating with people who speak different languages in a business or social setting, or helping peo- ple who have hearing problems to communicate with people who speak a different language. It can also be used in education and research to facil- itate language learning and cross-cultural communication. The modern times have witnessed a huge leap in the field of Natural Language Pro- cessing (NLP) due to the development of deep learning models like BERT (Bidirectional Encoder Representations from Transformer), GPT (Generative Pre-trained Transformer), GPT-2, GPT-3, ROBERTa (Robustly Optimized BERT Approach), T5 (Text-to-text Transfer Transformer), DistilBERT etc. This paper proposes a simplistic approach for Speech to Speech translation using a TNN (Transformer Neural Network) which is based on an Encoder-Decoder architecture and makes use of attention mechanism.
Keywords: BERT, GPT, ROBERTa, TNN, T5.

76. Stock Price Prediction Using ARIMA, LR and LSTM

Paper Id 169

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Abstract: Stock price prediction is a necessary topic in economics finance which has ignited the interest of various researchers over the decade to research for better predictive models. The model ARIMA i.e., Auto Regressive Integrated Moving Average, model LSTM i.e., Long Short Term Memory and the LR i.e. Linear Regression model for the prediction of Stock prices for the current time period is on the trend for use and one of the best models of course. The model uses synthetic dataset that is a real time dataset from yahoo finance website. The models will work on the stock prices of Bank of America. This study evaluates and compares both the models using the parameters like Root Mean Square Error (RMSE) and Mean Absolute Percentage error (MAPE). The study further analyzes models for accuracy obtained for prediction of stock price. After comparison, this study suggests that even though all three models can predict stock prices to a good amount of accuracy, the Proposed model using LSTM out performs and provides better accuracy with lower error rate.
Keywords: ARIMA, Deep Learning, Linear Regression, LSTM, Machine Learning, RMSE, Stock price, prediction, Time series analysis.

77. A Novel Solution for Fuzzy Wave Equation

Paper Id 170

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Abstract: In this article, different methods are used to solve wave equations using fuzzy techniques. The wave equation represents a Fuzzy Partial Differential Equation(FPDE). Proposed three different methods, namely Fuzzy Adomian Decomposition analysis, Fuzzy Homotopy Perturbation technique, and Fuzzy Laplace Transformation. Numerical problems with two different fuzzifications were discussed with an analysis of the membership function's effect to improve the solutions.
Keywords: Fuzzy numbers, Generalized Hukuhara differentiability, Homotopy Perturbation technique, Adomian decomposition analysis, Fuzzy Laplace Transformation, Fuzzy improper integral.

78. A Hybrid Model For Rain Prediction Using Machine Learning Algorithm

Paper Id 171

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Abstract: The objective of this paper is to create an algorithm which performs better than current algorithms for rain prediction on any dataset. The proposed hybrid model is evaluated on the Delhi dataset because it was the only dataset currently easily available and other datasets quality was not promising. This study proposes a hybrid model of combination of Linear Regression (LR) with Random Forest Classifier (RFC) and Gradient Boosting Classifier (GBC) algorithms. The proposed method in this paper has preliminary data processing, feature selection, training RFC and GBC on the training data, combining their outputs, training LR on the combined predictions, and evaluating the final model's performance using metrics such as F1 score, accuracy, precision, and recall. RFC and GBC are decision tree-based algorithms that generates strong and weak decision trees, respectively. The results suggest that the proposed hybrid model outperforms the currently available individual algorithms which has 98% accuracy, providing more accurate rain predictions with 99.9% accuracy. This study's findings may have practical implications for weather forecasting in Delhi or may use other datasets, which could help government agencies and citizens make informed decisions to mitigate the impacts of rainfall.
Keywords: Gradient Boosting Classifier (GBC), GRU, Linear Regression (LR), Random Forest Classifier (RFC).

79. Quality Assessment of School Management System in India through Data Envelopment Analysis

Paper Id 172

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Abstract: The role of education is an essential part of economic growth. Education can

help build and develop the personality of the person and enhance their knowledge in various areas. Primary education teaches children the fundamental skills they need to succeed in later school years. In the present study, we identify the essential factors of the school management system using Data Envelopment Analysis (DEA). This study focuses on six criteria for successful good school management; teaching management quality, quality determinants, learning/ teacher's hrs, language policies, facilities provided, school infrastructure, and social reasons. This analysis demonstrates the impact of the overall ranking performance of the criteria and sub-criteria for the school management system.
Keywords: School, MCDM, DEA, performance, FAHP, BWM.

80. A Hybrid Approach for PV Forecasting and its Application in Energy Management Scheme of a Microgrid

Paper Id 173

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Abstract: Photovoltaic (PV) system is the most promising renewable technology. PV Forecasting is needed due to the natural variation of meteorological variables such as solar radiations and climatic conditions. For this reason, the power produced by a PV system is always non-linear. A hybrid forecasting approach has been presented in this paper. This hybrid approach is a combination of a statistical approach, machine learning approach as well as physical approach. The machine learning approach uses a single-layer and double-layer perception concept based on Artificial Neural Networks (ANN) whereas the statistical and physical approach used a data-driven formulation concept for forecasting. These data are based on historical analysis as well as they are also helpful in future forecasting. An implementation of a two-layer hierarchical model for the Energy Management System (EMS) of islanded solar Microgrid (MG) is also presented. The MG control employing the forecast module and simulation process has been discussed briefly. The whole forecasting has been done on the basis of industrial real-time data and has been simulated in HOMER pro 3.14.2 version software.
Keywords: PV forecasting, Microgrid, Energy Management Scheme, Deep Learning, Machine Learning, Artificial Neural Network.

81. Solving Geometric Programming Problems with Laplace Uncertainty Distribution

Paper Id 174

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Abstract: The geometric programming technique is widely recognized as an effective optimization tool for solving nonlinear optimization problems in modern times. While the conventional geometric programming problem assumes precise coefficients for each term in the objective and constraint functions, real-world scenarios often involve uncertain coefficients. To address this issue, we propose a chance-constrained geometric programming problem within an uncertain-based framework, accounting for the uncertainty in these coefficients. Specifically, we employ the Laplace uncertainty distribution to characterize this uncertainty. Our primary focus in this study is the development of a method that can establish an equivalent crisp geometric programming problem corresponding to the uncertain geometric programming problem. To validate our proposed method, we present a numerical example. Furthermore, we demonstrate the efficiency and efficacy of our approach through its application in an inventory model.
Keywords: Geometric programming, Laplace uncertainty, Inventory.

82. Simulation of Data Flow Diagram using Coloured Petri Net

Paper Id 175

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Abstract: A Data Flow Diagram (DFD) is representation of flow of data, specification of requirements and to model a system in System Development Life Cycle (SDLC). The Coloured Petri Net (CP-Net) is a mathematical and graphical modeling language used to design, simulate and verify the system with token values attached. This paper presents the transformation of DFD into CP-Net with addition of token values with specific color to include the behavior property in the DFD. The simulation process of static DFD is shown with the case study of train ticket reservation system by using CP-Net model and tokens and colors of values between transitions.
Keywords: Data Flow Diagram (DFD), Coloured Petri Net, Simulation.

83. An ecologically sustainable omnichannel fresh food distribution model considering freshness-keeping effort and carbon emissions

Paper Id 176

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Abstract: This paper proposes an economically and ecologically sustainable omnichannel fresh food distribution network considering freshness maintenance and their interplay with food quality loss. The study investigates strategic investments in freshness maintenance for competitive advantage in the presence of vehicular carbon emissions due to food miles. To this aim, a comprehensive mixed integer nonlinear programming model that captures a complex three-tier multi-echelon structure that contains various omnichannel distribution strategies is developed and solved. The model optimizes freshness-keeping effort levels and investment choice decisions simultaneously with shipment quantities and route selection, balancing economic and sustainability objectives as a single objective optimization problem. Particle swarm optimization approach was used to arrive at near optimal solutions for datasets inspired from fresh food transport of Gujarat state in polynomial time. Sample experiments on low and high demand instances indicate that there are comparable solutions with similar levels of total network costs governed by different combinations of transportation costs and total quality loss costs. Furthermore, it was observed that for majority of the routes in the upstream supply chain, the choice of investing towards freshness-keeping effort activities was chosen less frequently and with less intensity as compared to downstream stages, depicted by lower and higher number of routes and freshness keeping effort levels selected for freshness-keeping at the respective stages. The findings offer important managerial implications for cost-effective and sustainable omnichannel fresh food distribution network design, guiding retailers and stakeholders towards making informed decisions.
Keywords: Fresh food distribution, omnichannel, freshness-keeping effort, carbon emission.

84. A Framework to Detect Social Distancing Violation and Mask Use in Public Places

Paper Id 177

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Abstract: Communities are instructed to stop and reduce close contact with nearby residents as the COVID 19 spreads. This is referred known as "social distancing," and it is a useful strategy for halting and limiting the COVID 19 virus's spread. The main cause for worry is that COVID-19 can travel from one person to another through touch or being close to an infected person. This has been a really challenging task given how crowded some public areas are. We devised an idea for a social distancing detection tool that can check if people are keeping a safe distance from each other by trying to analyze real-time video streams from the camera using Python, Deep Learning (DL), and Computer Vision

(CV). This tool was created to ensure social distancing protocol in public locations and the workplace. The goal of this project was to create a Python-based system for the instantaneous detection of social distance violations and mask use. To monitor public areas, workplaces, or events, the solution merges security cameras with CV techniques and deep learning algorithms. Data collection, preprocessing, mask detection, social distancing detection, integration, testing, and evaluation were among the processes that the project went through. In especially during the COVID-19 epidemic, the final solution is a useful tool for organizations and individuals to make sure that mask-wearing and social distance rules are being observed. The final solution is a helpful tool for companies and people to ensure that social distance and mask-wearing norms are being followed.

Keywords: Social distancing, Mask detection, YOLO, Deep Learning, Object detection.

85. Application of Regression Analysis of Student Failure Rate

Paper Id 178

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Abstract: The education sector has been rapidly growing and is currently facing several challenges. One such challenge is identifying students who are at risk of failing, as this can help educators provide targeted interventions to improve student performance. Machine learning models have been developed to predict the probability of student failure based on various student performance metrics to address this issue. In this paper, we present a regression-based model that predicts the probability of student failure using student performance metrics such as attendance, previous academic performance, and demographic information. The model was trained on a dataset of students and achieved high accuracy in predicting the probability of student failure. While the model performs well in predicting the probability of student failure, there is always room for improvement. Possible enhancements to the model include feature engineering, ensemble learning, hyperparameter tuning, deep learning, and interpretability. These enhancements can improve the model's accuracy, stability, and transparency, leading to better predictions and targeted interventions for at-risk students.
Keywords: Machine Learning, Student Failure, Regression.

86. Machine Learning based Sound Event Detection: A Case Study for Noise Identification in Classroom Environment

Paper Id 179

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Abstract: Peaceful academic surroundings is one of the most fundamental requirements in any teaching-learning environment. The main aim of this paper is to explore the applicability of sound event classification for noise in a classroom environment. Sound event classification in a multisource environment becomes more challenging due to the presence of polyphonic and overlapping sound. For a complex environment, results of domain-specific sound event detection are not much accurate, as it is difficult to fully extract features from models with a single input. In this paper, deep and acoustic feature-based classification of sound events is performed using a CNN-based model and a transfer learning approach using YAMNet. In this study, we introduce a new dataset which we call the school classroom dataset (SCD). Also, in addition to using SCD, we have performed the sound event classification on the standard Urban Sound 8K Dataset and ESC-50 datasets. The experimental results demonstrate that the mel-spectrogram features along with MFCC and Chroma features are better suited for improving the model performance and achieve better performance over the other models in the literature.
Keywords: CNN, Deep-Features, Acoustic-Features, Sound-Event-Classification, Transfer-learning.

87. Using Opinionated-Objective Terms to Improve Lexicon Based Sentiment Analysis

Paper Id 180

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Abstract: Sentiment analysis (SA) has received huge attention to understand customer perception, especially in the movie review (IMDB) domain. This is due to the availability of large, labelled dataset. This has enhanced the use and development of machine learning

(ML) algorithms ranging from traditional machine learning algorithms, deep learning algorithms to large language models. The ML models have shown great performances. However, the application of ML methods for SA is limited in the service industry like banking, due to the unavailability of large training datasets. Thus, we consider the use of lexicon-based sentiment analysis appropriate. We employ 346,000 Nigerian bank customers' tweets to develop our corpus and thus, propose SentiLeye, a novel lexicon-based algorithm for sentiment analysis. Our algorithm incorporates corpus-based approach and external lexical resources for sentiment lexicon generation of Pidgin English language terms (a non-English under-resourced language). Moreover, we demonstrate the use of verbs and adverbs that express opinion on service experience to improve the performance of lexicon-based sentiment analysis. Results show that SentiLeye outperforms popular off-the-shelf sentiment lexicons with a macro F1 score of 76%. We conclude that results from domain-specific algorithms such as SentiLeye evidence that general-purpose lexicons cannot replace them.
Keywords: Sentiment Analysis, Sentiment Classification, Lexicon, Banking Industry, Pidgin English.

88. Explaining the Artificial Neural Network Using Evolutionary Fuzzy Association Rule Mining (EFARM)

Paper Id 181

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Abstract: The Artificial Neural Network (ANN) is a widely used machine learning technique for various classification problems. However, despite its popularity, ANN has certain limitations requiring careful consideration. One primary drawback of ANN is its classification as a black-box model, meaning it generates outputs without explaining them. This paper introduces an innovative approach that presents an evolutionary fuzzy association rules-based explanation model to address this issue. In this proposed model, the fuzzy association rules mining technique generates refined rules for the ANN. These rules are then further optimized using an evolutionary algorithm known as NSGA-2, explicitly focusing on enhancing the model's fidelity, coverage, and rule count. To evaluate the effectiveness of the proposed model, comprehensive testing has been conducted on three benchmark datasets: Pima, WBCD, and Austra. Furthermore, a comparative analysis with four other works within the same field has been performed to assess its performance. The results demonstrate that the proposed explanation model achieves an impressive accuracy rate ranging from 92% to 100%. By offering interpretable and refined rules, the proposed approach enhances the transparency and comprehensibility of the ANN's decision-making process.
Keywords: Explainable Artificial Intelligence, Fuzzy association mining, Multi-objective genetic algorithm, Neural network, Rule extraction.

89. Study of optimality strategies for two-person game model under interval uncertainty

Paper Id 186

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Abstract: Game theory is a useful tool to deal with real-world problems of a conflicting nature. We may not ignore the uncertainty in real-world problems due to vagueness in the data set for the problem. Therefore, this paper investigates a two-player zero-sum game (a matrix game) with uncertain payoffs to determine the optimal value of the game and the players' optimal mixed strategies. Further, we develop the solution concept to achieve the goal using a bi-objective programming problem. Furthermore, real-world problems are successfully applied to the developed approach in an uncertain environment.
Keywords: Linear programming problem, Matrix games, Non-cooperative game theory, Mixed strategy, Interval analysis.

90. L-BFGS Optimization Based Human Body Posture Rectification- a smart interaction for computer guided workout

Paper Id 187

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Abstract: Human pose estimation possesses a significant potential in reducing the cases of injuries sustained during strenuous physical activities like gym workout sessions. Pose estimation aims towards locating human body joints accompanied with visual inputs. Major challenges in perceiving inputs from a cluttered background have been addressed in this work. The paper presents an end-to-end methodology, based on two different algorithms, MediaPipe Holistic Pipeline and Modified BlazePose, that performs real-time pose detection and warns users regarding incorrect body movements. The reason for choosing these models over more popular and robust Human Pose Estimation models like OpenPose, is the lightness of the models. A comprehensive review of the two models has been illustrated in this research work for 2D as well as 3D pose estimation. The research piece has also incorporated the subsequent methodology applied to identify faulty body joint angles by comparing them with the optimum ones. Considering an uncontrolled environment, the testing of the models has

been done. The models have confirmed the identification of the human Region Of Interest as foreground from background objects and calculate the pose angle of joints. A systematic study pertaining to the visibility of joints for each model is also presented in the paper for better reference. The deviation of the measured angle of joints from the optimal ones is properly annotated, followed by optical analysis.
Keywords: MediaPipe Holistic Pipeline, BlazePose, Body Pose Measurements.

91. SCP-CNN: Skin Cancer Prediction on Imbalanced Dataset Using CNN Deep Learning

Paper Id 191

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Abstract: Detecting skin cancer is a critical task for successful treatment and recovery. Unfortunately, traditional methods of diagnosis rely heavily on the expertise of dermatologists, whose availability can be limited. This paper proposed a novel approach using weight classification to balance the various skin cancer groupings and adjust for data anomalies. On the MNIST dataset, seven different types of skin lesions are identified as skin cancer. A Convolutional Neural Network is designed to predict the type of cancerous and the proposed model is further trained using a range of hyperparameter tunings to improve its accuracy. The proposed framework offers a promising result for early skin cancer detection with an accuracy of 91.75%
Keywords: DNA, Imbalanced, AlexNet, InceptionV3, RegNetY-320, skin cancer, CNN, Hyperparameter, preprocessing, MNIST.

92. Optimizing Pneumonia Detection from Scarce Chest X-ray Data: A Comparative Analysis of Advanced Augmentation Techniques using Deep Learning

Paper Id 192

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Abstract: Pneumonia, a prevalent respiratory ailment, necessitates precise and efficient diagnosis for effective treatment. This paper introduces a deep learning approach for pneumonia detection from chest X-ray images, employing two distinct network architectures: a convolutional neural network (CNN) trained from scratch and a pre-trained ResNet-50

model. The primary objective of this study is to conduct a comprehensive comparative analysis of advanced augmentation techniques, namely RandAugment, CutMix, MixUp and Geometric augmentation, specifically designed to address the scarcity of data. To emulate scarce data conditions, the dataset was artificially down sampled. The experimental results yield significant insights into the impact of augmentation techniques on model performance. When utilizing the pre-trained ResNet-50 model, RandAugment exhibits superior efficacy compared to other augmentation methods, yielding an impressive accuracy of 90%. In contrast, when experimentation was conducted on the smaller CNN trained from scratch, geometric augmentation emerges as the optimal choice, achieving an accuracy of 83%. This comparative analysis underscores the critical importance of selecting appropriate augmentation techniques when confronted with limited data for pneumonia detection. The findings contribute to the optimization of deep learning models in the realm of medical imaging tasks, facilitating accurate and timely pneumonia diagnosis from chest X-ray images.
Keywords: Pneumonia detection, limited data, data augmentation, Transfer learning.

93. Unleashing the Potential of Deep Learning for Precise Nuclei Segmentation and Classification in H&E Stained Whole Slide Images

Paper Id 193

Tabasum Majeed[1], Syed Wajid Aalam[2], Abdul Basit Ahanger[2], Rayees Ahmad Dar[1], Tariq Ahmad Masoodi[4], Muzafar Ahmad Macha[3], Ajaz A bhat[4], Muzafar Rasool Bhat[2], Assif Assad[1]

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Abstract: Accurately identifying diverse cell types within and in the vicinity of the tumor matrix plays a crucial role in understanding the tumor microenvironment for cancer prognosis and scientific investigation. By automating the detection, segmentation, and classification of nuclei using Artificial Intelligence (AI), the burden on pathologists can be alleviated, minimizing errors caused by fatigue and subjectivity. In this study, we conducted a comprehensive evaluation of five pretrained models: Patch DenseNet121, Patch EfficientNet-B3, Patch MobileNet,Patch VGG-16, Patch ResNet34 and a custom Patch Attention U-Net. These models offer an end-to-end solution for the automated segmentation and classification of nuclei from H&E stained whole slide images of multiple organs (breast, kidney, lung, and prostate) using the MoNuSAC 2020 Challenge dataset. Performance was assessed using the F1-Score and Intersection over Union (IoU) metrics. Among the models tested, Patch VGG-16 emerged as the top-performing model, achieving an impressive IoU of 85.48 and an F1 score of 0.88 on the validation dataset. The results of this study contribute to the

advancement of AI-based techniques for the automated analysis of tumor microenvironments in diverse organ types, ultimately aiding in cancer diagnosis and treatment decision-making.
Keywords: Deep Learning, Nuclei Segmentation, Classification, Whole Slide Images, H&E Staining, Tumor Microenvironment.

94. Customer Segmentation in Online Shoppers Purchasing Intention

Paper Id 194

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Abstract: This research paper examines the impact of customer segmentation on purchasing intentions in online shoppers. Using the K-means method and the Online Shoppers Purchasing Intention Dataset, which includes 12,330 sessions from a popular e-commerce website, the study analyzes customer behavior. The findings highlight notable sales surges in August, varying preferences across countries, and the significance of customer engagement and transactional activity. Through RFM and K-means segmentations, exceptional customers with high engagement and value are identified, emphasizing the importance of customer retention strategies. Moreover, opportunities to re-engage less active customers are uncovered. The research provides valuable insights for businesses to optimize marketing efforts, enhance customer satisfaction and loyalty, and maximize revenue potential in the online shopping.
Keywords: Customer segmentation, online shopping, data mining, machine learning, k-Means algorithm, RFM analysis.

95. Matrix Games having Linguistic q-Rung Orthopair Fuzzy Payoffs

Paper Id 195

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Abstract: The development of matrix games having uncertain payoffs is an important research area from the last few decades. In many real-life decision-making situations, experts prefer to express their assessment data using linguistic variables rather than numerical

ones. The present study focuses on game problem with qualitative information as payoffs by employing Linguistic q-Rung Orthopair Fuzzy Values (Lq-ROFVs). Its solution is obtained by transforming the bi-objective model into linear or nonlinear programming problems. Finally, to demonstrate the proposed approach, a real life application is modelled into game problem.

Keywords: q-Rung orthopair fuzzy set, linguistic variables, linguistic q-rung orthopair fuzzy set, aggregation operator, reasonable solution.

96. Research Analysis on Current Advances in Parkinson's Disease Detection Using Signal Processing and Machine Learning-Based Techniques

Paper Id 196

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Abstract: Parkinson's Disease (PD) is a neurodegenerative condition characterized by the degeneration of dopaminergic neurons in the brain, resulting in both motor and non-motor symptoms. The timely and precise diagnosis of PD is of paramount importance for effective management and treatment strategies. Recent years have witnessed the emergence of diverse diagnostic approaches for PD, encompassing clinical assessments, advanced imaging techniques, and biochemical analyses. This comprehensive technical review aims to present a comprehensive overview of the various methodologies employed for diagnosing Parkinson's disease. Numerous scholarly articles have demonstrated the utilization of Deep Learning Neural Networks for classification purposes, while a select few have developed novel methods and Machine Learning models by incorporating existing Deep Learning techniques, often complemented by various optimization approaches like the Moth Flame Optimizer (MFO) or feature selection techniques to enhance the accuracy and precision of PD prediction. Notably, each article included in this study has harnessed Electrophysiological signals as the primary features of Machine Learning algorithms, showcasing their prominence in the field of PD classification and prediction, particularly within the biomedical domain.

Keywords: Parkinson's Disease, Signal Processing, Machine Learning, Deep Learning, EEG, EMG.

97. Analysis of different inference implementations for deep learning model on ADITYA-U tokamak

Paper Id 197

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Abstract: Data driven deep learning model is implemented on ADITYA-U with precursor of disruption event using various important diagnostic signals. Model proves useful with simulated data and validated for previous shots with unseen data. Model output needs to be deployed on ADITYA-U disruption mitigation system with real-time hardware using appropriate inference execution time. In order to validate suitability and execution time, the benchmark results need to be analyzed for various methodologies. LSTM based model inference is developed using various methods like python, fruggly deep, Keras2cpp and kears2c. The setup is made to feed analog signal input at every 1kHz rate and the inference is made using various methods to benchmark results with statistics. Same platform is used to get statistics and analyzed for repetitive cycles to validate results. The keras2c inference gives optimized result in range of below 100us time which is best fit for real-time implementation for deployment on ADITYA-U. This paper reports the analysis of benchmark result for the deep learning model implemented for ADITYA-U tokamak.
Keywords: Plasma Disruption, Deep Learning.

98. Deciphering the Pathways towards Analysis of Existing Health care services by use of AI to Respiratory Diseases concerning Cough study: Future Challenges and Applications

Paper Id 199

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Abstract: The rate of using artificial intelligence (AI) methods in the healthcare industry has been accelerating. Numerous scholars and health advisers are interested in the possible application of AI in the healthcare industry. Due to significant advancements in contemporary technologies, particularly AI and ML, the healthcare system has recently gained more attention. Current study is aimed to review the role of AI in healthcare services and analyze various respiratory diseases. This paper also highlights the review of various respiratory diseases, introduction to AI and its significant role in COVID-19 analysis, research

gaps and challenges concerning cough analysis, and future scope.
Keywords: Artificial Intelligence, Machine learning, Respiratory diseases, Healthcare services, COVID-19 analysis, Cough analysis.

99. Predicting Impact Strength of Natural Fiber Composites using Optimized Gradient Boosting Approach

Paper Id 201

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Abstract: Natural fiber composites are gaining meteoric attention due to their eco-friendly nature and potential applications in various industries. Coir fiber, with India being its highest producer among tropical countries, holds immense significance due to its abundant availability and potential for sustainable applications. This research article presents an approach for predicting the impact strength of short coir-based composites (CBCs) using least-square gradient boosting algorithm (LSBoost). The dataset encompassed information on matrix type, fiber properties and manufacturing process. The data analysis revealed the significant variation of impact strength with the varying fiber fraction and manufacturing process. Thereon, genetic algorithm (GA) was deployed in replacement to Bayesian optimization to optimize the hyperparameters of the LSBoost predictive model that may explore the hyperparameter space differently and potentially find superior configurations. The differently optimized LSBoost models were compared using standard performance metrics. The GA optimized LSBoost model exhibited better performance in comparison to Bayesian optimization but was computationally intensive. This study significantly contributes to the development of efficient and reliable techniques for predicting the impact strength of sustainable composites.
Keywords: Coir based composite, Mechanical property, gradient boosting.

100. A Research on Maximum Entropy Results for Bulk Arrival Priority Retrial G-queue

Paper Id 204

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Abstract: The main objective of the present investigation is to provide a look at the maximum entropy results for bulk arrival priority retrial G-queue under working breakdown and working vacation. Computer systems, industries, packet-switching networks, telecommunications systems, etc. are practical applications for such a queue. The two sorts of clients that are taken into consideration are priority clients and regular clients. Priority clients are given unique privileges that allow them to receive services before other customers and avoid having to wait in queue. By using supplementary variable technique, we estimate the orbit size, steady state probability, and probability generating functions in this article. Some numerical results are also exhibited. Ultimately, a comparitive analysis between exact expected waiting times and approximate expected waiting times are given.
Keywords: Priority Retrial queue, G-queue, Working Breakdown, Arrivals in batches.

101. Multiobjective Diabetic Diet Model using Neutrosophic Fuzzy Programming

Paper Id 205

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Abstract: The global health issue of diabetes, influenced by sedentary lifestyles and nutrient-deficient diets, is addressed in this paper. The focus is optimizing and modeling the diabetic diet in a neutrosophic fuzzy environment. A multiobjective linear programming model is proposed to maximize fiber and carbohydrates, minimize fat and sugar, and adhere to daily nutrient requirements. However, relying solely on precise data for dietary recommendations overlooks the fluctuations and uncertainties in nutrient consumption. To address this, the fuzzy and intuitionistic concept accurately represents diet acceptance and rejection but fails to account for indeterminacy. To handle this indeterminacy in the data, the neutrosophic set theory is employed, which plays a vital role in simulating the decision-making process by considering all aspects of a decision - truth, indeterminacy, and falsity. The findings of this study indicate that utilizing neutrosophic optimization leads to the best optimal solution, increasing the satisfactory degree of decision-makers in terms of nutrient acceptance, conflicts, and non-acceptance. To illustrate the diet model in a neutrosophic fuzzy environment, a numerical example is provided, along with a comparative analysis with other approaches.
Keywords: Multiobjective optimization, Neutrosophic programming, Diabetic Diet.

102. Performance Analysis of ANN-based Multi-Input Hybrid Power Conversion System

Paper Id 206

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Abstract: This paper presents an ANN-based multi-input boost converter. A boost converter converts a DC voltage to a higher input DC voltage. A multiinput boost converter raises voltage as well, it has three inputs, two of which are unidirectional and one of which is bidirectional. The two different unidirectional ports connect renewable energy sources like a fuel cell and a solar cell, whereas the bidirectional port connects to a battery. Photovoltaic cells are the principal power source used for the generation of input power. For tracking the Maximum Power Point Tracking (MPPT) Perturb & Observe technique is used. The system's secondary source is a fuel cell with no negative environmental impact. If the other sources cannot give the desired output, the battery is used as the power input source. The output of the proposed system is constant voltage and current. The proposed converter is compared to a traditional and interleaved boost converter in terms of efficiency, component counts, and stability. The results are obtained using MATLAB/ Simulink, demonstrating that the proposed converter outperforms the conventional and interleaved boost converters.
Keywords: Multi-Input Boost Converter, Neural Network Controller, Perturb & Observe, Photovoltaic cell, Fuel cell, Energy storage system (ESS).

103. AI in the Legal System: Transforming Legal Practice through Artificial Intelligence and its Impact during Covid19

Paper Id 207

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Abstract: In the age of Artificial Intelligence (AI) and Machine learning (ML), technology has profoundly impacted our day to day life and also have challenged our civil and criminal legal system. The adoption of digitization in the judiciary has often been slower compared to other fields. In India there has been more than 5 cr pending cases in all the courts including about 59 lacs cases in High courts as per the information available on the National Judicial Data Grid (NJDG). Despite these challenges, many countries start focussing in promoting digitization in the judiciary. With continued efforts and investment, it is expected that e-governance in the judiciary will gradually improve efficiency, accessibility and transparency in the legal system. E-Filing and online hearings have become increasingly prevalent in the legal system, especially during the COVID19 pandemic. This paper includes growth in adoption of AI/ML over the period in general and legal and judiciary in particular. It details its adoptability globally in case management, investigation, predictive

analytics, legal research and decision making. The incorporation of AI in the legal system has demonstrated significant potential for delivery of justice in a timely manner at affordable cost. However, ethical considerations surrounding fairness, transparency, and accountability must be addressed to ensure responsible and effective implementation of AI in the legal system. AI along with digitisation would democratise the justice delivery system; empowering the public to access it at affordable cost on one side and enable the State to deliver it in an efficient and transparent manner.

Keywords: Artificial Intelligence (AI), E-governance, Judiciary, democratise justice, Access to justice.

104. ECCO: Cloud Energy Optimization and Load Balancing

Paper Id 208

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Abstract: The term "cloud computing" refers to a technique that makes computer resources, such as processing power, data storage, and application-oriented services, available on demand. This research paper focuses on optimizing load balancing and energy optimization by using virtual scheduling techniques. Before that, various scheduling algorithms were implemented for better request handling, such as random dens, heroes, dens, round-robin, and so on. However, it requires more flexible and efficient request handling, which is why we proposed an energy optimization and load-balanced scheduling approach for cloud computing (ECCO). This approach improves the performance of load balancing, energy optimization, and load-balanced scheduling (user to end server node). In the analysis part, we analyze the cloud network behavior in-terms of average energy consumption, load, average delay, data received and task handling by virtual machine. Those results are compared with various scheduling approaches, i.e., round robin, random, dens, and ECCO, and we get that ECCO provides better load balancing and an energy optimized scheduling algorithm for cloud computing.

Keywords: Cloud, Energy, Task, Scheduling, Load Balancing, ECCO.

105. Recommender process based on trust-distrust factor for signed social networks

Paper Id 209

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Abstract: Recommender process have gained popularity in recent years due to their effectiveness in addressing the issue of information overload. It is nonetheless susceptible to several intrinsic problems, such as cold starting and data scarcity. Numerous studies show that leveraging data from social networks is a highly successful tactic to deal with such issues. The interaction between users based on their conduct and social links is also taken into consideration in research on recommendation process that integrate social interactions, in addition to the user's preferences for the product. Social network relationships that involve both trust and distrust have not gotten much attention. Our research finding suggests the methods of integrating the trust and distrust social relationships using machine learning in order to enhance the collaborative filtering recommendation algorithm, which combined the users' trust and distrust social relationships and effectively reduced the sparseness in the signed social networks. The experimental results shows that the recommended methodologies outperform state-of-the-art algorithms based on trust-distrust using machine learning.
Keywords: Social networks, signed networks, trust-distrust, negative and positive sign.

106. Object Detection Techniques for a Novel Traffic Dataset using real-time Infrared Imagery

Paper Id 210

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Abstract: Object detection is a significant part of computer vision, gaining considerable attention during the past few decades. With the gradual and remarkable development in deep learning, object detection has accomplished great success as a visual recognition task. In this paper, we have shown a comparative analysis of the six most popular existing deep-learning-based object detection techniques on our novel custom infrared traffic dataset based on four scenarios- i., proximity to the camera (near and far, around 2-300 meters), ii. occlusion, iii. visibility of the objects (full and partial), and iv. multiple objects in a single frame. This dataset is used to train the selected deep-learning techniques. The resultant images in each scenario have been shown with the class labels and confidence score. The comparison has been done on the basis of a total loss and mean average precision.
Keywords: Object detection, infrared object detection, Faster R-CNN, YOLOv3, YOLOv4, Detectron2, EfficientDet, YOLOv5.

107. Sentiment Recognition Through Speech Using Deep Learning Model

Paper Id 211

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Abstract: The ability to recognize emotions in speech has the potential to enhance a variety of areas, including safety, customer service, mental health, and communication. Speech-based emotion detection focuses on classifying audio recordings according to specific emotions. The frequency and pitch are read from the audio files. We are contrasting the accuracy of the two models, the Multilayer Perceptron Classifier model and the Support Vector Classification model, in order to attain the goal of recognizing the fundamental emotions, such as calm, happy, sad, and angry. We used the Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS) dataset with Mel-Frequency Cepstral Coefficients, Chroma, and Mel as feature extraction techniques. The outcomes demonstrate that the MLP classifier outperformed the SVC model. For the MLP and SVC models, 92.34% and 70.69% accuracy scores, respectively, have been recorded.
Keywords: Sentiment Recognition, MLP classifier, SVC model, RAVDESS dataset.

108. A Comparative Analysis of Big Data Analytics in Cloud Computing

Paper Id 212

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Abstract: Big data and cloud computing are two technologies that are worrying the IT industry. Every day several sources generate huge amounts of data. The data is so big that it can't be processed using conventional methods. Statistics show that 44 zettabytes or so of data are generated every day. Every human generates 1.7 MB of data per second. With the help of cloud computing, these processes can be carried out in a cost-effective and efficient manner. Many sectors are leveraging with a brief introduction to Big Data. Huge amount of data is generated daily, if we examine topics like the analytics cycle, analytics, advantages, and the shift from the ETL to ELT paradigm as a result of big data analytics in the cloud before delving into big data analytics and concluding with a case study. This paper presents the analysis of big data which offers several advantages in a variety of fields and industries, including education, healthcare, and business. It has also witnessed a change

in how data is handled and examined as a result of the combination between Big Data and Cloud Computing.
Keywords: Cloud computing, big data analytics, ELT (Extract, Load, Transform) procedure.

109. GA based Order Abatement Technique for Linear Dynamic Systems

Paper Id 213

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Abstract: A hybrid technique of order abatement for Higher Order Linear Dynamic Systems (HOLDSs) is presented in this paper. The denominator polynomial of the original HOLDSs is abated with the help of continued fraction approach, however the diminished numerator is acquired using the Genetic Algorithm. The abated system is achieved by mixing the benefits of the two methods. The objective of the proposed technique is to minimize the Integral Square Error (ISE) and preserve the characteristics of the HOLDS. The proposed technique guarantees the conservation of steady-state stability along with the transient stability of the original HOLDS. A thorough comparative analysis is done with two examples of HOLDSs from the literature. The ISEs, Frequency- response and Time-response are calculated and plotted with the help of Simulink/MATLAB and compared with the other reduction techniques from the literature. The results show that proposed technique gives lesser ISE in contrast to other techniques and also the time response & Frequency response matches the original system response very closely.
Keywords: Continued Fraction method, Genetic Algorithm, Step Response, Integral Square Error, Order abatement, Frequency Response.

110. A Study on Multi-Server Retrial Queue with Balking and Feedback

Paper Id 215

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Abstract: Queueing theory has become a dynamic tool for modeling various networks like transportation networks, communication networks, production lines, operating systems, etc. In recent years, computer networks and data communication systems are the fastest growing technologies, which lead to glorious development in many applications. This paper presents an infinite capacity M/M/c retrial queue model with an optional service channel including customer balking and loss behaviors. The customer obtained the optional service / non-essential (NES) service only after completing the essential service (ES) process. So, any customer entering into the system, if finds all essential servers busy then it automatically joins the orbit and retries for the service in an exponentially distributed fashion. After the completion of the essential service, the customer has three routes to choose between, either he leaves the system or he joins the orbit for feedback and retries for the essential service again or he chooses to take the optional service available. The retrial system is modelled by a quasi-birth and death process and thereby in this process some system performance measures are derived. Also, a cost model is obtained to find out the optimal values of a few sensitive parameters simultaneously at the minimal total expected cost per unit of time.
Keywords: Multi-Server Retrial Queue, Optional Service, Feedback, Geometric Loss.

111. A Survey: Image Processing Techniques for Detecting Rice Crop Disease

Paper Id 217

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Abstract: Rice grains are a primary energy source for food and nutrition. Rice plant diseases are expected to inflict agricultural, economic, and societal harm in the future. Researchers have shown a great interest in detecting rice diseases using image processing methodology and machine learning based classification and they used many methods for disease detection, characterization, and quantification. Image processing is used to diagnose plant diseases, giving a powerful tool with exact results. This study evaluates the literature to determine leading edge of using Image processing techniques to identify rice diseases, define trends, and expose gaps and strategies for disease identification and dataset features also. The results of the systematic review can be used to comprehend modern developments

in image processing for the detection of rice crop diseases and to highlight areas for improvement. The article examines practically all works published between 2009 and 2022.
Keywords: Image processing, Rice diseases, Segmentation, Feature Extraction, Machine Learning.

112. Bibliometric Analysis: A Trends & Advancement in Clustering Techniques on VANET

Paper Id 218

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Abstract: In recent years, Traffic management & road safety has become a major concern for all countries around the globe. Many techniques & applications based on Intelligent Transportation Systems came into existence for road safety, traffic management & infotainment. To support the Intelligent Transport System, VANET has been implemented. With the highly dynamic nature of VANET & frequently changing topology network with high mobility of vehicles or nodes, dissemination of messages becomes a challenge. Clustering Technique is one of the methods which enhances network performance by maintaining communication link stability, sharing network resources, timely dissemination of information and making the network more reliable by using network bandwidth efficiently. This study uses bibliometric analysis to understand the impact of Clustering techniques on VANET from 2017 to 2022. The objective of the study was to understand the trends & advancement in clustering in VANET through bibliometric analysis. The publications were extracted from the Dimension database and the VOS viewer was used to visualize the research patterns. The findings provided valuable information on the publication author, author's country, year, author's organization affiliation, publication journal, citation etc. Based on the findings of this analysis, the other researchers may be able to design their studies better and add more perception or understanding to their empirical studies.
Keywords: VANET, Clustering, Cluster Head, Cluster Stability, Cluster Formation, Bibliometric Analysis, VOS Viewer.

113. A Hybrid Variant SOMGOA for Unconstrained Optimization

Paper Id 219

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Abstract: Grasshopper Optimization Algorithm (GOA) is a relatively recent population-based stochastic approach for solving nonlinear global optimization problems. Several attempts have been made in the past to enhance the efficiency of population-based approaches by combining them with features of other algorithms. In this paper, an enhanced version of GOA is introduced by combining it with another population-based approach, the Self Organizing Migrating Algorithm (SOMA). The combination of GOA and SOMA results in a hybrid variant called SOMGOA. The effectiveness of this approach is analyzed based on results, and a comparative analysis is conducted against previously published results from other algorithms using 15 standard benchmark functions. The conclusion drawn is that SOMGOA outperforms all other algorithms, making it a promising choice for solving nonlinear optimization problems.
Keywords: Grasshopper Optimization Algorithm, Self Organizing Migrating Algorithm, hybridization, population-based approach.

114. Chaotic Swarm Bat Algorithm with Improved Search

Paper Id 220

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Abstract: Swarm Bat Algorithm with Improved Search (SBAIS) is an efficient modification of the Bat Algorithm (BA). It operates by partitioning the population into a super-swarm of best solutions and sub-swarms of the remaining solutions. The super swarm conducts a refined search, while the remaining swarms perform standard search as per BA. This partitioning into swarms and the utilization of different search mechanisms empower SBAIS to enhance its performance. In this paper, a chaotic variant of SBAIS, named Chaotic Swarm Bat Algorithm with Improved Search (ChSBAIS), is proposed. Ten different chaotic map functions are tested to enhance SBAIS, and the best one is selected for ChSBAIS. The proposed algorithm is compared to SBAIS over 30 different optimization functions and various dimensions. The results demonstrate that incorporating a chaotic map into ChSBAIS boosts its efficiency, establishing it as a robust optimization algorithm.
Keywords: Swarm Bat Algorithm with Improved Search, Chaotic Maps, Bat Algorithm, Numerical Optimization, Global Optimization.

115. Random Forest Modeling for Prediction of Thrust Force during Drilling of Flax/PP Composite

Paper Id 221

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Abstract: The current investigation presents a random forest modeling approach for predicting the thrust force during the drilling of flax/polypropylene (PP) composites. Drilling composites is complex due to the generation of high thrust force and the heterogeneous nature of the material. Accurate thrust force prediction is crucial for improving hole quality. Various input parameters—spindle speed, feed rate, and drill geometry—are considered, and a random forest model is trained to predict thrust force. The results demonstrate accurate predictions by the random forest model for thrust force in drilling flax/PP composites. Model performance is evaluated using metrics like mean absolute error, mean squared error, and mean absolute percentage error. Feed rate is found to be the most significant input parameter, followed by drill geometry and spindle speed. The study highlights the effectiveness of the random forest modeling approach for thrust force prediction in composite drilling. It also sheds light on the input parameters' influence on the drilling process. The findings benefit researchers in composite material drilling, aiding parameter optimization for improved product quality.
Keywords: Drilling, natural fiber, random forest, thrust force.

116. BERT Algorithm and its Methodology for Sentiments Analysis: A Survey

Paper Id 222

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Abstract: The Bidirectional Encoder Representations from Transformers (BERT) algorithm has become a valuable tool for learning common languages and has generated innovative outcomes on numerous projects. Social media stages offer a resource of user-generated information that can be analyzed to pick up bits of knowledge about human behavior and assumption. In this survey paper, we offer an outline of the application of the BERT calculation to social media analysis. This paper covers the BERT algorithm, its preprocessing, and tokenization of social media data. We also discuss methods for fine-tuning BERT models for social media-specific datasets. We explore various estimation approaches and named entity recognition using BERT. Lastly, this paper presents the limitations of the BERT algorithm for social media analysis and outlines future directions for research in this field. Overall, this survey highlights the potential of the BERT algorithm as a crucial tool for social media analysis, offering insights into human behavior and sentiment.
Keywords: Bidirectional Encoder Representations from Transformers (BERT), Natural Language Processing (NLP), Sentiment analysis.

117. Numerical simulation of (1+1)-dimensional Kaup system and Sawada-Kotera-Ito seventh-order KdV equation by reduced differential transform method

Paper Id 226

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Abstract: The main goal of this article is to demonstrate the use of the Reduced Differential Transform Method (RDTM). This method has been applied directly without using bilinear forms, Wronskian, or inverse scattering method. Also, it is worth pointing out that if the terms of the series increase, the RDTM provides better convergence to the analytical solution. In this paper, this method is used for solving nonlinear (1+1)-dimensional Kaup system and Sawada-Kotera-Ito seventh-order KdV equation with given initial conditions having arbitrary constants. The numerical solutions obtained by RDTM are compared with the known exact solutions by fixing the arbitrary constants in tables as well as in figures.
Keywords: Reduced differential transform method (RDTM), (1+1)-dimensional Kaup system, Sawada-Kotera-Ito seventh-order KdV equation.

118. An Application of Sentiment Analysis to analyze the performance of players on endorsed brands using social media

Paper Id 231

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Abstract: Sentiment analysis and Named Entity Recognition (NER) are two powerful NLP techniques. This study investigates the correlation between the sentiments of cricket players and their impact on the stock prices of endorsed brands. The study employs Spacy's NER model to extract player names from Twitter data and conduct sentiment analysis to evaluate public sentiment towards the players. The main aim of the research is to determine whether there exists a correlation between player sentiment and the success of advertising campaigns launched by their brands. To achieve the objective, the study collected tweets associated with cricket players, preprocessed the text, and utilized NER to identify related entities. Sentiment analysis has been performed to evaluate public sentiment towards the

players. The proposed approach has been used to analyze the sentiment towards both the players and their supported organizations. Analyzing sentiments towards players and their supported brands on Twitter has provided valuable insights into advertising campaign effectiveness and social media's impact on stock prices.
Keywords: Natural Language Processing, Named Entity Recognition, Sentiment Analysis, Spacy, Cricket Players, Organizations, Stock Market, Social Media, Twitter.

119. Automatic Number Plate Detection System for Indian Vehicles using Yolov5 and EasyOCR

Paper Id 232

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Abstract: Automatic Number Plate Recognition (ANPR) systems have gained significant attention due to their potential applications in traffic law enforcement and intelligent parking systems. This research paper proposes an enhanced ANPR system utilizing the YOLOv5 object detection framework and the EasyOCR text recognition library. The model is specifically designed to read Indian license plates and is capable of detecting the license plate number from images as well as videos. The precision of the model is 99.5%, recall is 98.8% and mAP is 99.2%.

Keywords: Automatic Number Plate Recognition System (ANPRS), License Plate Detection, You Only Look Once (Yolo), Yolov5, Optical Character Recognition(OCR), EasyOCR, Indian License Plates.

120. Evaluating Performance of SMOTE and ADASYN to Classify Falls and Activities of Daily Living

Paper Id 233

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Abstract: Class imbalance in real-life applications leads to degraded performance of machine learning models. These methods often favor the majority class and result in overfitting issues. Oversampling techniques have been employed to balance datasets by increasing

samples of the minority class, thus enhancing classifier performance. Accurate detection of falls and activities of daily living (ADL) significantly enhances the quality of life, especially for the elderly. In this study, real-time data related to falls and ADL are collected through a working prototype. Experiments are conducted to balance the data using the SMOTE and ADASYN oversampling techniques. Three machine learning models—K-Nearest Neighbors (KNN), Random Forest (RF), and Classification and Regression Trees (CART)—with and without parameter tuning, are used for classifying various types of activities and falls. The results demonstrate that both ADASYN and SMOTE enhance classification accuracy, with ADASYN outperforming SMOTE.
Keywords: ADASYN, CART, Falls, Inertial Measurement Unit, KNN, Machine Learning, RF, Parameter Tuning, SMOTE.

121. Advancing Digital Image Forensics: Enhancing Image Forgery Detection through Error Level Analysis and Convolutional Neural Networks

Paper Id 234

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Abstract: Digital image forgery detection is crucial in image forensics, aiming to identify manipulated regions and preserve visual integrity. Our framework combines Error Level Analysis (ELA) with prominent Convolutional Neural Network (CNN) architectures (VGG-16, VGG-19, ResNet-50, and Xception) to detect forgeries. ELA exploits error-level inconsistencies from manipulation, while CNN architectures extract features. We compare ELA with patch-level techniques, demonstrating its superior accuracy in capturing subtle artifacts. Experiments on the CASIA1 dataset evaluate the framework using metrics such as loss, accuracy, recall, precision, F1-score, and computational time. Results confirm the framework's effectiveness in accurately detecting forgeries. Computational time analysis highlights its efficiency for real-world applications. In conclusion, our research presents a comprehensive framework using ELA and CNN architectures, showcasing ELA's superiority and the potential of integrating it with CNNs for efficient forgery detection. This work advances image forensics, benefiting researchers and practitioners.
Keywords: Image forgery, patch-level, error-level analysis, CNN.

122. Creating a Binary AHA Algorithm with Varied Transfer Function

Paper Id 237

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Abstract: To solve binary problems, various optimization algorithms are converted into their binary versions. In this research, we developed a binary optimization technique using a different transfer function with the Artificial Hummingbird algorithm. This study compares various transfer functions, both S-shaped and V-shaped, to determine which one performs better for creating a new binary algorithm. The newly formed algorithm is evaluated using benchmark functions. A comparative study of this novel algorithm is also presented in this paper.
Keywords: Artificial Hummingbird Algorithm (AHA), foraging, Benchmark functions, Binary Artificial Hummingbird Algorithm, Transfer functions.

123. OPTUNA-Driven Soft Computing Approach for Early Diagnosis of Diabetes Mellitus using ANN

Paper Id 240

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Abstract: Diabetes is a severe disease characterized by elevated blood glucose levels. Early identification and prediction of diabetes are crucial for effective management. Considering that diabetes affected approximately 422 million people globally in 2018, as reported by the World Health Organisation (WHO), the significance of accurate classification and prediction methods cannot be overstated. This research enhances the accuracy of diabetes prediction. The proposed work introduces an enhanced method for diabetes classification and prediction by integrating artificial neural networks (ANNs) into the OPTUNA hyperparameter optimization framework. Soft computing techniques, including Recursive feature elimination with cross-validation (RFECV) and principal component analysis (PCA), are employed to improve performance and handle uncertain and imprecise data. Experiments on the Pima Indian Diabetes dataset demonstrate superior accuracy compared to conventional methods. The proposed approach offers a powerful decision support system for healthcare

practitioners, aiding in early diagnosis and effective management of diabetes. The proposed methodology achieved high accuracy rates of 98.78% for the trained data and 98.44% for the test data, demonstrating its effectiveness by combining the strengths of ANNs and soft computing.

Keywords: Soft computing, ANN-Optuna, Diabetes disease prediction, PCA, machine learning, RFECV.

124. Automated Gestational Age Prediction: A Systematic Review

Paper Id 241

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Abstract: Background: Gestational age determination is a critical aspect of prenatal care, allowing healthcare providers to monitor fetal development and identify potential complications. Nevertheless, traditional methods which are used to determine gestational age, including ultrasound and relying on the date of the last menstrual period, may be prone to variability and inaccuracies. Objective: The objective of this paper is to provide an overview and critical analysis of various machine learning techniques and methodologies utilized for gestational age determination. The aim is to assess the precision of these techniques and their potential to enhance the accuracy and effectiveness of forecasting gestational age. Selection Criteria: After conducting a comprehensive search of academic databases using keywords and phrases related to gestational age determination and automated machine learning, the studies that met the inclusion criteria were identified. A total of 161 articles were selected, encompassing studies that employed automated machine learning techniques for gestational age determination and were published in peer-reviewed journals from 2015 to 2023. Results: After applying inclusion and exclusion criteria, 24 research articles were selected. These studies used biparietal diameter, head circumference, and femur length as predictive measurement features for calculation of gestational age. The machine learning approaches that yielded the most promising outcomes were the ones employing BPD and HC to predict gestational age, achieving an accuracy rate exceeding 95Conclusion: The measurement criteria of BPD and HC produced the best results with a high level of accuracy. However, an alternative approach would be to incorporate all three measurement criteria, including Abdominal Circumference (AC), and calculate the average measurement as the gestational age.

Keywords: Gestational Age; Machine Learning; BPD; HC; Femur Length.

125. Comparative Study of Clustering Techniques for Extractive Text Summarization

Paper Id 242

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Abstract: Text summarization aims to generate concise summaries of lengthy text for faster consumption of relevant information. Summaries can be generated either by abstraction or extraction methods. This paper focuses on creating extractive text summaries using different clustering techniques, namely k-means, Hierarchical Agglomerative, Birch and Affinity propagation using Term Frequency — Inverse Document Frequency (TF-IDF). The optimal number of clusters is determined using the silhouette score, while other statistical measures such as precision, recall and F1 score are used to evaluate the accuracy of the generated summaries. This paper compares various clustering techniques based on their computational efficiency and their ability to determine the optimal number of clusters. Additionally, it evaluates the accuracy of news article clustering across various sizes while considering the respective advantages and challenges associated with each algorithm.
Keywords: Summarization, Clustering, K-means, Agglomerative, Birch, Affinity Propagation.

126. Analyzing the Function, Weight, and Use Cases of Ordered Weighted Averaging Operators in Fuzzy Logic

Paper Id 243

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Abstract: In 1965, Zadeh revolutionized data representation by introducing the concept of fuzzy sets to handle imprecise information. This breakthrough led to the development of fuzzy logic theory, which provides a mathematical foundation for modeling uncertainties in human cognitive processes such as thinking and reasoning. Building upon this, Ronald R. Yager introduced membership aggregation cumulative operators in 1988. These operators, based on ordered weighted averaging (OWA), were specifically designed to address the challenges posed by fuzzy logic applications. This approach emphasized the significance of the OWA weighting vector in various domains, including decision making. The aim of this project is to comprehensively examine and analyze OWA operators, while showcasing their practical applications. The author explores the evolution of fuzzy operators and conducts a detailed review of OWA operators, considering three essential criteria: function, weight, and use cases. By investigating these aspects, a deeper understanding of OWA operators and their diverse applications can be gained.
Keywords: Quadrupole exciton, polariton, WGM, BEC, OWA weighting vector.

127. A CNN Model Based Approach for Disease Detection in Mango Plant Leaves

Paper Id 244

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Abstract: In this study, we propose a machine learning (ML) based method for the early detection of plant leaf diseases. Plant diseases are a major concern in agriculture, impacting crop yield and food security. Early and accurate identification of these diseases is vital for effective disease management. Our approach employs deep learning algorithms and a dataset of annotated images containing both healthy and diseased plant leaves. Through training a deep neural network, we enable automated disease detection by extracting relevant features from leaf images and classifying them as healthy or diseased. By reducing reliance on human expertise, our approach enables timely detection, facilitating prompt implementation of disease management strategies. This ML-based method has the potential to revolutionize the field of plant pathology, offering valuable insights for the development of precision agriculture techniques aimed at ensuring sustainable crop production.
Keywords: Image classification, Convolutional Neural Network, Disease leaves, Machine learning.

128. FuzzyBack - A Hybrid Neuro-Fuzzy Ensemble for Concept Drift Adaptation in Stream Mining using Neural Network

Paper Id 246

Saket Sarin[1], Sunil K. Singh[1], Sudhakar Kumar[1], Utkarsh Chauhan[1], Shivam Goyal[1], Tushar Singh[1], Priyanshu[1], Brij B. Gupta[2], Francesco Colace[3]
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Abstract: The prevalence of continuous data streams in various domains has posed new challenges in stream mining, particularly with the presence of concept drift. Concept drift is the phrase used to describe changes in the statistical characteristics of data streams over time, rendering initial models ineffective. This research proposes an innovative approach that combines Fuzzy ARTMAP and Backpropagation to address concept drift in stream mining.

Fuzzy ARTMAP is a neuro-fuzzy classifier known for adaptability, while Backpropagation is a popular training algorithm for neural networks. The approach integrates concept drift detection using Fuzzy ARTMAP, ensemble fusion with Backpropagation, and dynamic model updates. By leveraging the strengths of both techniques, the approach aims to enhance the model's learning capability and ensure accurate predictions in the presence of concept drift. The research explores each step of the approach, including experimental setup, evaluation metrics, and comprehensive analysis to validate its effectiveness in addressing concept drift adaptation in stream mining. The ultimate goal is to develop a robust learning framework capable of autonomously adapting to real-time stream mining. The obtained accuracy of our model is nearly 85 percent.
Keywords: Ensemble Fusion, Neural Networks, Fuzzy ARTMAP, Backpropagation, Concept Drift Adaptation, Data Stream Mining, Real-time.

129. A Multi-Criteria Decision Making Approach for Country-Wise Ranking in Sugarcane Production

Paper Id 248

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Abstract: Sugarcane is a major commercial crop grown in many countries around the world. It is an important source of income for millions of farmers and workers involved in the sugar industry. The cultivation and processing of sugarcane also create jobs in other industries such as transportation, manufacturing, and retail. Additionally, sugarcane is used not only for sugar production but also for biofuel production, making it a versatile and valuable crop. In this article, we will explore the current state of sugarcane production worldwide, including the top-producing countries. The country-wise ranking of sugarcane is determined with respect to five criteria using Multi-Criteria Decision Making (MCDM) methodology. The final ranking is compared through three MCDM methods viz. VIKOR, TOPSIS, WSM.
Keywords: Sugarcane, MCDM, Ranking.

130. A University Admittance Predictor using Stacked Ensemble Learning

Paper Id 250

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Abstract: Choosing which universities to apply to as a graduate student can be a difficult task. The application process is constantly evolving, and it can be hard to know if your profile meets the requirements of a particular school. Additionally, the expense of submitting an application to a university is frequently substantial, so it is important to think carefully about your options based on your profile. One tool that can be helpful in this process is a university admission prediction system. These systems use data from previous applicants to various universities, including whether they were accepted or rejected, to estimate your chances of getting into a specific school. In the past, these prediction systems have had some limitations, such as not considering important factors like GRE scores or research experience, and not being very accurate. In our research, we suggest a new stacked ensemble model that can predict a student's chances of being accepted to a particular university with a high level of accuracy. Our model considers several factors pertaining to the student, such as their research and industry experience. We also compare our system to other machine learning algorithms and find out if it outperforms all of them.
Keywords: Admission, Deep Learning, Stacked Ensemble Model, Machine Learning, Postgraduate studies, Prediction System, University, University Admission Prediction System.

131. Clustering in WSN: Techniques and Future Challenges

Paper Id 251

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Abstract: Clustering or partitioning is done in Wireless Sensor Networks to increase the lifetime of nodes by balancing the load and energy consumption in the network. Direct communication of nodes with the sink is an energy consuming task. So, the nodes communicate with the sink using multi-hop communication. It has been observed that the formation of clusters provides a better solution to the multi-hop communication problem. Here every member node in a cluster sends the messages to its Cluster Head (CH) as its next hop. The CHs collect data from all nodes in their clusters, aggregate and compress the data and forward it to the sink. If the sink is in direct communication range of the CH, the data can be sent directly, else a multi-hop route can be selected which consists of other

CHs. The energy consumption of CH is more than the common nodes because of the extra computational work it must perform. Periodic CH selection is done to maintain the energy balance in the network. Partitioning the Region of Interest (RoI) into clusters, selecting the CH for each cluster, and choosing the communication method from CH to sink constitutes the basic clustering or partitioning problem. The paper focuses on the comparative study of available techniques for clustering and aims to identify the drawbacks in them with the objective to outline the future challenges to be overcome in the efficient clustering of WSNs.
Keywords: Wireless Sensor Network, Clustering, Cluster Head, Connectivity, Load Balancing, Energy Balancing.

132. A Comparative Study in Image Fusion using Orthogonal and Biorthogonal Wavelet

Paper Id 253

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Abstract: A method called picture fusion is largely concerned with improving photographs to enhance scene visualization. In order to produce a composite image that is more significant and instructive, it attempts to maintain the key elements from each image. This method has been used in a number of industries, including robotics, satellite images, and medicine. Researcher decision-making and the success of scientific endeavors are greatly influenced by the quality of the fused image. In this article, a comparison of the wavelets Haar and Bior2.2 is made. Different photos are employed to compare the two wavelets. The performance of the wavelets is assessed based on metrics like the Peak Signal-to-Noise Ratio (PSNR), Signal-to-Noise Ratio (SNR), Mean Squared Error (MSE), Structural Similarity Index (SSIM), and Standard Deviation (SD). Based on the results, it can be said that Bior2.2 performs somewhat better than Haar in terms of picture fusion quality. We use orthogonal and biorthogonal wavelets to compare how well image fusion works. To fuse pictures, we utilize the Discrete Wavelet Transform (DWT) and the maximum selection criteria. The performance of the fused pictures is assessed using a number of factors, such as visual quality measurements. The advantages of biorthogonal wavelets over orthogonal wavelets for image fusion tasks are highlighted in this research, especially when working with numerous sensors. It emphasizes how important the decomposition level is for producing high-quality fused pictures. The results help advance image fusion methodologies and offer insightful information

to academics and industry professionals involved in picture processing and analysis.
Keywords: DWT, orthogonal, bi-orthogonal, wavelet.

133. Detection And Prevention of Game Addiction in Children

Paper Id 254

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Abstract: According to statistics, 90% of households have computers, and of them, 80% have a high-speed internet connection. It is undeniable that kids use computers for a variety of purposes, including reading, typing, learning, doing their schoolwork, and playing video games. Game addiction is a serious issue connected to computer use. We are all aware of the joy, thus, the side effects gaming brings. The goal of the paper is to identify the aspects that lead to game addiction, analyze the data, and build a model to detect game addiction in youngsters. Furthermore, designing features to prevent the aforementioned issue. We aim to do so by using Haar Cascade Classifier (HCC), a trending technique. We make use of the HCC model for detecting the user's face. After successfully detecting the user, our system starts tracking the activity and sends the report to their parents at the end of the day, thus informing the parents about their child's activity on the device. Our system is also able to nudge the user if he/she is too close to the screen and hence preventing any health-related problems. This technique makes use of time-based behavior that was gathered through a user's interactions with a laptop while playing games. Additionally, it will reduce mistakes brought on by parents who are unable to constantly watch over their children making improper behavior observations. We have successfully deployed the model as a Chrome extension. The overall purpose of this research is to detect game addiction by taking the screen time and user activity into consideration. Currently, such systems are available only on smartphones, but we have developed a system for computer devices as most of the games are played on computers.
Keywords: Haar Cascade Classifier, Game Addiction, Chrome extension, Machine Learning, Features.

134. Exploring and Evaluating Energy-Efficient Clustering Schemes in AODV: An Implementation and Comparative Study

Paper Id 255

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Abstract: Wireless sensor networks play an important part in the monitoring and analysis of the physical environment since they compile data from a wide range of sensors. In this research study, a clustering protocol is presented with the intention of establishing an automated framework for the organization of a wireless sensor network (WSN). The data gathering, processing, and decision-making capabilities of the network are all improved as a result of the implementation of the suggested protocol, which also contributes to the network's increased overall efficiency. In this paper, we analyze the security concerns surrounding MANETs and suggest a few promising new lines of study. Several key and trust management systems have been created and suggested to prevent attacks from occurring from outside the MANET system. Additionally, a number of secure MANET routing protocols have been developed to prevent attacks from occurring from inside the MANET system. Concerning the detection of intrusions, research has been conducted on a recently developed intrusion detection framework that was developed with MANET in mind especially. To address the issues about MANET's level of security, measures of both prevention and detection will be used. The clustering technique that was suggested in this research makes use of a hierarchical, scalable network architecture focused on energy optimization. The strategy that has been offered reduces the amount of energy that is wasted while simultaneously increasing the effectiveness of the network in terms of data collection and transmission. This is accomplished by intelligently grouping sensor nodes into clusters according to the amounts of energy they possess and the capabilities they possess.
Keywords: MANET, AODA, WSN, Energy, Throughput, End-2-End

135. Exploring the Power of Deep Learning in Anomaly Detection: A Comprehensive Review and Analysis

Paper Id 256

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Abstract: This paper aims to provide a comprehensive overview of existing and state-of-the-art fraud and intrusion detection strategies, specifically focusing on incorporating neural networks. We begin by discussing the fundamental concept of data mining and its significance in detecting anomalies. By leveraging advanced machine learning and neural network techniques, we can effectively uncover subtle patterns and irregularities within complex datasets. We explore how the development of anomalies has enhanced our ability to identify and mitigate various threats, such as malware attacks and unlawful practices. Traditional detection strategies have proven effective, but as deep learning progresses, we uncover new opportunities and insights that can significantly enhance the accuracy and efficiency of anomaly detection systems. Throughout this study, we delve into the most cutting-edge approaches, ranging from broad neural networks to shallower architectures, and their applicability to fraud and intrusion detection. We analyze the strengths and limitations of these strategies, shedding light on their performance characteristics, scalability, and interpretability. By addressing these key issues, we aim to provide a comprehensive summary of the latest fraud and intrusion detection advancements driven by deep learning methodologies. This research contributes to the broader understanding of data mining's potential in uncovering anomalies and bolstering security measures across diverse domains.
Keywords: Neural Network, Fraud Detection, Data warehouse, Deep Learning, Anomaly detection, Softmax.

136. Big Data Analytics for Diabetes Mellitus: Leveraging Hadoop Framework and Power BI for Improved Healthcare Insights

Paper Id 257

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Abstract: Diabetes mellitus is one of the prevalent non-communicable diseases affecting a significant number of individuals in modern times. The generation of patient-related data has reached staggering quantities, encompassing diverse types of Electronic Medical Records (EMR), pharmacy records, test findings, and other relevant information. Leveraging the vast amount of data available, big data analytics can be employed to identify trends and establish connections among numerous factors influencing diabetes. It is possible to get significant insights via in-depth analysis, which may then be used to throw light on the links that exist between different features, which can eventually contribute to the improvement of healthcare systems. In this article, we concentrate on using the Hadoop framework, which is a distributed platform famous for its capacity to analyze enormous amounts of data, to investigate a diabetes dataset. Specifically, we look at how this framework may be used to explore the diabetes dataset. The dataset includes important factors such as age, blood pressure, body mass index (BMI), skin thickness, and other diabetes-associated characteristics and characteristics connected to obesity. The data that was utilized came from the PIMA Indian Database, which is a source that is generally acknowledged in the field of diabetes research. We are able to successfully handle and analyze this massive dataset by harnessing the power of Hadoop. The results of this investigation have several repercussions for the current configuration of the healthcare system. Healthcare practitioners may get a deeper comprehension of diabetes as well as the processes that underlie the condition if they investigate the correlations and dependencies that exist between the many diabetes-related elements. This information may be used to guide the creation of focused treatments, personalized treatment plans, and preventative efforts, which will eventually result in better patient outcomes and improved quality of care.
Keywords: Big Data, Diabetes, Electronic Medical Records, healthcare

137. Design and Implementation of Deep Learning Models for Tomato Plant leaf Disease Classification

Paper Id 259

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Abstract: Agriculture is an integral part of the community, and ensuring that plants can grow and produce fruits and vegetables is necessary for the survival of the human race. In this study, we focus on the classification of various tomato plant diseases, such as early blight, Septoria leaf spot, bacterial leaf spot, late blight, mosaic virus, yellow virus, mold leaf, and two-spotted spider mite leaf. Tomato plants were chosen as they are the world's most used and common fruit, used in every household worldwide. The dataset used is a combination of various datasets, such as the PlantVillage dataset and the PlantDoc Dataset, along with augmentation. The dataset, taken from Kaggle, contains more than 40,000 images of tomato plant leaves. We compare various deep learning models, such as pre-trained models

(ResNet-50, ResNet-152, EfficientNetB3, Xception, VGG19, InceptionV3, etc.), and a suggested Convolutional Neural Network (CNN) model to identify the one that provides the best results for plant disease classification.
Keywords: Convolutional Neural Network (CNN), Image Segmentation, Plant disease classification, Tomato plant leaf disease, Deep Learning, Image Classification.

138. Develop and Analyze Custom Applications in Cloud Using Salesforce

Paper Id 260

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Abstract: Back to School is a custom application developed using the Salesforce platform in the cloud. This application aims to facilitate the enrollment of students who are physically or mentally challenged in a user-friendly manner. The application employs well-structured forms with validations to ensure data consistency, reliability, and accuracy. Users can enroll in the application, and the Salesforce admin has the authority to modify passwords, check the number of available accounts, and admit students. The admin also manages essential data about the school, including situating availability and other relevant information. Notably, Back to School focuses on enrolling students with physical and mental disabilities, making it useful for visitors or other external individuals unfamiliar with the current school setup. The application also offers the flexibility for users to enroll with a limited number of choices.
Keywords: Web design, cloud, Salesforce, efficiency, business.

139. Insights from Deploying Industry 4.0 Technologies towards Sustainable Business Performance: A Study Based on Applied Methodology of SLR

Paper Id 261

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Abstract: This research focuses on the applicability of Industry 4.0 (I 4.0) technologies exploring their relevance to sustainable business performance. A study was conducted to portray the impact of I 4.0 technologies underlining their effects on business operations. This research aims to determine the linkage between I 4.0 applications and sustainable business performance addressing the barriers to I 4.0 deployment in the context of Indian manufacturing industries. Previous research indicates that sustainable business performance can be categorized into environmental performance, operational performance, and economic performance. On the other hand, Industry 4.0 implementation can be evaluated by finding the crucial enablers and barriers. In this study, a systematic literature review was performed on 68 primary articles published in the year ranging from 2015 to 2022 accumulating crucial insights from diverse publication database repositories. The findings of this article will determine the linkage between 'Industry 4.0 deployment' and 'sustainable business performance' based on crucial inferences from this study contributing valuable and vital insights into the current research, potential future studies, and key managerial implications in this study domain.
Keywords: Industry 4.0, Sustainable Business Performance, Sustainability, Enablers, Barriers.

140. Levitation of a Small Particle using Arduino Uno in Resonant Levitator

Paper Id 263

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Abstract: Acoustic levitation uses sound waves to counteract gravity, create standing waves, and then keep objects in the air. In this paper, we will start with an introduction about acoustic levitation, its various types, introduction about different parts, their work in this project, and step-by-step process to make a working model of acoustic levitation. Acoustic levitation was discovered a century ago. At that time, it was limited to levitating small objects, but now it can be useful to levitate objects larger than the acoustic wavelength. It is helpful to trap an assortment of materials like fluids, solids, and living things like holding insects or other very delicate living things, allowing us to effectively study them under a

magnifying lens without contacting them. It's useful in many other places like the mobile industry, packaging industry, etc.
Keywords: Acoustic, Levitation, Standing wave.

141. PLC Based Inventory Logistic Management System In Textile

Paper Id 264

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Abstract: Inventory management is the process of maintaining an account of the company's products that are being ordered, sold, and stored. This process comprises management of raw materials, processing, and warehousing of finished products. The practice analyzes and retorts to tendencies to ensure there's always sufficient stock to satisfy customer orders and appropriate warning for shortage. A well-managed inventory helps in saving money, improving cash flows, and satisfying customers. An automated system for this limits the danger of blunder. The implementation of such a system would reduce the work done by humans to about 90% and thereby resulting in the increase in process speed. This paper explores a PLC based inventory management system that includes several industrial-grade servos along with other motors, banding, and packaging systems. PLC-based systems are highly reliable having many industrial advantages like durability, long life span, easy maintenance, etc. The future work includes integration of the proposed solution with a mobile application database including RFID system along with extending the automation towards the manufacturing unit.
Keywords: PLC, HMI, IMS.

142. Heart Arrhythmia detection through real-time ECG Acquisition by Machine Learning Techniques

Paper Id 265

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Abstract: Heart disease illness depicts a scope of conditions that influence your heart. Machine learning (ML) and deep learning end up being powerful in helping to simply decide

and forecast from the enormous amount of information delivered by the medical services industry. In this paper, we compared the accuracies of seven algorithms viz. Logistic Regression, KNN (nearest neighbor), Naive Bayes Classifier (NBC), Decision tree, Random Forest, Support Vector Machine (SVM), and Convolutional Neural Networks, to pick the best suitable algorithm and finally we chose CNN (Deep Learning or CNN, i.e., Convolutional Neural Network) which has shown outstanding results with an accuracy of 99.96% in binary classification and 97.08% in multi-class classification. A robust and accurate system to detect heart diseases on real-time data is developed which is based on CNN.
Keywords: Machine Learning (ML), Artificial Intelligence (AI), Arrhythmia Detection, Heart Disease Classification, ECG Analysis.

143. Facial Image Enhancement Limitation Of Using Spatial Domain Histogram Enhancement Methodologies

Paper Id 267

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Abstract: This study evaluates various spatial domain image enhancement procedures, as well as facial image enhancement methods based on histogram improvement. For color pictures, RGB space is separately upgraded and mixed to reproduce the outcomes. For the performance evaluation, the paper evaluated histogram equalization (HE), Bi histogram equalization (BBHE), and CLAHE methods. The study discusses the limitations of spatial domain approaches. For the performance measurements, the YouTube makeup face pictures database and the Yale Face database are used. The spatial case of facial makeup database is considered as the level of difficulties for enhancement quality. The entropy and SNR analysis are carried out. Despite that, every SDE is the most color-sensitive. CLAHE outperforms with 30.69 dB SNR and mean brightness of 173.557. Although good contrast improvement is provided, it is determined that spatial domain approaches are sensitive to brightness variations and so are unsuitable for face picture enhancement even after brightness preservation.
Keywords: Image Enhancement, Spatial Domain Enhancement, HE, BBHE, CHAHE, SNR, Entropy.

144. Predicting Traffic Flow with Deep Learning

Paper Id 268

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Abstract: In transportation systems, a vast volume of traffic data is generated on a daily basis. The contributing factors for this traffic include expanding urban population, aging infrastructure, uncoordinated traffic timings, etc. Since traffic congestion costs valuable time and fuel every day, it needs to be monitored every day to avoid accidents and to enable the proper flow of traffic. This study aims to predict traffic flow using advanced forecasting techniques such as Long Short-Term Memory (LSTM), Gated Recurrent Units (GRU), and XGBoost models. Both the LSTM (Long Short Term Memory) and GRU (Gated Recurrent Unit) networks are used to predict the vehicle traffic flow and their prediction errors over different road junctions are compared to know which network works better. Experiments demonstrate that the proposed GRU model performs slightly superior to the LSTM model. The evaluation also shows that XGBoost-based methods perform the best in short-term and long-term traffic flow prediction.
Keywords: Smart Cities, Traffic Flow, Prediction, Deep Learning, Intelligent transportation systems, LSTM, GRU.

145. Employing Machine Learning for Criminal Face Detection System

Paper Id 272

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Abstract: The crime rate is increasing daily, and finding criminals in such a large population will be challenging. It is known that the face is a unique and determining part of the human body that identifies a person; hence, it can be used to track down the identity of a criminal. A solution to this problem would be to create a system that controls CCTV cameras and monitors them 24/7 to identify criminals and notify the nearest police station. In times like now, security cameras can be found almost everywhere, and criminal face recognition systems can be implemented using the previously captured faces from police stations and criminal images. This article proposes a system that can enhance criminal distinction and provide a more effective and efficient outlook for the police department. This proposed system consists of a database where the appearance of the criminal will be uploaded along with the criminal description he has made, and then the database will provide the information to the system. Once the image is in the database, the system will detect the criminal by comparing the captured appearance, which can be done with facial recognition software.

The crime data in our database along with the people who come to this public place, if the face of a person from the public place matches the present data in our database, will be the most recent to notify the police department. This leads to improved social security.
Keywords: Face detection, OpenCV, Machine Learning, Face recognition, Anaconda and Jupyter.

146. Model Order Reduction of Linear Continuous and Discrete Systems using Grey Wolf Optimization

Paper Id 274

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Abstract: The Single Input Single Output (SISO) continuous and discrete time system is reduced through evolutionary technique to a lower order model in this study. The Grey Wolf Optimization approach (GWO) is used in the evolutionary process method to minimize the higher model. The foundation of GWO approach is based on the Integral Square Error (ISE), which measures the disparity between the transient responses of the original higher order model and the lower order model when a unit step input is applied. If the initial high order system is stable and of equivalent quality to other well-known existing order reduction approaches, the suggested technique ensures stability of the reduced model. Four numerical examples, two for continuous time and two for discrete time, are used to demonstrate the approach.
Keywords: Continuous system, Reduced order model, Discrete system, Single Input Single Output, Stability, Grey Wolf Optimization, Bilinear transformation, Transfer Function.

147. DQNOCHN: Design of an efficient Dyna Q Network for enhancing Onboard & offboard Charging performance of energy Harvesting Networks

Paper Id 281

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Abstract: Designing high-efficiency energy harvesting networks with support for on-board & offboard charging is a multidomain task that involves optimization of charging

component ratings, design of efficient harvesting strategies, and continuous feedback optimizations. Existing harvesting models either do not support onboard & offboard charging, or showcase lower efficiency when used for multisource energy harvesting scenarios. To overcome these issues, this paper proposes the design of an efficient Dyna Q Network (DQN) for enhancing the onboard and offboard charging performance of energy harvesting networks. Energy harvesting networks are gaining popularity due to their ability to harness energy from the surrounding environment sources. However, their performance can be limited by the availability of energy and the efficiency of their charging process. The proposed Dyna Q Network utilizes reinforcement learning techniques to optimize the charging performance of energy harvesting networks. The network is designed to adapt to different energy harvesting scenarios and to make decisions that maximize the amount of energy stored in the harvesting node's battery sets. This is achieved by using a combination of Q-learning and Dyna algorithms, which enable the network to learn from its environment and harvest energy from Radio Frequency (RF) sources. The proposed network is evaluated using simulation experiments, and the results show that it outperforms existing charging algorithms in terms of both charging efficiency and battery capacity levels. Furthermore, the network is able to adapt to different energy harvesting scenarios, making it a versatile solution for a wide range of applications.

Keywords: Energy, Harvesting, Charging, On Board, Off Board, Deep, Dyna, Q Learning, Scenarios.

148. Integrating Image Visibility Graph and Topological Data Analysis for Enhanced Texture Classification

Paper Id 285

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Abstract: In this study, a method for classifying textures based on image visibility graphs and topological data analysis is given. To improve texture classification result, we propose a new method that uses topological data analysis together with image visibility graphs. The present study involves the analysis of the degree distribution obtained from the image visibility graph along with the extraction of seven distinct topological features that are subsequently utilised for classification purposes. The proposed approach has been evaluated on established image texture datasets, such as the Salzburg texture image dataset. The results show an improvement in performance, suggesting the possibility of integrating graph-based techniques and topological characteristics in the process of texture classification.

Keywords: Image visibility graph, Topological feature, Feature extraction, Topological Data Analysis, and Texture classification.

149. Traffic Volume Prediction Using Regression Modeling Approach

Paper Id 286

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Abstract: An advanced application called the Intelligent Traffic System (ITS) seeks to offer cutting-edge services for managing traffic and other types of transportation. Therefore, the amount of traffic is a crucial element in the proper application of ITS. As a result, the authors of the current research have created a regression model to forecast real-time traffic volume in a metropolitan region. One month's worth of real-time data from a busy road is gathered for modelling purposes. According to the findings, the constructed model is quite suitable for predicting traffic volume, with R2 and modified R2 values of 81.67% and 80.70%, respectively.
Keywords: Traffic volume, modeling, ANOVA, Intelligent Transport Systems.

150. Smart Agriculture With The Internet Of Things: Improving Productivity, Sustainability, And Crop Yield

Paper Id 287

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Abstract: By enabling the linking of physical objects and streamlining data interchange, the Internet of Things (IoT) has revolutionized a number of industries. Agriculture 4.0 or "Smart Agriculture" has emerged as a result of the IoT's substantial recent advancements in this industry. A network of networked devices, including sensors, actuators, drones, and robots, coupled with farming infrastructure is made possible by smart agriculture, which makes use of IoT technologies. The temperature, humidity, soil moisture, and crop health are just a few of the environmental elements that these devices collect data on in real-time. Farmers and agronomists can optimize farming operations by using this data in conjunction with advanced analytics and machine learning algorithms. The adoption of IoT in agriculture offers a number of significant benefits. The ability to precisely and automatically monitor

crop conditions enables farmers to spot early warning indications of pests, diseases, and nutritional deficits. Farmers can optimize the use of irrigation, fertilizer, and pesticides while minimizing resource waste and environmental effects thanks to real-time data and analytics. This study examines IoT's uses and advantages for smart agriculture, highlighting its potential to raise productivity, sustainability, and agricultural output.
Keywords: Internet of Things, Smart Agriculture, Applications, Challenges.

151. Feature Selection and Reduction for Analysis of Histopathology Images

Paper Id 288

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Abstract: Applications ranging from computer-assisted diagnosis (CAD) to image categorization and retrieval are very much popular in the automatic analysis of microscopic images. The research community is increasingly measuring certain key properties in images, such as tissue architecture, color, texture, and morphology. Extracting feature and selecting vital feature set is important task in CAD. The removal of undesirable elements and interferences from surface histopathology images is accomplished using the important technique of feature extraction. Picking a feature vector needs to be done carefully if the goal is to successfully classify the biopsy images. However, an array of features containing a lot of redundant characteristics are being employed in many investigations of the histopathology image classification. This work presents a brief summary of the key algorithms and approaches for feature extraction and selection in histopathological images. The major goal of this research is to bring together a comprehensive overview of the computational techniques used to quantify visual aspects in histology images.
Keywords: Feature extraction, Feature Selection, Histopathological Images, Machine Learning.

152. A novel approach for Generalized Decagonal Neutrosophic Linear Programming Problem

Paper Id 289

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Abstract: In this manuscript, the author describes a new type of programming problem i.e. decagonal neutrosophic linear programming problem (DgN-LPP), and proposes a novel solution methodology for DgN-LPP. To the best of our knowledge, this problem as well as the proposed solution technique have not been discussed in research literature so far. Decagonal neutrosophic numbers (DgNNs) are specific neutrosophic numbers (NNs) having a total of ten edges of all three parts of information viz. truthiness, falsity, and indeterminacy. Here, we formulate DgN-LPP as a linear programming problem with all its coefficients/parameters in the form of Decagonal neutrosophic numbers (DgNNs). To design this problem, we elaborate on the different properties of decagonal neutrosophic numbers (DgNNs) and basic operations on two DgNNs. A new ranking function is also proposed to convert DgNNs into corresponding equivalent crisp values. With the help of the new ranking function, the current problem (DgN-LPP) is converted into an equivalent crisp LP problem. This crisp LP problem is solved with existing methods to obtain the optimal solution of the original DgN-LPP. A numerical example and a case study of an industrial production problem are illustrated to demonstrate the proposed solution techniques as well as their applicability in solving real problems.
Keywords: Decagonal neutrosophic number, Neutrosophic set theory, Linear programming problem, Ranking function; Score function.

153. Strengthening IoT Supply Chain Integrity: A Blockchain-based Approach to Identify Malicious Devices

Paper Id 290

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Abstract: The integration of the Internet of Things (IoT) has revolutionized supply chains by offering enhanced monitoring, tracking, and optimization capabilities. With the growing interconnectivity and dependence on IoT devices, it becomes imperative to identify and prevent cyber-attacks that target these IoT devices during the supply chain process. This paper proposes a novel approach that leverages blockchain technology to identify and mitigate cyber-attacks on IoT devices within the supply chain process. By leveraging blockchain's decentralized nature and immutability, the proposed solution aims to establish a secure and transparent ecosystem, enabling stakeholders to validate the authenticity and trustworthiness of IoT devices throughout the supply chain, thus strengthening the overall integrity of the IoT supply chain network.
Keywords: Blockchain Technology, Secure Supply chain, IoT, IoT Attacks.

154. A Review on Heart Diseases Using Machine Learning and Deep Learning Techniques

Paper Id 291

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Abstract: Heart disease is one of today's major issues, as well as one of the main causes of mortality globally. Electrocardiogram (ECG) and patient data may be used to diagnose cardiac illness in its early stages, as shown by recent advancements in machine learning (ML), deep learning (DL) application. Many scholars and practitioners have uncovered numerous data level and algorithm level solutions throughout the years. An exhaustive literature review is presented here to reveal the difficulties posed by unbalanced data in heart disease forecasts and to offer a wider perspective on the available knowledge. Using 93 articles of reference that we had acquired between 2018 and 2023 from respectable journals, we conducted a meta-analysis. An extensive analysis of 30 literature references has been done, taking into account the kind of cardiac ailment, methods, programmes, and results. Our research showed that existing approaches have a few problems that have yet to be resolved when working with datasets, which ultimately reduces their real usefulness and efficacy. ML and DL methods are utilized to enhance data-driven decision-making for cardiac disease detection. For content analysis of 93 articles' metadata, 30 articles about the diagnosis of heart disease were chosen. The research was primarily concerned with the models' performance, as well as other issues including the machine learning and deep learning's interpretability and explicability.
Keywords: Coronary Artery Disease, Heart Arrhythmia, Heart Failure, Heart Valve Disease, ML, DL.

155. Assessment of Hostels for Higher Education Institute through Principal Component Analysis enabled DEA

Paper Id 292

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Abstract: Data envelopment analysis (DEA) is a well-known multi-criteria decisionmaking (MCDM) technique which is used to measure the relative efficiency of decisionmaking

units (DMUs). However, in the case of classical DEA, the discriminatory power is often weak particularly when the number of input and output variables are high. In the paper, combine analytic hierarchy process-principal component analysis (AHP-PCA), is applied to identify the most relevant criteria thereby reducing the number of criteria and increasing the discriminatory power of DEA. Further, in this study, super-efficiency-data envelopment analysis (SE-DEA) is applied to determine the efficiency of DMUs. The feasibility of the proposed process is illustrated for a real-world multi-criteria decision-making problem based on the hostel management system for the higher education institute (HEI) and assesses the performance of the decision-making units.
Keywords: Performance analysis, super-efficiency, combine AHP-PCA, high-dimensional data.

156. Anchor words inference for Stochastic Matrix Factorization

Paper Id 295

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Abstract: Topic modeling offers a useful way to examine the topic labels of extensive document collections, facilitating the organization and outline of the themes within that collection. Previous researchers have suggested considering the probabilistic model, where each document is the convex combination of topic vectors, and the topic vector is a distribution of words. However, finding an appropriate distribution vector for each topic is not easy for a high-dimensional word co-occurrence space. This work provides an alternative topic vector inference method combined with Nonnegative Matrix Factorization for learning high-quality topics. To verify the effectiveness and priority of the proposed method, we experiment with three public benchmark datasets, NIPS, Movies, and NYtimes, and show a competitive performance.
Keywords: Topic modeling, Anchor Words, Nonnegative Matrix Factorization, QR decomposition.

157. Natural Disaster Twitter Data Classification using CNN and Logistic Regression

Paper Id 300

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Abstract: Satellite-based natural disaster management and assessment are prevalent. A significant hurdle is faced in estimating the population affected as well as the internal damage of buildings which cannot be assessed from the top. Social media images and texts can estimate the affected population fairly well. This paper uses Twitter and Flickr data for sentiment analysis and classification using SVM, CNN, XGBoost, Logistic Regression, Gradient Boost, etc. The sentiment analysis gave us information about the panic situation among the people, i.e. panic, no panic or neutral. The best results for text classification were provided by Logistic Regression which gave an accuracy of 83.45% and 88.99% on test and train data, respectively. For image classification, CNN was used, which gave us an accuracy of 83.29%. Since social media reaction is immediate, our system can swiftly assist government agencies and organizations in providing required aid in affected regions based on priority.
Keywords: Natural disasters, Crisis MMD, Sentiment Analysis, Multi-label classification, CNN, Social media, Machine learning, NLP, Binary classification, Regression.

158. Deep Learning based Framework for Multi-disease Detection using CNN-BiLSTM

Paper Id 301

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Abstract: There has been a surge in interest in developing accurate and efficient illness prediction models to help in early diagnosis and treatment planning in recent years. Despite innovations in deep learning techniques, there is enormous potential for leveraging these techniques for illness prediction across different domains. This study presents a deep learning-based technique for predicting multiple diseases, like diabetes, liver, and Kidney, to improve diagnosis accuracy and facilitate prompt treatments. In this paper, the authors employ two deep learning algorithms, CNN, LSTM, and proposed CNN-BILSTM, to determine if patients are at risk of illness. The suggested CNN-BiLSTM approaches outperform

others for all three diseases, representing a major improvement, especially for a disease that impacts a large population.
Keywords: Deep Learning, Disease Prediction, Convolutional Neural Networks, Medical Data, Early Diagnosis, Healthcare Management.

159. Polyethylene Classification into Virgin and Recycled: A Machine Learning Approach

Paper Id 302

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Abstract: The use of recycled waste is increasing nowadays, and it is a major concern to use recycled post-consumer waste in food packaging. The use of recycled waste will reduce waste and will contribute to sustainability and a circular economy. In this study, a comparison has been made between recycled and virgin Polypropylene (PP) materials that have been used and going to be used in food packaging respectively. Herein, virgin and recycled PP samples were analyzed, and hundreds of Volatile Organic Compounds (VOCs), odorous, and semi-VOCs have been observed with the help of Gas chromatography-mass spectrometry (GC-MS). These samples were analyzed two times to get high efficiency. To classify the VOCs and odorous compounds within the Virgin Polyethylene (Vpet) and Recycled Polyethylene (Rpet) classes, four machine learning algorithms were applied: Random Forest (RF), XGBOOST, Support Vector Machine (SVM), and Gradient Boosted Decision Tree (GBDT). Among these algorithms, Random Forest achieved the highest accuracy. Additionally, the Mean Decrease Impurity method was utilized to determine the feature importance in the classification process.
Keywords: Recycling, Polyethylene classification, Machine learning, Volatile organic chemicals.

160. An overview of software resources for multi-objective optimisation

Paper Id 305

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Abstract: Despite the growing abundance of software resources for multi-objective optimisation, most of the resources are still far from use by many researchers. To highlight their features and functionalities, this paper comprehensively reviews the available software resources for multi-objective optimisation. We first categorised the resources based on the programming languages they support and then evaluated them based on their type, accessibility and available features. This study may assist researchers in selecting an appropriate resource to solve complex multi-objective optimisation problems.
Keywords: Software, Tool, Solver, Resource, Package, Review.

161. Sound database of Industrial Machine for Audio Anomaly Detection

Paper Id 306

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Abstract: Audio anomaly detection (AAD) can seamlessly determine faults in industrial machines and improve the efficiency of predictive maintenance systems. However, unavailability of audio sound recordings of real industrial machines operating in their actual industrial setup has limited efficacy of detection systems. Many different audio databases exist having collection of sounds from dummy (or real) systems operating in controlled environment but collection of audio sounds from actual industrial machines are missing. Therefore, audio sound recordings of Air compressor machine working in its natural industrial environment are presented. Only real sounds of an actual machine are captured. Synthetic mixing of sounds is avoided. Damaging the machine for creating an anomalous state is avoided. Yet fourteen different unhealthy states are identified and their audio recordings are presented. Data-set with varied values of SNRs is also presented. Spectrograms are plotted and spectral shape parameter values of the developed corpus are calculated. The findings demonstrate the divergence in the developed database and its usefulness in building an effective AAD system for a real industrial machine.
Keywords: Audio anomaly detection, Machine sound dataset, Machine condition monitoring, Unsupervised learning, Predictive maintenance, Open access sound database.

162. Snorkel AI method for supply chain event extraction and risk assessment

Paper Id 308

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Abstract: The utilization of Snorkel AI has gained popularity in data-centric computing due to its inherent advantages of quick and systematic iterative processes, along with maximum data utility capability. One of the major challenges in artificial intelligence is the labeling from event extraction. However, a Snorkel AI-based model has been proposed to address this challenge for event extraction. This model aims to improve the accuracy and efficiency of the labeling process by leveraging supervision techniques. Furthermore, the effectiveness of the risk assessment system depends on the quality and relevance of the labeled data. We perform risk assessment through the K-Nearest Neighbor (KNN) Algorithm. The model achieves an accuracy of 92.4 % and significantly improves the precision of supply chain risk assessments.
Keywords: Event extraction, Machine learning, Risk assessment, Snorkel AI, Supply chain.

163. Performance Assessment of Selected Indian Pulp and Paper Mills through two-stage network

Paper Id 309

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Abstract: In the present paper, a case study of selected Indian Pulp and Paper mills is discussed where the aim is to measure the efficiency of the mills based on the available data containing information about the 32 pulp and paper mills as per the 6 selected criteria. To calculate the efficiency of each Mill, data envelopment analysis (DEA) is an appropriate technique. However, classical DEA models often neglect the presence of undesirable outputs or inputs that need to be minimized or reduced. This study addresses this limitation by developing a two-stage network DEA framework that contains undesirable variables. A two-stage network DEA is developed for evaluating the efficiency of decision-making units (DMUs) operating in a multi-stage process. Here, a DMU represents a Pulp and Paper mill.

The results highlight the importance of considering undesirable variables in assessing the efficiency of DMUs accurately. The developed model offers valuable insights for decision-makers by identifying areas for improvement and suggesting strategies to enhance efficiency while dealing with undesirable variables. The efficiency scores obtained through the two-stage network DEA technique are compared with those calculated by the classical DEA method.
Keywords: Efficiency, Two-stage network DEA, Paper mills.

164. Time Series Forecasting of Sugarcane Production in India

Paper Id 310

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Abstract: Sugarcane is a major commercial crop in India's agricultural map, and a significant portion of the population relies on the sugar business for their income. Predictions for such a significant commercial crop are extremely important for commerce and industry. A well-defined forecasting system will support the decision-makers in making a proper planning for distribution, storage, marketing, price fixation, etc. In the current study, time series forecasting is done for the sugarcane production in India using statistical and machine learning algorithms like Auto-regressive integrated moving average (ARIMA), Fb-prophet, Support vector regression (SVR), Random Forest, Long Short Term Memory (LSTM), k-nearest neighbor (KNN) and artificial neural networks (ANN).
Keywords: Sugarcane, Production, Forecasting, Machine Learning.

165. Hough Transform Generalization for Detecting Fuzzy Line

Paper Id 311

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Abstract: An increase in global population growth has necessitated an increase in food production. One of the main factors influencing annual agricultural production is the abnormal physiological functioning of plants or plant diseases, which directly affects the vegetation

leading to a reduction in plant yields and, in the worst case, may even destroy the entire plantation. A majority of diseases can be identified through the plant's leaves, which a plant pathologist traditionally does. This, however, is a time-consuming task, and the accuracy of diagnosis depends a lot on the expertise of the pathologist. Convolution neural networks (CNNs) have shown immense potential in image identification tasks. However, optimizing its hyperparameters and layouts is a challenging task. We proposed a genetic algorithm to enhance the performance of CNNs for plant disease identification by assessing the most effective hyperparameters and architecture for the fully connected layers of three cutting-edge CNNs: Xception, DenseNet201, and ResNet152V2. The results show that genetic algorithm possess the potential to enhance the performance of CNN architecture in the agriculture domain, especially when used for plant disease identification.
Keywords: Plant Disease, Genetic Algorithm, Pre-Trained CNN, Image Classification.

166. Performance Assessment of Indian States Towards Sustainable Development Goals: A Comparative Analysis using TOPSIS and Clustering Algorithm

Paper Id 312

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Abstract: Society 5.0 represents a transformative era where the convergence of technology and society reshapes decision-making processes. This paper explores the challenges and opportunities in decision-making within Society 5.0 and focuses on the Sustainable Development Goals (SDGs) as a critical framework for sustainable development. Assessing the progress of Indian states toward these goals is crucial for effective policy formulation. To comprehensively analyze the performance of Indian states in achieving the SDGs, this study employs the TOPSIS method and cluster analysis. Integrating these approaches establishes a robust framework for benchmarking and evaluating state performance. The findings provide valuable insights into progress variations, identifying improvement areas and enabling targeted policy interventions and resource allocation. This research enhances our understanding of sustainable development progress at India's state level. By informing policy decisions and fostering effective strategies, it contributes to the successful implementation of the SDGs. The manuscript presents the methodology, data analysis, and results, providing a structured assessment of Indian states' SDG performance. Through this study, we aim to support evidence-based decision-making and promote sustainable development in India.
Keywords: Society 5.0, SDGs, TOPSIS, Clustering, K-means.

167. Examining Structural Bias in Salp Swarm Algorithm and Its Two Variants using Signature Test: A Theoretical Study

Paper Id 313

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Abstract: The Salp Swarm Algorithm is a popular optimization method known for its simplicity and efficiency. However, it is susceptible to structural bias, which can cause the algorithm to favour specific regions of the search space without regard for the objective function. Structural bias can hamper exploration, leading to the population revisiting certain locations without acquiring new information, which adds to the computational load. This study involves a comprehensive investigation of the occurrence and types of structural bias in the Salp Swarm Algorithm. Additionally, we evaluate two newly developed variants of Salp Swarm Algorithm, namely the Laplacian Salp Swarm Algorithm and the Quadratic Approximation Salp Swarm Algorithm, for their structural bias. To detect and analyze structural bias and its type, a simple yet effective methodology called the signature test is employed. After conducting a thorough analysis, we have identified algorithms that have demonstrated unbiased behaviour. We anticipate that our analysis will be a valuable resource for practitioners who are interested in analyzing the theoretical aspects of their algorithms.
Keywords: Metaheuristic algorithms, Salp Swarm Algorithm, Laplacian Salp Swarm Algorithm, Quadratic Approximation Salp Swarm Algorithm, Structural bias, Signature test.

168. An application of two-stage network DEA model with desirable and undesirable outputs

Paper Id 316

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Abstract: COVID-19 has been a serious issue in the whole world till today There have been procurement challenges and ensuring the availability of vaccines and healthcare facilities has proved problematic during different waves of the pandemic. In this paper, the two-stage network data envelopment analysis (NDEA) framework is used as a powerful and flexible tool to evaluate the efficiency of decision-making units (DMUs) when dealing with undesirable outputs. By considering desirable and undesirable outputs separately, this approach provides

a more realistic and accurate assessment of performance, especially in complex, real-world settings where multiple inputs and outputs are involved. In this research, we show that the two-stage network DEA directs how to optimize the healthcare resources available and improve the efficiency in handling the problems, issues, and challenges due to pandemics such as COVID-19 in two stages. The first stage is spreading the pandemic, whereas the second stage is for maximizing recovery and minimizing death.

Keywords: Data Envelopment Analysis, undesirable outputs, Efficiency, Decision Maker Unit

169. ANFIS for Markovian Unreliable Retrial Queue with Differentiated Vacation

Paper Id 317

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Abstract: The performance analysis of an unreliable server Markovian retrial queueing system with balking and reneging of the customers has been proposed. The differentiated vacation policy has been considered which is a combination of κ working vacation and complete vacation. To analyze the queueing system, Chapman-Kolmogorov equations are constructed and solved by implementing the matrix geometric method. The system metrics such as state probabilities, mean queue length, mean system length, mean waiting time in the queue, total cost of the system etc. are formulated. The sensitivity analysis of the system performance metrics has been done by taking illustrations. The hybrid soft computing approach Adaptive Neuro-Fuzzy Inference System (ANFIS) has also been implemented to explore the design of AI based controller in order to control the traffic.

Keywords: Retrial queue, unreliable server, differentiated vacation, ANFIS, matrix geometric method.

170. Exploring the Recent Applications of Circle Packing Problem

Paper Id 319

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Abstract: The circle packing problem is an essential to combinatorial optimization, which has gained popularity due to its numerous applications in various fields. We give a thorough examination of the circle packing problem's applications during the last five years, focusing on real-world applications in various fields. We examine recent advancements in this subject, emphasize key issues and opportunities, and recommend future research directions. We also critically examine the circle packing problem's restrictions and strengths. This research shows that a circle packing problem is a powerful tool for handling a wide range of problems and that its uses have contributed to significant breakthroughs in a variety of fields. Our findings provide important insights into the current state of circle packing problem applications and lay the groundwork for future research.
Keywords: Circle Packing Problem, Sphere Packing Problem, Real life Applications.

171. Comparision Analysis of the Structural Biased of MPA and OLMPA

Paper Id 320

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Abstract: The Marine Predators Algorithm, known for its simplicity and efficiency, is a widely used optimization method. However, it is prone to structural bias, which can cause the algorithm to favor specific areas in the search space without considering the objective function. This bias can hinder exploration, leading to the population repeatedly visiting certain locations without gaining new information, resulting in increased computational burden. In this study, we extensively investigated the occurrence and types of structural bias in the Marine Predators Algorithm. We also assessed newly developed algorithm variants, such as the Opposition based Local Escaping Marine Predator Algorithm, to determine their susceptibility to structural bias. To detect and analyze structural bias and its types, we employed a straightforward yet effective methodology called the signature test. Through a comprehensive analysis, we have identified algorithms that exhibit unbiased behavior. We believe that our analysis will serve as a valuable resource for practitioners interested in analyzing the theoretical aspects of their algorithms.
Keywords: Nature Inspired Optimization, Metaheuristics, Marine Predators Algorithm, Structural biased.

172. Comparative Performance of Five Population-based Algorithms for Asymmetric Travelling Salesman Problem

Paper Id 321

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Abstract: In this study, the performance of five well-known population-based algorithms: Particle Swarm Optimization (PSO), Grey wolf Optimizer (GWO), Whale Optimization Algorithm (WOA), Sine-Cosine Algorithm (SCA) and Artificial Humming Bird Algorithm (AHA) is analysed over Asymmetric Travelling Salesman Problem (ATSP). These five algorithms are considered for analysis because they have produced some of the most impressive results in the literature for various optimization problems as well as real-world problems. These algorithms are initially proposed to solve continuous optimization efficiently. Therefore, to solve ATSP which is a combinatorial optimization problem, these algorithms are slightly modified by using the order-based decoding method. Also, the 2-opt algorithm is used to enhance the local search ability of these algorithms. To investigate the performance, all the algorithms are tested over 14 ATSP instances and compared with each other. Additionally, the performance is verified by conducting statistical test. The computational results show that AHA is more competitive and robust in solving the ATSP.
Keywords: Particle Swarm Optimization, Grey wolf Optimizer, Whale Optimization Algorithm, Sine-Cosine Algorithm, Artificial Humming Bird Algorithm, Asymmetric Travelling Salesman Problem.

173. Establishing the Linkage between Industry 4.0 Applications and Circular Supply Chain Performance for SMEs: An Overview

Paper Id 322

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Abstract: In this study, the significance of circular economy (CE) to supply chain networks is explored, emphasizing the applicability of Industry 4.0 technologies. This study highlights the combined influence of two distinct domains – circular supply chain (CSC) and Industry 4.0 (I 4.0), on the circular economy in the context of small-medium enterprises. Despite the fact that many studies have highlighted barriers to CE implementation, no in-depth research has examined how these barriers affect CSC. This study incorporates a detailed literature assessment to put barriers from the viewpoint of 3R reclamation methods (reusing, re-designing, and recycling). The main barriers to 3R reclamation techniques are listed, and their impacts are discussed. The findings infer that the hurdles pertaining to "economics and finance," "governments and regulations," and "society and culture" significantly affect an organization's ability to implement reclamation measures in the early phases. The most important findings highlight how end-user interest in buying reclaimed

goods affects re-utilization, how inadequately enabling legislation affects the 3R strategies (mostly reclamation), and how an absence of market cooperation affects an organization's ability to carry out re-manufacturing effectively. The outline of this study is to adopt CSC in SMEs using I4.0 technologies in order to achieve sustainability on a broad scale.
Keywords: Circular Supply Chain, Industry 4.0, Circular Economy, Small Medium Enterprises.

174. Mathematics-Driven Model for Closed-Loop Supply Chain Network Design

Paper Id 324

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Abstract: The closed-loop supply chain (CLSC) has gained popularity as a practical way to improve sustainability and resource efficiency in various industries. Unlike a linear supply chain, a closed-loop supply chain uses reverse logistics to recover, recycle, and reuse items or their components. This study creates a mathematical model for a reliable and effective CLSC model that integrates forward and reverse logistics operations to reduce costs, boost profits, and reduce environmental impact. A metaheuristic approach (Genetic Algorithm) is used to solve the model. The experimental findings show that the suggested strategy performs in enhancing CLSC performance.
Keywords: Supply chain, Mathematical model, Genetic Algorithm.

175. Population Dynamics in the Whale Optimization Algorithm: A Theoretical Investigation of Structural Bias

Paper Id 325

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Abstract: The Whale Optimization Algorithm (WOA) introduced by Mirjalili and Lewis in 2016 has gained significant attention as a notable optimization algorithm. Despite its wide usage, limited theoretical investigation has been conducted on this class of optimization algorithms. A critical aspect that has received inadequate attention is the presence of structural

bias—an algorithmic operator bias that causes the population to repeatedly focus on specific regions. This phenomenon severely restricts the algorithm's exploration capability, increases computational costs, and slows down convergence. Therefore, it is crucial to analyze the population dynamics of WOA, identify potential structural biases, and develop strategies to mitigate their adverse effects on algorithm performance and computational efficiency. Surprisingly, no prior studies have comprehensively examined the structural bias of WOA in the existing literature. Hence, the primary objective of this study is to analyze the population dynamics of WOA and investigate the presence of structural bias using signature tests. Our analysis reveals the existence of a distinct diagonal axial bias within WOA, indicating a tendency to converge towards specific regions of the search space. By comprehending and characterizing this bias, our study provides valuable insights into the behavior of WOA, enhancing the understanding within the research community and offering guidance for future advancements in algorithm design.

Keywords: Metaheuristic Algorithms, Whale Optimization Algorithm, Structural bias, Population dynamics, Signature test.

176. Comparative Analysis of Pre-trained Deep Learning Models for Classification between Diseased and Healthy Apple Leaves

Paper Id 326

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Abstract: Plant diseases are the leading cause of production decline in the agricultural sector. Every year, the agriculture sector suffers significant crop production losses due to delayed identification of plant diseases. Plant disease can significantly impact agricultural productivity, leading to substantial crop losses and economic damage. Correctly identifying plant diseases is a significant challenge as plants are susceptible to various diseases, and visually observing the leaves can be particularly difficult if the diseases have similar textures or visual characteristics. We compared three pre-trained machine learning models, VGG19, Inception V3, and ResNet50, to classify healthy and diseased apple leaf images. Using the Plant Village dataset, we assessed these models' accuracy in organizing healthy and diseased leaves. Additionally, we explored the impact of changing optimizers, such as using the Nesterov optimizer in the Vgg-19, Inception model, and Resnet50, to observe variations in model performance. The motive of comparison is to find the best model. The data used in

this study can be found at https://github.com.
Keywords: Apple leaf disease, VGG19, InceptionV3, ResNet50.

177. LSTM based Bi-directional Sequence-to-Sequence Model for solving Arithmetic English Word Problems

Paper Id 327

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Abstract: Solving arithmetic English word problems is a challenging task that requires the integration of natural language understanding and mathematical reasoning. In this research paper, we propose a solution using an LSTM-based bidirectional sequence-to-sequence model to tackle this problem. Our study focuses on the MathQA dataset, which provides a diverse set of arithmetic word problems. The LSTM-based model utilizes an encoder-decoder architecture, with the encoder processing the input word problem and the decoder generating the corresponding mathematical expression or answer. The bidirectional nature of the LSTM allows for the capture of contextual information from both past and future contexts, enhancing the model's understanding and performance. To evaluate our proposed approach, we conducted experiments on the MathQA dataset. We compared the performance of our LSTM-based model with other baseline models commonly used in similar tasks. Our results demonstrate that the LSTM-based bi-directional sequence-to-sequence model achieves superior performance in solving arithmetic English word problems on the MathQA dataset. The model showcases its ability to capture complex linguistic patterns and mathematical relationships, leading to accurate predictions. Furthermore, our experiments highlight the effectiveness of leveraging bi-directional information flow for enhanced contextual understanding and improved performance.
Keywords: Artificial Intelligence, Math Word Problems, Machine Learning, Natural Language Processing, Recurrent Neural networks.

178. Optimized Vaccine Selection Using Machine Learning and Genetic Algorithms: A Study on Side-effects of Covid-19 Vaccines

Paper Id 330

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Abstract: The Covid-19 pandemic has necessitated large-scale vaccination campaigns to control the virus's spread. Given the scale of these efforts, it's crucial to scrutinize potential adverse effects, especially in vulnerable population groups. This study combines machine learning and Genetic Algorithms (GA) to analyze patterns of patient recovery post-vaccination. We use a range of classifiers, including the Gradient Boosting Decision Tree (GBDT), to identify key features and symptom categories that influence patient recovery. We also use Principal Component Analysis (PCA) to reduce dimensionality and uncover patterns within high-dimensional data. The data used in this study has taken from the Vaccine Adverse Event Reporting System (VAERS). With the help of GA, we aim to guide optimal vaccine selection for susceptible demographics, minimizing the risk and severity of side effects. Our research paves the way for more personalized vaccination strategies, promoting healthier outcomes and reducing risks associated with mass vaccination.
Keywords: Covid-19, Side effects minimization, supervised machine learning, Genetic Algorithm.

179. Parameter Estimation of a Solar Module by Wild Horse Optimizer

Paper Id 332

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Abstract: Photovoltaic (PV) modules are composed of several PV cells that are basically characterized as circuits, such as the single diode model (SDM), double diode model (DDM), and triple diode model (TDM). Parameter estimation of the PV cell model is significant to enhance the efficiency of the PV system. In this article, for the estimation of PV cell parameters a metaheuristics technique is presented. The authors provide a framework for

estimating PV module parameters based on a recent metaheuristic known as the wild horse optimizer (WHO). The results so obtained demonstrated that this framework based on WHO is effective for "PV cell circuit model parameter estimation problem".
Keywords: Metaheuristics; Photovoltaic (PV) modules; Single diode model (SDM); Wild Horse Optimizer (WHO).

180. Study on Vehicles Routing Problems in the context of Genetic Algorithm and Simulated Annealing

Paper Id 334

Chitranshi Mishra[1], Manjari[2], Suneet Singh[3], Sunil Jauhar[4], Saurabh Pratap[3]
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Abstract: The field of metaheuristics has made significant progress in solving complex optimization problems, and it continues to evolve with the emergence of new algorithms. This paper focuses on providing a schematic review of the research employing Genetic Algorithms (GA) and Simulated annealing algorithms (SA) to vehicle routing context. The study involves a analysis of approximately 487 papers published from 2018 onwards. These papers are classified based on relevant keywords to examine the advancements and trends in the field. Additionally, this paper discusses recent developments, identifies research gaps, and outlines future directions specifically in the context of vehicle routing and the application of genetic algorithms and simulated annealing algorithms.
Keywords: Vehicle Routing, Optimization, Bibliometric Analysis, VosViewer, R Studio.

181. Determination of Significant Barriers towards addressing the Industry 4.0 Implementation Prospects: A MCDM technique-based Approach

Paper Id 335

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Abstract: This article works at identifying and analyzing the major barriers to the deployment of the fourth industrial revolution, the I4.0 concept in Indian manufacturing sectors. An organized literature review has been carried out from several important online research databases, like Emerald Publication, Web of Science, Scopus, John Wiley, IEEE Explore, ASME, Taylor and Francis, SCIRP, Springer Open, and Science Direct to perform this study on I4.0 deployment. Applying the analytical hierarchy process (AHP) technique, following a thorough literature study to identify the various obstacles to I4.0 deployment, prioritizes these barriers. The contextual linkage between the various significant barriers to Industry 4.0 implementation was developed using the AHP technique after consulting a panel of specialists from both industry and academia. The findings of this study will aid to identify and categorize significant barriers, showing both the immediate and long-term impacts of each of these derived barriers on the implementation of I4.0. The outcome of this study will provide experts and policymakers with a thorough knowledge of the implementation prospects for Industry 4.0 and the various obstructions affecting its successful deployment. In this study, the five major barriers to Industry 4.0 deployment have been identified, and employing the AHP technique, hierarchical linkages are developed among these barriers striving towards successfully implementing the I4.0 concept.
Keywords: Smart Manufacturing, Industry 4.0, Manufacturing Industries, MCDM, AHP.

182. Modelling of high efficiency battery charger for light EVs using MATLAB/SIMULINK

Paper Id 337

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Abstract: Recently, there has been a rise in interest towards electric and hybrid electric cars (EVs and HEVs) to lower the levels of pollution in the environment. The batteries used for propulsion in electric vehicles (EVs) may be charged from the grid through an on-board charger in these cars. Chargers are a vital component of an electric vehicle; hence, it is necessary to have chargers that have a high efficiency and a high-power factor. In this paper, it is proposed that a bridgeless single-power conversion battery charger be used to achieve high efficiency. It is constructed up of an isolated step-up AC-DC converter and a series resonance circuit that is connected in series. The bridgeless design helps to cut down on the conduction losses that are experienced by the input diode rectifier. The zero current switching that is provided by the series-resonance circuit helps to lessen the reverse recovery losses that are caused by the output diodes (ZCS). In addition, the core of the transformer may be activated in both directions owing to direct and series-resonance current injection,

which contributes to the device's high-power capacity. The total harmonic distortion and power factor are the two metrics that are used in the analysis of the efficiency of the power conversion performed by the charger. Since it is integrated into the EV, the battery has to be as compact as possible, as well as lightweight and long-lasting. In a single-stage power conversion, the control approach that is derived from feedback linearization is established. This allows the proposed charger to regulate the output power and modify the power factor. The MATLAB/SIMULINK is used throughout the process of developing and validating the proposed system.
Keywords: Power Converter, Battery Charger, Electric Vehicles (EVs), Hybrid Electric Vehicles (HEVs).

183. Why Do Cities Hold Cash? Empirical Arguments from Indian Municipal Corporations

Paper Id 338

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Abstract: This study is an early-bird attempt to probe the reasons behind Cash Holding among Indian urban local bodies (ULBs). The risk of uncertainty, volatility in cash flows, and dynamic economic conditions insist on the management of ULBs to view cash as a strategic tool for situation management and scenario planning. This paper explores the reasons for Cash Holdings by analyzing 38 Indian municipal corporation's data over five years. The study results revealed the Existence of a high degree of inverse relationship between municipal Cash Holdings and aspects such as Growth, Size, State Revenue, Capital Expenditure, and Debt Per Capita. In contrast, Administrative Expenses and Tax Revenue positively correlated with municipal Cash Holdings. The study results empirically identified the variables, namely Size, Administrative Expense, State Revenue, and Debt Per Capita, as the primary reasons for holding cash by Indian municipal corporations and pointed out the Existence of differences among different categories of municipal corporations in India.
Keywords: Cash Holdings, Urban Local Bodies, Municipal Finance, Liquidity, AMRUT, Financial Stability.

184. Role of Metaheuristic Algorithms in Classification and Clustering: A State of the Art

Paper Id 339

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Abstract: This paper explores the approaches of the Metaheuristic Algorithms (MAs) to tackle the challenges of feature selection in classification tasks and centroid initialization in clustering problems. Feature selection plays a critical role in handling the curse of dimensionality and identifying relevant and non-redundant features for classification. In the field of clustering, particularly k-means, determining the optimal number of clusters and initializing cluster centroids are crucial steps. The research work highlights the significance of MAs in addressing feature selection and clustering challenges. These algorithms help to construct strong machine learning methods for classification and clustering issues by utilizing their optimization capabilities.
Keywords: Metaheuristics Algorithm, Machine learning, Clustering, Classification Algorithm.

185. Expected Credits Approach for Scale Efficiency using Fuzzy DEA

Paper Id 340

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Abstract: Data Envelopment Analysis (DEA) is a technique that uses data to evaluate the relative efficiencies of decision-making units (DMUs). In real life, the collection of crisp data is onerous; some vagueness can occur due to inconvenient data. With vague data, conventional DEA models cannot be used, as DEA is very sensitive to data. To overcome this problem, the fuzzy theory is integrated with DEA. The New Slack DEA Model (NSM) concerns straight away with input and output slacks. To handle vague or qualitative data, a fuzzy New Slack DEA model can be used. In this study, the fuzzy NSM technique with the expected credits approach is used to calculate the scale efficiencies of DMUs under the constant returns to scale (CRS) and variable returns to scale (VRS) assumptions. This approach converts the fuzzy NSM into a crisp linear programming model and provides a single, crisp efficiency score for each DMU. To illustrate the proposed fuzzy NSM technique with the expected credits approach, the scale efficiency of the Indian oil refineries is measured.
Keywords: Data envelopment analysis, Fuzzy NSM technique, Expected credit approach, Oil refinery.

186. Performance Evaluation of Public Transport Sector with Missing Data

Paper Id 341

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Abstract: Efficiency analysis is vital for decision-making in service sectors such as public transport and public health, aiding policy formulation and understanding competition. This study focuses on evaluating the efficiency of India's public transport sector, particularly State Road Transport Undertakings (SRTUs), utilizing Data Envelopment Analysis (DEA). However, a key challenge in real-life efficiency analysis is the unavailability or absence of certain data points. To address this issue, the study proposes the integration of DEA models and fuzzy numbers. By incorporating non-symmetrical fuzzy data, the study measures the efficiency of SRTUs and provides a ranking based on fuzzy efficiency.
Keywords: Data Envelopment Analysis, Efficiency, Fuzzy LPP, Transport Sector.

187. Heterogeneous Mixture Model for Software Reliability Prediction

Paper Id 343

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Abstract: The mixed distribution model can be used for the performance prediction of software reliability indices. The purpose of present study is to develop a heterogeneous mixture model of distributions to establish the software reliability indices which are computationally tractable. The parameter estimation is done using Expectation-Maximization (EM) algorithm and implemented on the real time software failure observation. We examine the suggested mixture models to opt the best model by using the Goodness of Fit (GOF) tests. To determine the best model, some statistical tests such as AIC, BIC, HQC etc. are performed. Adaptive Neuro-Fuzzy Inference System (ANFIS) which is a combination of artificial neural network of ANN and fuzzy inference system is used for comparing the numerical results obtained for the software indices via mixture model.
Keywords: Reliability, mixture model, Expectation-Maximization Algorithm, AIC, BIC, HQC, ANFIS.

188. Two Dimensional Finite Element Model of Interdependent Ca2^+ and IP_3 Dynamics in T Lymphocyte

Paper Id 344

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Abstract: Calcium signaling is crucial for the functioning of the immune system, particularly in lymphocytes. These cells rely on regulated increases in cytosolic and organellar calcium concentrations to control various essential processes such as metabolism, proliferation, differentiation, secretion of antibodies and cytokines, and cytotoxicity. The activation of calcium influx in T lymphocytes involves the participation of inositol 1,4,5-trisphosphate (IP3), although the exact mechanisms are still a topic of debate. Previous studies have investigated the relationship between IP_3 formation and calcium mobilization using different experimental methods. To further explore this relationship, we propose a mathematical model that examines the complex dynamics of calcium and IP_3 in T lymphocytes. Our two-dimensional model incorporates calcium-induced calcium release via IP_3 receptors and incorporates calcium modulation of IP_3 levels through feedback regulation of production and degradation. By employing the Forward-Time Center-Space method, we were able to successfully simulate the observed oscillatory patterns in calcium and IP_3 signals. The model highlights the significance of calcium-dependent production and degradation of IP_3 in generating complex calcium oscillations in cardiac T lymphocytes. We also investigated the impact and sensitivity of source, leak, and diffusion coefficients on the dynamics of both calcium and IP_3. Our findings indicate a nonlinear relationship between calcium and IP_3 dynamics.
Keywords: Finite Element Method, RyR, Buffer, IP_3R.

189. A Generalized Two and Three Phase Software Reliability Growth Model Incorporating Testing Coverage and Imperfect Debugging Process

Paper Id 345

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Abstract: Innovative advancements are quickly in an industry, to stay aware of the bit-by-bit expanding race and to get the upper hand, the product development associations need to acquire the right information about software, use it competently, and pass it to the next generation. Since software reliability is a key component of good programming, it is possible to decouple quantitative measures for the reliability of programming frameworks from software reliability models. Software reliability is commonly understood to be the likelihood that a software system will successfully fulfill the task assigned to it in a specific environment for

a predetermined number of inputs, assuming that the hardware and the information are both error-free. One of the primary factors contributing to the software quality is its reliability. The three-phase software reliability growth model discussed in this research includes test coverage in an adequately debugged environment. We construct two models for the growth of software reliability that take complete debugging and testing coverage into account. The results of the sensitivity analysis demonstrated that the parameters of the defined models have an impact on both the software's reliability and the mean value function (MVF). The cost of the software has been optimized using the PSO approach.
Keywords: Software reliability, testing coverage, imperfect debugging, fault detection rate (FDR), mean value function (MVF).

190. Impact of Circular Economy on Sustainable Inventory Model with Renewable Energy under Green Environment

Paper Id 346

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Abstract: Sustainability becomes an effective technique to reduce the effect of global warming on the earth. The concept of a green environment encompasses various practices focused on environmental conservation and improved ecological health. These practices include informed consumption, conservation measures, and investments in renewable energies. Circular economy principles are particularly effective in the modern era. This paper introduces a novel approach for demand and profit dependent on the circularity index. The study encompasses all the mentioned factors and explores their interactions. Specifically, renewable energy is harnessed to reduce costs and carbon emissions, further contributing to sustainability. The primary objective of this paper is to develop a mathematical model that addresses sustainable inventory management within a green environment, incorporating renewable energy resources. To illustrate the model's effectiveness, a numerical example is presented using Mathematica 12.0 software. Additionally, sensitivity analysis is conducted to highlight the model's key features and the influence of different parameters on the optimal solution.
Keywords: Circular Economy, Inventory Model, Green Environment, Renewable Energy, Circularity Index.

191. An EPQ Model for Stock Dependent Demand with setup cost Dependent on Population under Green Environment

Paper Id 348

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Abstract: Globally the setup cost is the most crucial problem in the marketplace. Product deterioration becomes a very major problem. To control the deterioration rate, we used preservation technology. Also, to protect the environment we invest in green technology such as renewable resources in the production process and storage process, etc. In this paper, we developed a production inventory model in which the production rate is demand dependent and includes above mention factor. Our aim is to find the optimal decision for the manufacturer. From the sensitivity analysis, we conclude that on increases in the deterioration reduction technique parameter, the order quantity slightly increases. But the total cost decreases. Numerical validation of the model is taken by using the software Mathematica 12.0. Sensitivity Analysis is carried out for the behavior of different parameters on optimal cost.

Keywords: Stock Dependent Demand, Population Dependent Setup Cost, Preservation Technology, Green Technology.


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