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Dr. P. Rama Mohan, Dr. C. Venkata Subbaiah,
Dr. M. Venkata Ramana, Smt. S. Z. Parveen,
Dr. A. Naresh, Dr. G. Ramanjaneyulu**
Editors

**Proceedings of National Conference on
Emerging Trends in Engineering and
Management**

EITEM-2025

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**Proceedings of National Conference on
Emerging Technologies in
Engineering and Management**

ETEM – 2025

Editors

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Preface

It is with great pleasure that we present the Proceedings of National Conference on Emerging Trends in Engineering and Management (ETEM)-2025. This book is a collection of selected papers that were presented at the conference and serves as a valuable resource for researchers, academicians, professionals, and students alike.

The ETEM conference is a platform for scholars and experts from various fields to come together and exchange ideas, discuss new research findings, and collaborate on innovative solutions to emerging challenges in their respective areas of expertise. The conference saw an overwhelming response from researchers and scholars from across the globe, who shared their latest research work and insights on diverse topics.

The papers presented in this conference cover a wide range of topics, including but not limited to artificial intelligence, computer science, environmental science, material science, and social sciences. These papers offer a glimpse into the latest trends, innovations, and breakthroughs in these areas, and provide valuable insights into the future directions of research.

We would like to thank all the contributors who submitted their work and made ETEM-2025 a grand success. We would also like to express our gratitude to the reviewers and editors who rigorously evaluated each paper and ensured that only the highest-quality work made it to the final publication.

We hope that this book will serve as a valuable reference for researchers and professionals and will inspire further research and collaboration in the fields of science and engineering.

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ETEM-2025

Engineers and scientists are the builders of the nation. They provide basic infrastructure facilities needed for the society. While providing these basic infrastructure facilities, an engineer or scientist is concerned with four aspects, namely, Quality, Productivity, Safety and Economy (QPSE). There has been a noticeable change in the environment within which engineer, or scientist carry out their work. There is a growing concern on the adverse consequences of the sustainable development activities. Global warming and climate change and their impacts on the various sectors of the society are also of major concern. In this changing environment the specifications for meeting the QPSE requirement are becoming more and more complicated. A multitude of threats confront us in our effort to achieve sustainability. Engineers and scientists have always been looking for innovative tools and techniques for solving the challenging problems that they face during planning, analysis, design, and construction of engineering structures. This conference is aimed to provide a forum to all engineers and scientists to deliberate on the innovative tools and techniques that are needed to face the challenge of sustainable development.

All the submitted papers will go through a peer review process and the corresponding authors will be notified. Authors of the selected papers may present their papers during the conference.

Acknowledgements

We would like to express our gratitude and sincerest thanks to **Dr. C. Gangi Reddy**, Chairman-AITK, **Sri. C. Yella Reddy**, Vice- Chairman-AITK, **Sri C. Abhishek Reddy**, Secretary & Correspondent-AITK, whose generous support made this book possible. Their encouragement to advancing research and support in the field is greatly appreciated.

We would like to thank **Prof. A. Sudhakara Reddy**, Principal-AITK, has monitored whole activity of this conference from beginning till its successful end.

We would like to thank the contributors whose insightful and thought-provoking research form the foundation of this book. Their research, ideas, and expertise have contributed immensely to the development of the field and will undoubtedly inspire new avenues of inquiry.

We would also like to extend our appreciation to the reviewers who provided valuable feedback and guidance on the book. Their critical insights and suggestions have helped us ensure the quality and rigor of the book.

We would like to thank the editorial and production team who worked tirelessly behind the scenes to bring this book to fruition. Their hard work, dedication and attention to detail have resulted in a high-quality publication that we are all proud of.

We are deeply grateful all those who made the publication of this book possible

We hope that the book will stimulate the new thinking, spark innovative ideas and contribute to ongoing discussions and debates in the field.

Once again, thank you to everyone involved in the making of this book. We hope that you find it informative, engaging, and thought-provoking.

Sincerely,
Organizing Chairs
ETEM 2025

Dr. C. GANGIREDDY

Hon'ble Secretary

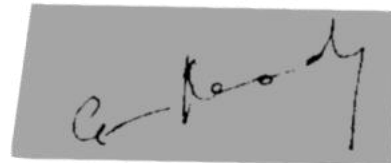
Annamacharya Educational Trust



MESSAGE

It gives me overwhelming joy to best of my best wishes and undeniably great pleasure that the Annamacharya Institute of Technology & Sciences-KADAPA which is a premier establishment in the field of education, is organizing Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 4th to 7th MARCH 2025. It is a premier Centre for imparting excellent education in a variety of courses at Undergraduate, Post-Graduate levels. I am quite sure that the Conference will provide a common platform for deliberations and discussions which would lead to mutual progress and development in Academic and Research. It is worth praising that, within Thirteen years of inception, this institution has crowned many technical quality-oriented feathers in its Glory.

I am sure that this promising global event will be another milestone of AITS KADAPA. I wish that this event will be another benchmark that stands as a symbol of academic Virility of the college. I wish this National Conference to be a grand successful event.



(Dr. C. GANGIREDDY)

Dr. A. SUDHAKARA REDDY

Principal



MESSAGE

It is my privilege to express that **AIMS-KADAPA** is marching ahead to organize Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 4th to 7th MARCH 2025. In this Technical era, Symposium of this sort are becoming essential and very much helpful for the development of students of various departments and definitely leads a way to amplify the learning skills of students efficiently and effectively. It is an immense pleasure for me to be a part of such knowledge-oriented program organized in this institution, **AIMS-KADAPA**.

I congratulate all the team members for their efforts in organizing such an event which will enhance the technical awareness of all the participants from various colleges.

I am confident that the deliberations among the galaxy of distinguished and young minds will be fruitful. This National Level Students Technical Symposium will be another stepping stone of success for this institution. I take this opportunity to congratulate the Students, Faculty and Non-Teaching staff of all the departments for organizing “Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 4th to 7th MARCH 2025. I am joyful for wishing this Conference a grand success.

A handwritten signature in blue ink, which appears to read "AS Reddy".

(Dr. A. SUDHAKARA REDDY)

Dr. P. Rama Mohan
Head of the Department
Electrical and Electronics Engineering



MESSAGE

On behalf of Electrical and Electronics Engineering department, it is my great honour and pleasure to bring out this message on the occasion of Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 4th MARCH 2025. This Conference has been continued as a tradition of being the premier forum for presentation of results and experience reporting on leading edge issues concerning recent research and importing the latest technical knowledge to the students.

The mission of the Conference is to share novel ideas as well as practical applications in the area of Electrical Engineering, in addition to identify new directions for future research and developments. “**ETEM 2K25**” is such a Conference which provides unique opportunities for young engineers, researchers and entrepreneurs to grow themselves technically. The main objective of this Conference is to create platform for students to come out with new ideas in technical area and share their knowledge.

As a Head of the Department of Electrical and Electronics Engineering, I appreciate the efforts of faculty members, supporting staff and students in organizing excellent Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 5th MARCH 2025, and I wish each of them to have successful Conference. I am very much thankful to each and every student participant. I personally thank the Management and the Principal for providing the required sources for conducting such a wonderful event.

A handwritten signature in black ink, appearing to read 'P. Rama Mohan', with a horizontal line underneath.

(Dr. P. Rama Mohan)

Dr. M. VENKATA RAMANA
Head of the Department
Artificial Intelligence and Data Science



MESSAGE

Artificial Intelligence & Data Science is an exciting, growing and challenging field that has vast impact on daily life. Our department working to produce rich blend of competent, technical and managerial, social skills and contribute to nation build. The department has well qualified and high experienced dedicated faculty with effective research-oriented teaching learning process. Department is wide open to innovative ideas and methodologies as excellent learning centre. The excellent infrastructure and teaching faculty of the Department ensuring quality education such interaction among students, parents and staff, along with a Training and Placement Cell ensures a bright future to its students.

As H.O.D. I wish to take the opportunity to congratulate the students, Teaching and Non-Teaching staff of the department for organizing “Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 7th MARCH 2025”. It’s my privilege in wishing the Conference a grand success.

A handwritten signature in black ink, appearing to read 'Dr. M. Venkata Ramana'.

(Dr M. VENKATA RAMANA)

S. Z. PARVEEN

Head of the Department

CSE (Artificial Intelligence & Machine Learning)



MESSAGE

CSE (Artificial Intelligence & Machine Learning) is an exciting, growing and challenging field that has vast impact on daily life. Our department working to produce rich blend of competent, technical and managerial, social skills and contribute to nation build. The department has well qualified and high experienced dedicated faculty with effective research-oriented teaching learning process. Department is wide open to innovative ideas and methodologies as excellent learning centre. The excellent infrastructure and teaching faculty of the Department ensuring quality education such interaction among students, parents and staff, along with a Training and Placement Cell ensures a bright future to its students.

As H.O.D. I wish to take the opportunity to congratulate the students, Teaching and Non-Teaching staff of the department for organizing “Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 7th MARCH 2025”. It’s my privilege in wishing the Conference a grand success.

A handwritten signature in black ink, consisting of stylized initials and a long horizontal stroke.

(S. Z. PARVEEN)

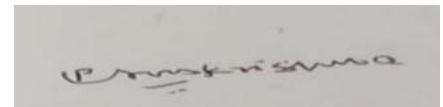
Dr. P.V.S Murali Krishna
Professor and Head of the Department
Electronics and Communication Engineering



MESSAGE

On behalf of the Department of Electronics and Communication Engineering, it is my great privilege and prestigious moment to organize the 2nd Proceedings of National Conference on Emerging Trends in Engineering and Management ETEM–2K25. The areas that have been chosen for presentation of papers are very essential in our day-to-day life. I am confident that this conference will emphasize on existing multidisciplinary areas of Electronics and Communication Engineering that counter the technological challenges of the current century and will provide a forum for integrating the knowledge and experience from experts of different fields.

The ETEM–2K25 program is a perfect time for us to introspect on both our achievements and failures as it showcases our current research and advancements in the field of Electronics and Communication Engineering. I would like to express my special thanks and appreciation to all the faculty and students of Department of E.C.E. in organizing ETEM–2K25 on 5th march and making this event a grand success.



(Dr. P. V. S Murali Krishna)

Dr. C. VENKATA SUBBAIAH

Head of the Department

Computer Science and Engineering



MESSAGE

Computer Science and Engineering is an exciting, growing and challenging field that has vast impact on daily life. Our department working to produce rich blend of competent, technical and managerial, social skills and contribute to nation build. The department has well qualified and high experienced dedicated faculty with effective research-oriented teaching learning process. Department is wide open to innovative ideas and methodologies as excellent learning center. The excellent infrastructure and teaching faculty of the Department ensuring quality education such interaction among students, parents and staff, along with a Training and Placement Cell ensures a bright future to its students.

As H.O.D. I wish to take the opportunity to congratulate the students, Teaching and Non- Teaching staff of the department for organizing “Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 4th MARCH 2025”. It’s my privilege in wishing the Conference a grand success.

A handwritten signature in black ink, written in a cursive style. The signature appears to be 'C. Venkata Subbiah' with a period at the end. The signature is contained within a dashed rectangular border.

(C. VENKATA SUBBAIAH)

Dr. A. Naresh
Head of the Department
Master of Computer Applications



MESSAGE

On behalf of Master of Computer Application Department, it is my great honour and pleasure to bring out this message on the occasion of Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 6th MARCH 2025. This Conference has been continued as a tradition of being the premier forum for presentation of results and experience reporting on leading edge issues concerning recent research and importing the latest technical knowledge to the students.

The mission of the Conference is to share novel ideas as well as practical applications in the area of Computer Application, in addition to identify new directions for future research and developments. “**ETEM 2K25**” is such a Conference which provides unique opportunities for young engineers, researchers and entrepreneurs to grow themselves technically. The main objective of this Conference is to create platform for students to come out with new ideas in technical area and share their knowledge.

As a Head of the Department of Electrical and Electronics Engineering, I appreciate the efforts of faculty members, supporting staff and students in organizing excellent Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 6th MARCH 2025, and I wish each of them to have successful Conference. I am very much thankful to each and every student participant. I personally thank the Management and the Principal for providing the required sources for conducting such a wonderful event.

A handwritten signature in black ink that reads "A. Naresh". The signature is written in a cursive style and is positioned above the printed name.

(Dr. A. Naresh)

Dr. G. Ramanjaneyulu

Head of the Department

Master of Business Administration



MESSAGE

Master of Business Administration is an exciting, growing and challenging field that has vast impact on daily life. Our department working to produce rich blend of competent, technical and managerial, social skills and contribute to nation build. The department has well qualified and high experienced dedicated faculty with effective research-oriented teaching learning process. Department is wide open to innovative ideas and methodologies as excellent learning center. The excellent infrastructure and teaching faculty of the Department ensuring quality education such interaction among students, parents and staff, along with a Training and Placement Cell ensures a bright future to its students.

As H.O.D. I wish to take the opportunity to congratulate the students, Teaching and Non- Teaching staff of the department for organizing “Proceedings of National Conference on Emerging Trends in Engineering and Management “ETEM 2K25” on 6th MARCH 2025”. It’s my privilege in wishing the Conference a grand success.

Dr. G. Ramanjaneyulu

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COMPUTER SCIENCE AND ENGINEERING

MALWARE DETECTION IN PDF USING MACHINE LEARNING MODEL WITH EXPLAINABLE AI

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Abstract

The Portable Document Format (PDF) is commonly targeted by cyber criminals to insert malicious code, which poses a significant risk to devices. To address this issue, this study creates a dataset of 15,000 PDF samples, including benign and malicious behaviors. Using analysis tools like PDFiD, PDFINFO, and PDF-PARSER, we extract crucial features and generate additional ones that are useful in classifying the PDF malware.

To improve detection, we develop an efficient feature set through empirical analysis of the extracted features. We apply several machine learning classifiers like Gradient Descent, SVM, Random Forest and AdaBoost.

The model's explainability is enhanced through decision trees, which generate rules that can be interpreted by humans, ensuring both effective and transparent detection of PDF malware. The integration of Explainable AI allows cybersecurity experts to understand the reasoning behind each classification, improving trust and understanding.

Keywords: Malicious PDF Detection, Feature Extraction, PDFiD, PDFINFO, PDF-PARSER, Content Features, Metadata Features, Random Forest, SVM, AdaBoost, Explainable AI, Cybersecurity, Malware Analysis.

REVOLUTIONIZING CLOUD SECURITY: HARNESSING AI AND ML FOR PROACTIVE CYBER DEFENSE

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Abstract

Cloud computing's rapid growth has not only expanded its capabilities but also intensified the complexity and volume of cyber threats. In response, Artificial Intelligence (AI) and Machine Learning (ML) have become critical tools for fortifying cloud environments. These technologies facilitate real-time anomaly detection by efficiently processing extensive cloud data. By learning from historical attack patterns, ML algorithms can anticipate and recognize emerging threats, while AI-driven systems automate the response process to quickly mitigate potential breaches. Advanced algorithms further aid in identifying zero-day vulnerabilities and complex attack methods, ensuring a swift reaction to previously unknown threats. Integrating AI with cloud platforms enables continuous monitoring and dynamic risk assessment, allowing security measures to adapt as threats evolve. Moreover, the adoption of explainable AI techniques enhances transparency, making security decisions more understandable and trustworthy for stakeholders. Collectively, these innovations play a pivotal role in constructing resilient, adaptive cloud security infrastructures that offer proactive, efficient, and scalable Defense against cyber-attacks.

Keywords: Cloud Computing, Cybersecurity, Artificial Intelligence (AI), Machine Learning (ML), Anomaly Detection, Zero-Day Vulnerabilities, Real-Time Monitoring, Dynamic Risk Assessment, Explainable AI, Proactive Defense.

RANDOM FOREST CLASSIFICATION FOR SMARTPHONE ADDICTION DETECTION

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Abstract

Smartphone addiction has become a pressing issue, with many individuals experiencing excessive phone usage, reduced productivity, and various health concerns. This study aims to develop a machine learning-based predictive model to identify individuals at risk of smartphone addiction. Data was collected through a structured survey covering demographics, phone usage habits, and psychological factors such as anxiety, depression, and stress. To ensure effective learning, we preprocessed the dataset by encoding categorical variables and normalizing numerical features. We experimented with multiple machine learning algorithms, including Logistic Regression, Decision Trees, Support Vector Machines, Naïve Bayes, XGBoost, and Random Forest. Model performance was evaluated using accuracy and other key metrics. Our findings indicate that phone usage patterns, such as notification-checking frequency, screen time, and preferred app types, were the most influential factors in addiction prediction. Additionally, demographic variables like age, gender, and stress levels played a significant role. This predictive model has several practical applications. Healthcare professionals can leverage it to detect high-risk individuals and implement early interventions. Moreover, app developers may use these insights to create less addictive applications that encourage balanced usage. Our study underscores the potential of machine learning in addressing smartphone addiction. However, further research is necessary to validate its effectiveness on larger and more diverse populations and explore real-world implementation strategies.

Keywords: Logistic Regression, Decision Tree, Support Vector Machine, Predictive Model, Smartphone Addiction, Naïve Bayes, XGBoost, Random Forest.

IMAGE CLASSIFICATION FOR QUALITY CONTROL WITH DEEP LEARNING AND SQL USING CNN

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Abstract

The project "Image Classification for Quality Control with Deep Learning and SQL" aims to develop an automated system for inspecting and classifying product quality using image analysis and deep learning techniques. By leveraging deep convolutional neural networks (CNNs), the system will accurately classify product images into predefined categories, identifying defects or quality issues. SQL databases will be used to store and manage large volumes of image data, enabling efficient querying and tracking of product quality over time. This integration of deep learning and SQL offers a powerful solution for manufacturing industries to enhance quality control processes, reduce human errors, and improve overall product consistency. The project will demonstrate the ability to seamlessly combine advanced AI technologies with traditional data management systems for industrial applications. This solution reduces reliance on manual inspections, minimizing human errors and improving production efficiency. The project also explores the scalability of deep learning models, optimizing inference speed and model deployment for real-world manufacturing environments. By seamlessly combining ai-driven image analysis with structured data management, this approach provides a cost-effective, reliable, and scalable quality control framework, enhancing product consistency and overall manufacturing standards.

Keywords: Deep Learning, Image Classification, Convolutional Neural Networks (CNNs), SQL Database, APIs, Quality Control, Real-Time Processing, Computer Vision.

INTERPRETING SIGN LANGUAGE WITH CONVOLUTIONAL NEURAL NETWORKS

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Abstract

Sign language is a vital mode of communication for individuals with hearing and speech impairments, yet its widespread adoption and understanding remain a challenge. This project aims to bridge this gap by developing an assistive system that translates hand gestures into text or spoken language in real time. Utilizing Convolutional Neural Networks (CNNs), the system detects and interprets hand movements from static images or video sequences, leveraging a large dataset of sign gestures to ensure accurate and high-precision translation. This technology has far-reaching applications in sectors such as education, healthcare, and customer service, where seamless communication is essential. As machine learning continues to advance, this project contributes to the development of intelligent assistive tools, enhancing accessibility and fostering inclusivity for sign language users. By integrating CNN-based gesture recognition, this innovation empowers individuals who rely on sign language, promoting social equity, expanding opportunities for the deaf and hard-of-hearing community, and reinforcing the fundamental right to accessible communication.

Keywords: Sign Language Recognition, Convolutional Neural Network, Hand Gesture Recognition, Assistive Technology, Real-Time Translation, Accessibility Solutions, Image processing, Computer Vision, Speech Impairments.

MEDICINAL PLANT RECOGNITION AND INSIGHT EXTRACTION USING CNN

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Abstract

Accurate identification of medicinal plants is crucial in ethnomedicine and pharmacology, but traditional methods are often time-consuming and error-prone, requiring specialized knowledge. To address this challenge, we developed GreenGuide, a deep learning-based system that identifies plants from uploaded images. Utilizing convolutional neural networks (CNNs), our plant identification system provides comprehensive information, including common and scientific names, local names (in Telugu), geographical distribution, medicinal applications, and preparation methods in English and Telugu. This technology benefits local communities, researchers, and herbal practitioners by increasing access to valuable medicinal knowledge. GreenGuide's user-friendly interface enhances plant identification ease, bridging modern technology and traditional herbal medicine. By automating identification through deep learning, we boost efficiency and effectiveness, providing convenience to healthcare practitioners and the public seeking easy access to herbal information. With GreenGuide, we aim to democratize access to medicinal plant knowledge, promoting informed healthcare decisions and preserving traditional herbal wisdom.

Keywords: Medicinal plant identification, Deep learning, Convolutional Neural Networks (CNNs), Image classification, Herbal medicine, plant recognition, image-based identification.

SMART CARE: A DISTRIBUTED MEDICAL RECOMMENDATION SYSTEM FOR ICU

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Abstract

Smart Summary leverages patients' admission reports and past lab values to predict International Classification of Diseases (ICD) codes, extract disease names, and forecast future abnormalities in lab values. Using this information, Smart Summary builds a comprehensive patient profile that covers the patient's case precisely. Additionally, it recommends the most relevant laboratory values for individual patients by analyzing their data through various modules, including lab values abnormality prediction, automatic ICD codes prediction, and disease named entity recognition. Furthermore, Smart Summary enhances its performance by incorporating doctors' feedback, utilizing this information to refine recommendations for patients with similar profiles within the same cluster. Experimental results demonstrate that Smart Summary effectively learns to recommend relevant lab values for patients, achieving a Precision@10 of 0.92 after training on doctors' feedback. Moreover, Smart Summary employs an efficient distributed machine learning method based on a split learning mechanism to ensure patient data privacy. This mechanism not only guarantees data privacy and security but also reduces communication overhead by 72% and computation overhead by 45.2% compared to the original split learning mechanism. To our knowledge, Smart Summary is the only system that creates comprehensive patient profiles using multiple machine learning models and recommends relevant lab values while ensuring privacy, efficiency, and security across various data sources.

Keywords: Distributed machine learning, green AI, medical informatics, recommender systems, split learning, neural networks.

OPTIMIZING 5G COVERAGE PREDICTION WITH MACHINE LEARNING

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Abstract

The widespread deployment of 5G networks has revolutionized telecommunications, requiring precise coverage prediction to enhance deployment strategies. This study, titled, Optimizing 5G Coverage Prediction with Machine Learning, explores the application of machine learning techniques to predict 5G coverage by analyzing critical factors such as geographical attributes, network operator data, and infrastructure deployment. This research investigates a diverse set of machine learning models, including traditional approaches like Decision Trees and Random Forests, alongside advanced techniques such as Gradient Boosting and Neural Networks, to determine the most effective method for accurate 5G coverage prediction. Furthermore, feature selection methods are applied to identify the most influential parameters that affect network coverage outcomes. The study's findings offer crucial insights into the primary factors driving 5G network deployment, providing valuable guidance for industry professionals to refine network planning and resource distribution. By integrating machine learning-driven predictive analytics, this research enhances decision-making in 5G expansion efforts, leading to more efficient, scalable, and data-driven telecommunication strategies.

Keywords: 5G Network Deployment, Machine Learning, Coverage Prediction, Feature Selection, Predictive Analytics, Telecommunications Optimization.

SMART MEDICARE FRAUD DETECTION: HANDLING CLASS IMBALANCE WITH SMOTE-ENN

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Abstract

Medicare fraud presents substantial difficulties which lead to major financial losses together with damage to healthcare systems credibility. The detection methods traditionally used for fraud analysis prove unsuccessful because fraudster methods keep becoming more complex and diverse. The project aims to enhance Medicare fraud detection through machine learning while specifically addressing the class imbalance problem where fraudulent claims are strictly lower than valid claims. We build a classification framework to detect fraudulent Medicare claims from the others through multiple advanced ML algorithms. The proposed classification algorithms consist of Extreme Gradient Boosting, Adaptive Boosting, LightGBM, Classification and Regression Tree (CART), Logit Model, and Ensemble Decision Trees. SMOTE-ENN provides a solution to balance an imbalanced dataset thus improving the performance of our models. The combination of SMOTE-ENN generates substantial improvements regarding the identification of fraudulent claims during experimentation. We examined the performance indicators of key markers like accuracy together with precision, recall and F1-score which showed significant improvements when the dataset underwent both unbalanced and balanced evaluations. The combination of SMOTE-ENN and ensemble learning methods creates an effective solution to identify Medicare fraud cases.

Keywords: SMOTE-ENN, Extreme Gradient Boosting, Adaptive Boosting, LightGBM, Classification and Regression Tree (CART), Logit Model, and Ensemble Decision Trees.

EXPOSING MISINFORMATION: ENHANCING FAKE NEWS DETECTION WITH SUPERVISED LEARNING

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Abstract

Fast action is essential to control the spread of misinformation across digital and social networks, making the immediate development of improved detection methods for fake news imperative. A predictive algorithm system is designed to classify news materials and identify fabricated stories, thereby reducing the risks associated with misinformation. Textual data processing employs Decision Trees, Support Vector Machines (SVM), and Random Forests as algorithms to detect deceptive patterns in data. The analysis of article content relies on TF-IDF combined with word embeddings to identify typical linguistic features commonly found in fake news. The training process involves extensive use of news articles that have been manually labelled as factual or deceptive, allowing the system to learn the distinctions between the two. The program utilizes cross-validation techniques to retrain and validate models, enhancing performance and replacing identified patterns of fake news. The objective of this project is to create a large-scale detection system that ensures dependable identification of the accuracy of digital information. This initiative aims to improve fact-checking procedures and the capability to control the spread of fake information through machine learning technology designed for fake news detection.

Keywords: Fake news detection, misinformation, machine learning, Decision Trees, SVM, Random Forest, TF-IDF, word embeddings, text classification, digital media safety, Supervised Learning, and Feature Engineering.

ENHANCED ELECTRICAL ENERGY CONSUMPTION PREDICTION USING DEEP LEARNING

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Abstract

Energy consumption prediction is important in such utility applications like smart grid, energy management system and sustainability planning. In this project, we make use of advanced deep learning algorithms like Long Short-Term Memory (LSTM), Recurrent Neural Network (RNN), Linear regression, Gated Recurrent Unit (GRU) and stacked LSTM to make predictions of electricity consumption. The features that may affect it are temperature, pressure, wind. Therefore, being able to use temporal information, we choose LSTM, RNN as well as LR as a baseline. GRU and stacked LSTM are then investigated as other RNN architectures. To address this problem, we approach it with data preprocessing, missing values implementation, feature normalization, and data formatting for the purpose of model training. In addition to that, we also run hyperparameter tuning and tune the hyperparameters when relaxing MAE, RMSE and R-squared. Prediction accuracy, computational efficiency, and the study of the hyperparameter's influence on model performance are studied. We further derive electricity consumption pattern for the stakeholders to use in performing demand forecasting, resource allocation and energy optimization to name a few. The intent of this research is to use advanced deep learning techniques to construct an energy consumption prediction about how to make the energy system more efficient and sustainable.

Keywords: Energy consumption prediction, LSTM, RNN, GRU, stacked LSTM, deep learning, electricity consumption, time-series forecasting, sustainability, smart grid, demand forecasting, resource allocation, renewable energy, energy optimization.

A DEEP LEARNING MODEL FOR DIAGNOSIS KIDNEY STONES FROM CT SCAN IMAGES

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Abstract

Kidney stones are a common renal condition that can impair kidney function if not detected early. This study presents an advanced deep learning approach for automated kidney stone detection using CT images. Unlike the existing method that utilizes an inductive transfer-based ensemble DNN with DarkNet19, InceptionV3, and ResNet101, our approach integrates CNN with Spatial Attention, ResNet, and VGG architectures to enhance feature extraction and classification accuracy. We applied data augmentation and advanced regularization techniques to improve model generalization. Comprehensive evaluation revealed that the CNN with Spatial Attention achieved a validation accuracy of 90.72%, outperforming the traditional ensemble DNNs. Our model effectively balances precision and recall, reducing overfitting observed in ResNet and poor generalization in VGG. This improved framework demonstrates potential for real-time kidney stone detection in medical imaging systems, providing a reliable and efficient tool for urologists to enhance diagnostic accuracy.

Keywords: Kidney Stone Detection, Deep Learning, Convolutional Neural Network (CNN), Spatial Attention, ResNet, VGG, Medical Imaging, CT Scan Classification.

LEVERAGING NLP TO ANALYZE BEHAVIORAL PATTERNS IN WHATSAPP MESSAGES

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Abstract

As WhatsApp gains popularity, there is a growing amount of textual data available that can be used to analyze human behavior in digital communication. For this project, I consider the use of NLP techniques (XGBoost, Hist Gradient Boosting (LGBM), and Gated Recurrent Unit (GRU) to examine messages in WhatsApp among students and to identify some patterns of how students use this medium for individual and group communication. These algorithms are evaluated separately for sentiment determination, behavioral trends, and emotional expression in text-based interactions. Sentiment is detected, keyword and frequency are extracted all in order to analyze then the frequency in addition to analyzing the messaging pattern over time. Moreover, this project investigates group dynamics like participation levels and response patterns as well. Moreover, the data privacy and anonymization part is prioritized: 1) Confidential information must remain undisclosed. 2) No personally identifiable information (PII) is processed. 3) Only textual data is evaluated, excluding multimedia content. The use of the findings is in the understanding of social behavior, improving mental health assessment and improving marketing strategies. The final contribution of this thesis was to utilize advanced algorithms to gain a deeper understanding of the field of digital behavior analysis and apply that knowledge to study human interaction in the digital age.

Keywords: WhatsApp messages, Natural Language Processing, XGBoost, Hist Gradient Boosting, GRU, sentiment analysis, pattern analysis, feature extraction, word count analysis, group dynamics, data privacy, emotional expression, text-based interactions, digital behavior analysis.

MACHINE LEARNING-BASED CLASSIFICATION OF SLEEP PATTERNS AND DISORDERS

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Abstract

Sleep disorders significantly impact physical and mental health, necessitating accurate and accessible diagnostic methods. Traditional diagnostic techniques like Polysomnography (PSG) are often inconvenient, expensive, and limited in availability. This project aims to leverage machine learning algorithms to classify sleep disorders using health and lifestyle data from the Kaggle Sleep Health and Lifestyle Dataset. The existing system employs algorithms such as K-Nearest Neighbors (KNN), Support Vector Machine (SVM), Decision Tree, Random Forest, and Artificial Neural Network (ANN), which have several limitations including computational expense and sensitivity to hyperparameters. To address these issues, the proposed system implements ensemble learning techniques, specifically Stacking Classifier and Voting Classifier, to enhance accuracy, robustness, and interpretability. By combining the strengths of multiple models, the project seeks to provide a more efficient, cost-effective, and accessible solution for diagnosing sleep disorders, ultimately improving patient outcomes and quality of life.

Keywords: Sleep Disorders, Machine Learning, Stacking Classifier, Voting Classifier, Sleep Apnea, Insomnia.

HYBRID MACHINE LEARNING MODEL FOR EFFICIENT BOTNET DETECTION IN IOT ENVIRONMENT

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Abstract

The increasing number of Internet of Things (IoT) devices has made people far more susceptible to cyberthreats, particularly botnet attacks. Because IoT traffic is complex, dynamic, and high-dimensional, detecting these assaults in IoT networks necessitates the use of sophisticated machine learning algorithms. A coordinated AI procedure is introduced in this review to improve botnet assault location. The framework coordinates the benefits of Arbitrary Woods calculations, Long Momentary Memory (LSTM) organizations, Convolutional Brain Organizations (CNN), Counterfeit Brain Organizations (ANN), and Intermittent Brain Organizations (RNN). CNNs help with finding spatial examples in network traffic for highlight learning, while ANN models are utilized for include extraction and non-straight order.. LSTMs and RNNs are utilized to catch worldly connections, which are basic for identifying patterns in botnet assaults inside successive IoT information. In conclusion, Arbitrary Timberland is coordinated to perform troupe picking up, working on the precision and vigor of the identification framework. This half breed approach use the interesting benefits of every calculation, guaranteeing unrivaled identification of both recognizable and novel botnet dangers. The resultant model is a feasible method for shielding IoT networks from creating botnet assaults since it further develops discovery execution and decreases misleading up-sides.

Keywords: IoT Networks, Botnet Detection, Machine Learning, Integrated Approach, Temporal Analysis, Ensemble Learning, Detection System, Cybersecurity, Sequential Data, Network Defense, Hybrid Algorithm (Random Neural Network).

HAND GESTURE IDENTIFICATION USING CONVOLUTIONAL NEURAL NETWORK

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Abstract

Hand gesture identification as a scientific field continues rapid development to improve computing interaction between humans and AI and virtual reality capabilities and sign language translation. The research project intends to create an improved deep learning framework which detects hand gestures. The identification of hand gestures becomes possible through continuous video observation that uses CNNs, VGG16, AlexNet. A big collection of hand gesture images with varied postures and motions undergoes processing by the model during training. The model performs better and demonstrates higher resistivity because it adopts image normalization along with resizing and data augmentation as preprocessing techniques. The deep learning methods allow researchers to investigate significant factors in hand gesture photos which builds better accuracy in gesture detection. The system processes multiple hand gestures that execute device commands and perform interpretation of sign language besides controlling the functionality of virtual environments. Operational effectiveness assessment for the model depends on accuracy together with precision and recall and F1-score measurement. The proposed system creates dependable functionality through its effective communication features that allow robots to understand gestures for robotics systems and assistive technology applications. The project developed through research implements complex deep learning systems to create a new hand gesture recognition framework which can be used for practical applications.

Keywords: hand gesture identification, deep learning, convolutional neural networks, CNN, VGG16, human-computer interaction, sign language, image processing, AlexNet, real-time recognition, gesture classification, assistive technology.

CALORIE ESTIMATION OF FOOD AND BEVERAGES USING DEEP LEARNING AND IMAGE ANALYSIS FOR NUTRITION MANAGEMENT

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Abstract

Calorie estimation of food and beverages plays a crucial role in promoting healthy eating habits and effective dietary management. Traditional methods rely on manual logging, which is time-consuming and prone to errors. This project introduces an AI-powered system that leverages deep learning and image analysis to automate calorie estimation from food images with high accuracy. The system extracts key visual features such as portion size, texture, and color to predict calorie content with minimal user intervention. A large-scale labeled food dataset is used for training, incorporating preprocessing techniques like segmentation, normalization, and feature extraction to enhance accuracy. Advanced neural networks perform food classification and calorie estimation, while data augmentation improves robustness against variations in lighting, angles, and presentation. The system's reliability is validated through mean absolute error (MAE) and accuracy metrics. The architecture includes use case diagrams, sequence diagrams, class diagrams, and activity diagrams to define system interactions and workflows. A data flow diagram illustrates the movement of information, while a deployment diagram visualizes the integration of the system into mobile and web-based platforms for real-time calorie tracking. Designed for accessibility, this tool assists individuals, nutritionists, and healthcare professionals in making informed dietary decisions. Future improvements include enhanced food detection accuracy, multi-language support, and interactive voice/image-based input to further optimize user experience. This project demonstrates the potential of AI-driven solutions in revolutionizing nutrition management and health tracking.

Keywords: Calorie estimation, deep learning, image analysis, nutrition management, food recognition, machine learning, neural networks, data flow, feature extraction, real-time tracking, deployment, UML modeling.

MACHINE LEARNING-BASED ACCIDENT SEVERITY CLASSIFICATION

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Abstract

Road traffic accidents are a leading cause of deaths and injuries globally, making it essential to predict the severity of such incidents to enhance traffic safety and implement preventive measures. This study aims to develop a predictive model for accident severity under different weather conditions using machine learning algorithms, including Artificial Neural Networks, Support Vector Machine (SVM), XGBoost, and Naive Bayes Algorithm. The dataset used includes historical accident data, with variables such as weather conditions (rain, fog, clear skies, snow, etc.), road surface condition, visibility, and other relevant factors. The target variable is the severity of the accident, which is classified into multiple categories. Each machine learning algorithm is trained and tested on this dataset to assess its ability to predict accident severity. Random Forest and XGBoost are selected for their capacity to capture complex, non-linear relationships between features, while SVM is chosen for its robustness in high-dimensional spaces. Logistic Regression is used as a baseline model due to its simplicity and ease of interpretation. The models are evaluated using metrics like accuracy, precision, recall, and F1-score. Preliminary findings indicate that weather conditions play a significant role in accident severity, with ensemble methods like Random Forest and XGBoost outperforming SVM and Logistic Regression in prediction accuracy. The insights gained from this study could help policymakers create weather-specific road safety strategies and real-time accident severity prediction systems to mitigate the impact of accidents in adverse weather conditions.

Keywords: Artificial Neural Networks, Logistic Regression, XGBoost, and Support Vector Machines, Naive Bayes Algorithm.

UPI DIGITAL PAYMENTS FOR TRANSACTIONS USING MACHINE LEARNING

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Abstract

The rapid adoption of Unified Payments Interface (UPI) for digital transactions, the risk of fraudulent activities has also increased significantly. However, with its growing adoption, UPI Fraud has emerged as a critical challenge. To address this challenge, We propose a novel approach to detect UPI fraud by analyse the transaction details such as the bank book name, transaction ID, and transaction amount. The various machine learning techniques including Random Forest classifier, Support Vector Machine, KNN, Naïve bias, Logistic Regression known for its accuracy and resilience against overfitting. The proposed model aims to enhance the security of UPI transactions, additional layer of protection against unauthorized activities. Initial evaluation suggest that the Random Forest classifier effectively distinguishes between genuine and fraudulent transactions, demonstrating its potential for integration into real-world financial systems. Additionally, a Stacking Classifier integrates the strength of these algorithms to potential improve performance. The results are expected to contribute significantly to the development of most secure transaction system and enhancing consumer trust. contributing to a safe and more trustworthy digital payment ecosystem.

Keywords: Random forest, Support vector Machine, UPI Digital payments, Logistic regression, Naïve Bias.

ENHANCING CYBERSECURITY POSTURES USING ADVANCED MACHINE LEARNING TECHNIQUES: A COMPREHENSIVE APPROACH TO THREAT DETECTION AND MITIGATION

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Abstract

In the realm of cybersecurity, the effectiveness of threat detection and mitigation strategies is paramount. This study explores the enhancement of cybersecurity postures through the implementation of advanced machine learning techniques. Specifically, we investigate the use of Random Forest, Support Vector Machine (SVM), Stacking Classifier, and Convolutional Neural Networks (CNN) for identifying and countering cyber threats. Our approach integrates these algorithms to leverage their unique strengths, thereby improving accuracy and robustness in threat detection. By evaluating these techniques on diverse datasets, we aim to provide a comprehensive framework for strengthening cybersecurity defences. This research contributes to advancing the field of machine learning in cybersecurity, offering new insights into effective threat mitigation strategies. In today's digital landscape, cybersecurity has become a critical concern due to the increasing frequency and sophistication of cyber threats. Traditional security measures often struggle to keep pace with rapidly evolving attack techniques, necessitating more advanced and adaptive approaches. Machine learning has emerged as a powerful tool in strengthening cybersecurity by enabling intelligent threat detection and mitigation. This study focuses on enhancing cybersecurity postures through the implementation of advanced machine learning techniques, including Random Forest, Support Vector Machine (SVM), Stacking Classifier, and Convolutional Neural Networks (CNN). By leveraging these models, we aim to develop an efficient and robust framework for identifying and countering cyber threats. This study contributes to the advancement of machine learning applications in cybersecurity by providing a structured framework for proactive threat mitigation. The insights gained from this research can help organizations strengthen their defense mechanisms and adapt to emerging cyber threats more efficiently. As cyberattacks continue to evolve, integrating machine learning into cybersecurity strategies becomes increasingly crucial for ensuring the security and resilience of digital systems. By bridging the gap between conventional security measures and AI-driven solutions, our research aims to pave the way for the development of intelligent, adaptive, and highly effective cybersecurity frameworks.

Keywords: Random Forest, Support Vector Machine (SVM), Stacking Classifier, and Convolutional Neural Networks (CNN).

PREDICTING RAINFALL PATTERNS USING MACHINE LEARNING FOR ENHANCED PREPAREDNESS

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Abstract

Rainfall prediction plays a crucial role in raising awareness about potential dangers associated with rainfall, enabling individuals to take proactive measures for their safety. This study aims to utilize machine learning algorithms to accurately predict rainfall, considering the significant impact of its scarcity or excess on both rural and urban life. The complex nature of rainfall, influenced by various atmospheric, oceanic, and geographical factors, makes it a challenging phenomenon to forecast. This research employs data preprocessing techniques, outlier analysis, correlation analysis, feature selection, and several machine learning algorithms such as Naïve Bayes (NB), Decision Tree, Support Vector Machine (SVM), Random Forest, and Logistic Regression. The study focuses on developing the most accurate rainfall prediction model by utilizing machine learning and feature selection techniques. The Artificial Neural Network (ANN) achieves a maximum accuracy of 90% and 91% before and after feature selection, respectively. Furthermore, k-means clustering and Principal Component Analysis (PCA) are applied to examine regional rainfall patterns in India. To enhance accessibility and usability, a web-based application system has been developed using Flask, allowing users to easily access rainfall predictions. This system aims to provide real-time insights and assist farmers, policymakers, and urban planners in making informed decisions. Additionally, the study highlights the importance of selecting relevant meteorological features to improve prediction accuracy. By comparing different machine learning models, the research offers valuable insights into optimizing rainfall forecasting techniques. Overall, this research demonstrates the effectiveness of various machine learning techniques in predicting rainfall using Indian weather data, contributing to better disaster preparedness and resource management.

Keywords: Rainfall Prediction, Machine Learning, Artificial Neural Network, Feature Selection, Support Vector Machine, Random Forest, Principal Component Analysis, K-Means Clustering, Weather Forecasting, Flask Web Application.

NATURAL LANGUAGE PROCESSING USING CHATTERBOT BASED ON DL

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Abstract

This project aims to create an intelligent communication system for robots using natural language-based robot questions and answers. The system uses LLama algorithms for language generation, fluency, and context comprehension. The Python server will provide accurate, contextually coherent answers to user queries, improving robotic systems' effectiveness in various settings. The system combines state-of-the-art robotics technology with sophisticated suites for robust real-world deployment. When given the ability to understand natural language, robots' usability and human-robot interaction increased across a number of domains. The objective of this project is to construct an intelligent communication system for robots through the use of "Natural Language based Robot Questions and Answers." In turn, it will be able to perform customer service, education, healthcare, and industrial automation by understanding natural language and intelligently responding to human-like questions.

Keywords: Context-aware responses, robotic assistance, natural language processing, question answering, conversational AI, LLama algorithm, language generation, and real-time communication.

CERVICAL CANCER DETECTION BY USING MACHINE LEARNING

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Abstract

Cervical cancer remains a leading cause of cancer-related deaths among women worldwide, despite being preventable and treatable if detected early. Advances in machine learning (ML) have paved the way for innovative solutions to address the challenges of early diagnosis and timely intervention. This project introduces a novel webbased framework for cervical cancer detection that leverages cutting-edge ML algorithms to deliver accurate, efficient, and accessible diagnostic support. The proposed system integrates multi-dimensional data, including demographic information, medical histories, and screening test results, to train robust ML models for cervical cancer risk prediction. A user-friendly web interface allows healthcare providers and individuals to input patient data and receive real-time risk assessments, empowering informed decision-making. The framework utilizes advanced techniques such as Ensemble Learning, Feature Selection, and Hyperparameter optimization to enhance predictive accuracy and reliability.

Keywords: Cervical, Cancer, Machine Learning, Feature Extraction, Support Vector Machine, Random Forest, Decision Trees, Dimensional Data.

INTEGRATING MACHINE LEARNING AND STATISTICAL METHODS FOR PREDICTING CARDIAC ARREST IN NEONATAL ICUS

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Abstract

Cardiac arrest in neonates is a critical medical emergency that requires early detection to ensure timely intervention and improved survival rates. Advanced diagnostic tools and predictive modeling techniques can assist in addressing the urgent need for identifying potential cardiac arrest risks in neonatal patients, particularly in intensive care settings. Previous research has examined various biomarkers and indicators associated with neonatal cardiac arrest, with a focus on physiological parameters and diagnostic imaging techniques such as echocardiography and computed tomography. While these methods offer valuable clinical insights, they are often resource-intensive and may not always provide sufficient predictive accuracy. This study introduces a Cardiac Machine Learning Model (CMLM) that integrates statistical methodologies for the early detection of cardiac arrest in neonates within Cardiac Intensive Care Units (CICUs). The model incorporates key physiological parameters and applies machine learning techniques to enhance predictive accuracy. Techniques such as Naïve Bayes, Decision Trees, and Random Forest are leveraged to construct predictive models, with a primary emphasis on neonatal healthcare and real-time patient monitoring. By analyzing physiological signals, this system generates actionable insights for healthcare professionals, enabling early detection and timely medical intervention. Additionally, the proposed model ensures improved data-driven decision-making by integrating multiple data sources, thereby enhancing prediction reliability. The real-time predictive capabilities facilitate proactive intervention, ultimately reducing the burden on healthcare infrastructure and improving overall neonatal care. The proposed framework is designed to deliver realtime predictive capabilities with enhanced accuracy, ultimately contributing to the reduction of neonatal mortality and morbidity rates.

Keywords: Random Forest, Decision Tree, Naïve Bayes, Cardiac Arrest Prediction, Predictive Modeling, Physiological Signal Analysis, Statistical Modeling, Neonatal Healthcare.

CELLULAR TRAFFIC FORECASTING USING MACHINE LEARNING WITH DATA DIMENSIONALITY REDUCTION TECHNIQUES

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Abstract

The unprecedented growth in cellular data traffic poses significant challenges to maintaining Quality of Service (QoS) in cellular networks. To address this challenge, this project proposes a novel framework for cellular traffic forecasting using machine learning with data dimensionality reduction techniques. The proposed framework integrates Random Forest Regressor, XGB Regressor, and Stacking Regressor with dimensionality reduction techniques to enhance prediction accuracy and reduce computational complexity. Experimental results demonstrate that the proposed framework outperforms existing approaches, achieving improved accuracy and efficiency in cellular traffic forecasting. This research contributes to the development of intelligent cellular network management systems, enabling proactive traffic management and optimized resource allocation.

Keywords: Cellular Traffic Prediction, Machine Learning, Data Reduction Techniques, Quality of Service (QoS).

DEEP LEARNING TECHNIQUES FOR NETWORK INTRUSION DETECTION SYSTEM

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Abstract

Intrusion detection systems (IDS) play an important role in network security by detecting and preventing harmful behavior. Network intrusion information is mixed into numerous common instances in dynamic and timevarying networking environments. This creates insufficient instances to train models and detection results with a high false detection rate. To address the data imbalance problem, we use a network intrusion detection (NIDS) method that incorporates deep networks and hybrid sampling. Using the assistance of the Difficult Set Sampling Technique (DSSTE) algorithm, we initially decreased the noise samples in the majority class before utilizing Deep Convolutional Generative Adversarial Networks (DCGANs) to increase the minority sample count. Moreover, we use DenseNet169 to capture spatial features and the Self Attention-based Transformer (SAT-Net) to capture temporal features and create a deep network model. This method effectively captures unique features of the data. Lastly, we utilized the Enhanced Elman Spike Neural Network (EESNN) to predict the attack types. We conduct experiments on more recent and extensive intrusion datasets KDD cup, to test the proposed technique. Our proposed system is reported to outperform state-of-the-art works on accuracy, false alarm rate, recall, and precision.

Keywords: Network Security, Data Imbalance, Intrusion detection system (IDS), Deep Convolutional Generative Adversarial Networks (DCGANs), DenseNet169, Self-Attention based Transformer (SAT-Net).

AIR QUALITY INDEX FORECASTING USING OPTIMIZED MACHINE LEARNING AND DEEP LEARNING MODELS

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Abstract

This study introduces an innovative approach for Air Quality Index (AQI) forecasting utilizing a Genetic Algorithm (GA)-based Improved Extreme Learning Machine (IELM) model. The proposed method integrates the strengths of Genetic Algorithm optimization with the advanced learning capability of IELM to accurately predict AQI levels. Leveraging a comprehensive dataset encompassing various pollutants and meteorological parameters across different cities, including PM2.5, PM10, NO, NO2, NOx, NH3, CO, SO2, O3, Benzene, Toluene, and Xylene, the model achieves superior forecasting performance. By comparing with conventional techniques such as Random Forest, Decision Tree, Adaptive Boost, and KNN, our approach demonstrates its efficacy in AQI prediction. The integration of GA ensures optimal parameter selection, enhancing the model's robustness and generalization across diverse environmental conditions. Experimental results validate the proposed method superiority in terms of accuracy, computational efficiency, and reliability.

Keywords: Random Forest, Decision Tree, Adaptive Boosting, KNN, Logistic Regression, MLP, Extreme Gradient Boosting classifier, Genetic Algorithm Method, Neighbour Based Classification method.

SPAM TEXT DETECTION OVER SOCIAL MEDIA USAGE: A SUPERVISED SAMPLING APPROACH FOR THE SOCIAL WEB OF THINGS

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Abstract

A novel downsampling technique, Negative Selection Density Clustering-based Downsampling (NSDC-DS), is proposed to enhance classifier performance in handling unbalanced communication text. This method refines traditional clustering by incorporating negative selection for self-anomaly detection, where the detector represents the sample center point and the self-set corresponds to the clustered sample. Anomalous matching is conducted between them, and NSDC evaluates sample similarity. To improve the effectiveness of random downsampling, the Naïve Bayes Support Vector Machine (NBSVM) classifier filters out irrelevant data, while principal component analysis (PCA) assesses sample information content. Additionally, an improved PCA-signed directed graph (SGD) algorithm optimizes model parameters, enabling semi-supervised spam detection in the Social Web of Things. Extensive experiments on unbalanced datasets demonstrated that NSDC-DS outperforms conventional approaches like NSDC, PCASGD, and standard models by achieving faster and more stable convergence. With the increasing prevalence of junk data, efficient classification has become a critical research focus, as imbalanced data often result in poor recognition of minority-class samples. Classification integration, cost-sensitive learning, and feature selection techniques have been explored to address this issue. Studies show that data balancing through sampling enhances classifier performance, with methods such as k-nearest neighbour, naive Bayes, and random forests widely utilized. While random oversampling may lead to overfitting, undersampling risks discarding valuable information. The NSDC-DS method improves clustering-based downsampling, ensuring both computational efficiency and higher classification accuracy. Experimental findings confirm that the proposed approach, along with an optimized PCA-SGD method, significantly enhances spam text recognition performance with rapid and steady convergence in semi-supervised learning.

Keywords: Artificial Intelligence, Machine Learning, Unbalanced Communication Text Classification, Spam Text Detection.

SEASONAL AND PRODUCTIVITY BASED AGRICULTURAL CROP RECOMMENDATIONS USING MACHINE LEARNING

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Abstract

Agriculture in Tamil Nadu faces significant challenges due to climatic uncertainties, affecting crop productivity. Traditional farming practices, including word-of-mouth recommendations, are no longer reliable due to changing environmental conditions. The rapid growth of information technology presents an opportunity to enhance agricultural sciences by integrating modern technological methods, particularly machine learning (ML) techniques. These techniques can develop predictive models based on historical and real-time data, helping farmers make informed decisions regarding crop selection, water usage, fertilizer application, and pest management. Existing crop prediction models primarily focus on soil characteristics and clustering approaches, such as K-means and K-means++, to group data for yield prediction. Other models utilize classification techniques like JRip, J48, and Naïve Bayes to analyse soil types. However, these models do not incorporate crop productivity and seasonal factors into their recommendations. The proposed system addresses these gaps by using data mining and machine learning algorithms to recommend crops based on productivity, season, and environmental conditions. Neural networks and classification techniques such as KNearest Neighbour (KNN) and Artificial Neural Networks (ANN) are employed to enhance predictive accuracy. The system considers factors such as rainfall, temperature, humidity, soil pH, and land conditions to optimize crop recommendations. By leveraging data analytics, this approach aids farmers in improving agricultural output, ensuring better resource utilization, and increasing overall productivity. The system aims to provide precise, data-driven recommendations, ultimately benefiting both experienced and upcoming farmers in their decision-making processes.

Keywords: Agricultural Crop Recommendation, Machine Learning, Data Mining, Data Analytics in Agriculture, Precision Farming.

AUTOMATED DETECTION OF CHRONIC KIDNEY DISEASE USING DEEP LEARNING ALGORITHMS

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Abstract

CKD represents a public health crisis thus all healthcare organizations must adopt treatment improvement efforts with accurate early diagnostic methods to reduce complications. The R system performs faster than an order of magnitude when detecting Normal, Cyst, Tumor and Stone on target renal conditions through the use of parallelised graphics processing units. The research conducted an exhaustive analysis of CNN models for exhaustive feature retrieval and hierarchical features mapping via VGG networks to determine their performance capabilities. The evaluation process takes place on a skilled medical images dataset that serves as an effective foundation for conducting fair assessments of diagnostic abilities and classification precision of different architectures. Subsequently the preprocessed input data emerges from various image normalization and noise reduction and augmentation methods that optimize model performance relevance. Precise model evaluation using Accuracy, Precision, Recall, and F1 Score will be conducted to determine the strengths and limitations of each model, so we will dedicate thorough analysis to them. This requirement has a project goal to build a self-operating diagnostic system which assists medical staff in automatic detection of kidney dysfunction cases with maximum precision during minimum operational time. Artificial intelligence based medical diagnostics.

Keywords: Chronic Kidney Disease, deep learning, automated classification, Convolutional Neural Networks, CNN, VGG networks, medical imaging, feature extraction, noise reduction, diagnostic tool, artificial intelligence, medical diagnostics.

DEVELOPMENT OF AI/ML FOR HUMAN EMOTION DETECTION USING FACIAL RECOGNITION

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Abstract

Artificial Intelligence (AI) and Machine Learning (ML) have various important areas of work and research and emotion recognition is one of them. Artificial Intelligence(AI) is a set of technologies that allow machines to perform tasks that are similar to human intelligence. AI aims to create systems that can think, listen, and act like humans. Not only in one sector AI is present in every sector, if we take computer sector, mechanical sector, civil sector, auto mobile, like this, AI is playing a crucial role in implementing the technology. It is used for chatbots, self- driving cars, virtual assistants like Alexa, etc., Coming to Machine Learning (ML), it is a branch of Artificial Intelligence(AI) that focuses on teaching machines to learn from data and improve it's performance. It uses algorithms and data to identify patterns. ML is used for Email spam filters, fraud detection, etc., To determine a human's facial expression, system or platform, should analyze and extract the assorted variations of human faces like Color, Shape, Expressions, Appearance, Orientation and Brightness etc.. A huge number of algorithms and techniques have been computed and executed to do this thing, on various static or non-static, equal foundation, distinct postures, comparable expressions and non-partisan front face. The objectives of Facial emotion recognition are the scanning and extracting the data and accordingly giving accurate results in real-time. The proposed work is predicated on AI – ML, we will use FER-2013 dataset to train the model and we will use our own reference pictures to increase the accuracy, along with other libraries and skill-sets. Our target is to achieve accuracy above 93%. This proposed project detects the various emotions of human such as: Happy, Sad, Anger, Neutral and Surprise.

Keywords: Artificial Intelligence, Machine Learning, Camera, Emotion Recognition, Facial Expression

BRAIN TUMOR DETECTION BY USING DEEP LEARNING ALGORITHM

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Abstract

Early detection of brain tumors stands as a fundamental factor which enhances the treatment results for patients. Advanced techniques are necessary to accurately identify brain tumors during medical imaging processes that use MRI scans. A deep learning method development project was created to perform brain tumor identification through MRI image analysis. A database consisting of brain MRI images serves this research study by designating each image according to tumor or nontumor classification. The VGG (Visual Geometry Group) algorithm serves as our choice because it represents one of the renowned convolutional neural network (CNN) models that utilizes deep architecture for image spatial hierarchical feature extraction. This project examines the training process of VGG network when it processes MRI image data to achieve precise brain tumor detection and classification outcomes. The designed model extracts MRI scan features that include abnormal tissue structures to become proficient at separating tumor from nontumor regions. The model gets evaluated through standard measures consisting of accuracy levels together with precision and recall assessments alongside F1-score calculations. The proposed method develops a dependable and efficient system for brain tumor detection which helps medical professionals along with radiologists to speed up their accurate diagnostic procedures.

Keywords: Brain tumor detection, deep learning, VGG algorithm, MRI images, convolutional neural network, medical imaging, machine learning.

HEART DISEASE PREDICTION USING MACHINE LEARNING

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Abstract

So, because heart disease is one of the major causative morbidities around the world, it is highly significant to detect the disease at the stage of early disease and predict it accurately to provide a significant improvement in patient results. In our research, the machine learning methods, boosting algorithms, and hybrid models are proven to enhance the applicability in predicting heart diseases. The researchers then conduct data exploratory analysis and features of the data identifying the key features and major pattern works associated with heart disease risk risk to lay the basis of their study. Indeed, methods of data preparation used here deal with the problem of missing values and class imbalance at candidate input data for tasks modeling, if there is also the presence of external data points. The predictions of our models are made of robust estimates of probabilities of heart disease, by ensuring that the boosting algorithm capabilities (AdaBoost, both XGBoost and Gradient Boosting) are integrated. And, in this study, the experiment and test the hybrid machine learning model or in others words the models that use more than one algorithms, to find possible way to improve accuracy and generalize predictive modeling. In evaluating the system reliability on the performance of prediction system, accuracy and other precision, recall, F1 score and AUC ROC are used as multiple criteria. By developing a highly accurate, scalable, and heart disease predictive analysis system, researchers try to give healthcare professionals the opportunity to pre perform early diagnosis and experienced clinical decisions on how to provide an individual treatment and hence, better patient results.

Keywords: Heart disease prediction, machine learning, boosting algorithms, XGBoost, AdaBoost, hybrid models, exploratory data analysis (EDA), data preprocessing.

FITNESS LIFESTYLE PREDICTION USING MACHINE LEARNING

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Abstract

This research uses machine learning to forecast fitness levels based on lifestyle information and personal health markers. Features like BMI, heart rate, calories burned, weather, and amount of exercise are all included in the dataset. The three fitness levels—"Good Fitness," "Average," and "Bad"—are determined by predetermined blood pressure, calorie expenditure, and BMI criteria. Encoding categorical variables, dealing with missing values, and scaling numerical features are all part of the data preprocessing process. Fitness levels are classified using a Random Forest Classifier, and metrics such as accuracy and classification reports are used to assess the model. This concept facilitates effective fitness evaluation and encourages data-driven decision-making for customized exercise regimens. Adding real-time data and broadening the scope to forecast long-term health patterns are possible future improvements.

Keywords: Health metrics, Body Mass Index, calorie expenditure, heart rate, data preprocessing, feature scaling, fitness levels classification model, machine learning, random forest, classifier, personalized fitness programs, and health trends.

PREDICTIVE DRUG RECOMMENDATION SYSTEM USING MACHINE LEARNING FOR ENHANCED MEDICATION

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Abstract

Healthcare professionals find pharmaceutical options through the machine learning skills of this Drug Recommendation System which takes detailed medical profiles and specific patient conditions into consideration. The system constructs drug treatment recommendations for each patient based on machine learning analysis of symptom data combined with medical history and demographic statistics. Through the employment of XGBoost and Neural Network supervised models the system achieves precise predictions for proper medications which leads to better therapeutic outcomes. The medical project connects a recommendation system that processes patient history data for ongoing learning to boost predictions going forward. Healthcare medical decision making receives benefits from this system which prevents errors in drug regimes to improve patient treatment results. A wide-ranging analysis of health treatment results and medication data permits the model to generate precise decisions. The evaluation process will evaluate system reliability for real-world applications by measuring four essential performance metrics including accuracy precision and recall alongside F1-score. Medical experts can now take advantage of modern capabilities through a revolutionary drug recommendation system that improves their treatment decisions for individualized patient care.

Keywords: Drug Recommendation, Machine Learning, Personalized Medicine, XGBoost, Neural Networks, Treatment Prediction, Medical Data Analysis, Decision Support System.

INNOVATIVE TRAFFIC ACCIDENT DETECTION FOR SMART CITIES: A DEEP LEARNING ENSEMBLE APPROACH

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Abstract

The dynamic and unpredictable nature of road traffic necessitates effective accident detection methods for enhancing safety and streamlining traffic management in smart cities. This paper offers a comprehensive exploration study of prevailing accident detection techniques, shedding light on the nuances of other state-of-the-art methodologies while providing a detailed overview of distinct traffic accident types like rear-end collisions, T-bone collisions, and frontal impact accidents. Our novel approach introduces the I3D-CONVLSTM2D model architecture, a lightweight solution tailored explicitly for accident detection in smart city traffic surveillance systems by integrating RGB frames with optical flow information. Empirical analysis of our experimental study underscores the efficacy of our model architecture. The I3D-CONVLSTM2D RGB + Optical-Flow (trainable) model outperformed its counterparts, achieving an impressive 87% Mean Average Precision (MAP). Our findings further elaborate on the challenges posed by data imbalances, particularly when working with a limited number of datasets, road structures, and traffic scenarios. Ultimately, our research illuminates the path towards a sophisticated vision-based accident detection system primed for real-time integration into edge IoT devices within smart urban infrastructures.

Keywords: Traffic surveillance, accident detection, action recognition, smart city, autonomous transportation, deep learning.

OPTIMIZED KNOWLEDGE DISTILLATION FOR FINANCIAL FRAUD DETECTION WITH TRANSFORMERS

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Abstract

Financial fraud cases continue to pose significant risks to investors, necessitating advanced detection techniques to aid financial institutions in decision-making. However, existing fraud detection methods often suffer from low accuracy, slow inference speeds, and limited generalization across diverse financial datasets. To address these challenges, we propose a Distributed Knowledge Distillation Framework for financial fraud detection, leveraging Transformer-based architectures. Our approach integrates a multi-attention mechanism to assign importance to key features, followed by feed-forward neural networks for high-level feature extraction, ensuring the retention of critical financial information. A final classification step is performed using neural networks to detect fraudulent activities. Additionally, to overcome inconsistencies in financial data indicators and imbalanced data distribution across industries, we introduce a distributed knowledge distillation algorithm. This algorithm aggregates detection knowledge from multiple teacher networks and transfers it to a student network, enhancing fraud detection across various industry sectors. Experimental results demonstrate that our proposed method significantly surpasses traditional detection techniques, achieving an F1 score of 92.87%, accuracy of 98.98%, precision of 81.48%, recall of 95.45%, and an AUC score of 96.73%. These findings highlight the effectiveness and robustness of our framework in improving fraud detection performance across financial sectors.

Keywords: Transformer, knowledge distillation, financial fraud detection.

ENHANCING UPI SECURITY WITH MACHINE LEARNING-BASED FRAUD DETECTION

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Abstract

Cybercrime is a byproduct of the rapid growth of e-commerce. Detecting online payment fraud is a difficult for online services and is crucial in the quickly changing world of e-commerce. Behavior-based techniques are acknowledged as a promising approach to the identification of online payment fraud. However, using low-quality behavioral data to create high-resolution behavioral models is a significant difficulty. We primarily tackle this issue from the perspective of data improvement for behavioral modeling in our work. Using a knowledge network, we extract fine-grained co-occurrence associations of transactional attributes. In order to learn and enhance the representation of comprehensive relationships, we also use the heterogeneous network embedding. In particular, we investigate tailored network embedding strategies for several behavioral model types, including generalized-agent-based, population-level, and individual-level models. Experiments conducted on a genuine dataset from a commercial bank demonstrate our method's performance gain. It can greatly enhance the effectiveness of online UPI payment fraud detection using representative behavioral models. As far as we are aware, this is the first study to use network embedding methods on attribute-level co-occurrence relationships to achieve data improvement for diverse behavior models. We apply the suggested techniques to an actual online banking payment service situation. According to a set of indicative measures for online fraud detection, it has been confirmed that our techniques perform noticeably better than 95.23% accuracy.

Keywords: Online payment services, fraud detection, network embedding, user behavioral modelling.

ENHANCING CUSTOMER INSIGHTS THROUGH SENTIMENT ANALYSIS OF PRODUCT REVIEWS

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Abstract

Businesses can acquire detailed insights into consumer opinions and preferences while understanding sentiment through product review analysis using classification systems. Modern online review assessments demonstrate that traditional sentiment analysis techniques cannot sufficiently process sophisticated textual factors including language structures and contextual details alongside sarcasm. This study explored both modern Natural Language Processing methods alongside advanced machine learning algorithms to achieve effective classification and sentiment analysis of product reviews. Through this research multiple text preparation techniques including tokenization, stemming and lemmatization have been studied together as preprocessing methods to enhance analytical performance. Our project uses leading-edge machine learning systems combining XGBoost and LightGBM to distinguish between positive and negative as well as neutral reviews. Through data from electronic commerce platforms our learning model will evaluate sentiment analysis performance and sustain reliable operation in multiple sectors. Employing both TF-IDF (Term Frequency- Inverse Document Frequency) and word embeddings the project identifies valuable linguistic attributes which enhance model performance. The basic models Naïve Bayes along with Logistic Regression will serve as comparison standards to determine advanced method effectiveness. This investigation produces valuable insights about consumer sentiment while it creates dependable customer feedback evaluation tools which help businesses enhance product quality together with customer service management.

Keywords: Sentiment Analysis, Product Reviews, Natural Language Processing, Machine Learning, XGBoost, LightGBM, Text Classification, Feature Extraction, Customer Feedback, E- commerce.

HYBRID VISION TRANSFORMER APPROACH TO STRENGTHEN SIGNATURE VERIFICATION

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Abstract

Verification of handwritten signatures is an important yet difficult problem. Although earlier research has made significant strides in this area, they passively learn signature traits from the available data. In this work, we provide a unique Deep Learning model for verifying handwritten signatures that actively modifies current data and creates new data in order to mine effective features. Powered by a proposed novel variation consistency mechanism, the Deep Learning contains three different types of modules unified under one end-to-end framework: In order to build a more discriminating model, the discriminator actively generates signature variations while the extractor looks for deep discriminating features in handwritten signatures. The discriminator then uses the extracted features to make verification judgements. The suggested model is adversarially trained using a min-max loss function, which allows the three modules to work together and compete to improve the overall model's performance and, consequently, the performance of signature verification. We put the suggested approach to the test using four difficult signature datasets: Synthetic Signature. The success of the suggested approach is confirmed by extensive experiments and in-depth talks.

Keywords: Handwritten signature, variation consistency, adversarial enhancement, neural network.

DEEPPFAKE IMAGE DETECTION USING DEEP LEARNING

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Abstract

Generative model advances have generated numerous deepfake pictures that now create extensive obstacles for security protection and digital privacy alongside trust issues in media. Traditional detection methodologies that use Convolutional Neural Networks (CNNs) and Long ShortTerm Memory (LSTM) networks demonstrate certain capability in recognizing these altered images. The detecting accuracy of these models decreases because they fail to identify minor discrepancies present in advanced deepfake images at high resolutions. The proposed research implements EfficientNetV2 architecture to improve deepfakeimage detection. The state-of-the-art deep learning model EfficientNetV2 achieves optimal accuracy levels at the same time it operates efficiently through its compound approach to adjusting network depth and resolution as well as width. The model works optimally to identify the refined irregularities which commonly appear in deepfakes. The research utilizes EfficientNetV2 to evaluate a large collection of real and false images. The study verifies EfficientNetV2's superiority through tests against standard CNNs and LSTM networks for both accuracy and robustness performance evaluation. The first testing shows that the EfficientNetV2 modeling surpasses traditional detection methods thus providing dependable deepfake picture identification. This work utilizes EfficientNetV2's cutting-edge abilities to help protect digital content authenticity because of the fast advancements in deepfake technologies.

Keywords: deepfake images, security, privacy, deep learning algorithms, EfficientNetV2, accuracy.

OPTIMIZED STOCK PREDICTION USING INVESTOR SENTIMENT AND DEEP LEARNING

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Abstract

One of the most important research topics these days is the stock market, and forecasting its characteristics is absolutely essential. Stock market prediction is extremely difficult and necessitates a thorough analysis of data patterns. To overcome this difficulty and provide a suitable solution, specialized statistical models and artificially intelligent algorithms are required. Numerous deep-learning & machine-learning methods can produce a solid forecast with a low chance of inaccuracy. Two network models that have been widely utilized to forecast stock market prices are the Convolutional Neural Network (CNN) and the Artificial Neural Network (ANN), often known as the Deep Feed Forward Neural Network. Based on the data values from the previous few days, the models have been utilized to forecast the data values for the days ahead. This procedure recursively repeats as long as the dataset is valid. Deep learning has been used in an attempt to optimize this prediction, and the results have been significant. The CNN model accuracy was 98.92%, whereas the of the ANN accuracy was 97.66%. In order to make predictions, the CNN model used 2D histograms that were created from the quantized dataset within a specific time period. For the analysis of such datasets, this method has not yet been used. The COVID-19 pandemic, it precipitated a sharp decline in the stock market, has been utilized as a case study to test the model. Due to its great accuracy, the study's outcomes were respectable enough.

Keywords: Stock price prediction, sentiment analysis, sentiment dictionaries, deep learning, LSTM models, and sparrow search algorithm optimization.

PROFESSIONAL ADVANCEMENT AND CAREER PATH PREDICTION USING MACHINE LEARNING

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Abstract

Students find it difficult to decide on a professional specialization. Students make selections based on their subjective opinions of friends and family because there is little guidance and little online information available. This raises the possibility of both students switching their academic fields and high university dropout rates. This research offers a Professional Advancement and Career Path Prediction Using Machine Learning (PACS) to help students pick engineering or another field by addressing the aforementioned issues. The PACS design is based on N-layered architecture machine learning, which is a hybrid model that combines Random Forest and Decision Tree. It makes use of students' extracurricular activities, personality types, and academic performance. Using a sample of 1250 registered students, the relationship between personality type and engineering discipline was constructed. PACS is put into practice and evaluated on a sample of 177 pupils. Graduates and undergraduates who are content with their fields make up the sample. The assessment looked at the degree of agreement between the 177 sample disciplines and the suggestions produced by PACS. The evaluation's findings indicated a weak correlation between the research sample's discipline and PACS's recommended practices. As a result, PACS can offer advice to students who want to pursue engineering or any other field of study. The first career-path recommender specifically designed for the Indian community and other developing nations is the PACS application. PACS's design is adaptable and can be extended in the future to take into account additional higher education academic specialties Using machine learning algorithms.

Keywords: Online Educational datamining, grounded theory, information technology, naïve bayes, career path, recommendation model.

PREDICTION AND CLASSIFICATION OF BRAIN HEMORRHAGE USING MACHINE LEARNING AND DEEP LEARNING ALGORITHMS

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Abstract

Brain hemorrhage is a deadly and serious condition that can only be treated if its early and accurate detection is ensured. Despite the fact that the diagnosis of brain hemorrhage from the medical images is not so easy due to their complexity and requirement of high precision, this issue is solved by using the appropriate well-known approaches. This research introduces the possibility of finding the best method among two established image processing neural networks, MobileNet, and ResNet, for embedding them into medical imaging technologies for brain hemorrhage detection. Mobile Net is a solution for resource-limited hardware environments such as mobiles and other portable devices. Furthermore, the network demonstrates a light and compact architecture that can be deployed in portable diagnostic tools. Resnet, however, stands out as it uses a method of residual learning to allow the construction of very deep networks without falling over with the well-known problem of vanishing gradients, which is very interesting when we have to do it with complex image classification. Therefore, ResNet must be the best choice for this whole brain hemorrhage situation. Both models, the major object of this study, are carried out over the brain hemorrhage dataset. Next, their performance was assessed rigorously with some of the most important cortices such as the accuracy, sensitivity, specificity, and the F1 score. The how of this investigation is to find out the advantages as well as the disadvantages of these models regarding their diagnostic reliability and computational efficiency. The results of this research represent the possible introduction of AI-based deep learning architectures into medical imaging systems thereby a breakthrough in diagnostic accuracy, quicker decision-making, and more effective patient care in clinical environments are expected. The application of the presented models in realtime services where fast and reliable detection is imperative is also indicated by the findings.

Keywords: Brain hemorrhage detection, deep learning, MobileNet, ResNet, convolutional neural networks, medical image analysis, diagnostic accuracy, healthcare, real-time detection, image classification.

HEART DISEASE PREDICTION USING DEEP LEARNING TECHNIQUES

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Abstract

Given its prominence as a leading cause of deaths worldwide, careful detection of this condition is still very important and current heart disease diagnosis methods are heavily dependent on experts, who however, need time to process patients and show the potential possibilities of human error. The research project is aiming to develop a deep learning-based system for heart disease prediction in order to make it efficient and accurate. To do such complex patterns extraction the system uses Convolutional Neural Networks and Long Short-Term Memory (LSTM) networks, which work on the blood pressure readings (t) together with patient's age (l) and cholesterol levels (b) as well as electrocardiogram (ECG) result. Feature selection methods are used to find acceptable information characteristics to reveal important predictive variables, improving the system understanding and the system performance at operation. Using a comprehensive dataset, the model completes training and its accuracy works to the optimal levels for it to be able to identify the patients within the appropriate risk groups. Robustness and reliability of the performance of the model has been established through the use of precision, recall, F1- score and ROC-AUC evaluation metrics. The system is designed to be working as a diagnosis tool that helps healthcare personnel to detect the heart diseases in a timely and convenient way. The proposed solution tries to minimize diagnosis delays and improve patient wellbeing and also assist in preventive healthcare operations through automation of predictions. A system for implementation within clinical operations could do this and change the direction of heart disease strategies by providing quick and reliable early diagnosis options to healthcare professionals.

Keywords: heart disease prediction, deep learning, CNN, LSTM, neural networks, medical diagnosis, feature selection, healthcare analytics, patient risk assessment, ROC-AUC, precision, recall.

DEEP LEARNING APPROACHES FOR CARDIOVASCULAR RISK PREDICTION THROUGH RETINAL IMAGE ANALYSIS

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Abstract

Cardiovascular diseases (CVDs) appears to rank highest in the global mortality rate and thus early diagnosis of these diseases is important gesture to be observed. Based on that, the current work will endeavour to develop a CNN model with MobileNetV3 for screening of CVDs from the retinal images. As for the specific details on the model to use, MobileNetV3 is selected because it is demonstrated to impart higher performance with less computing burden, and CNN layers to extract prominent features from the images. Hence for enhancing the quality of the retinal images of the given dataset which consists of multiethnic population data and includes two groups; with and without CVDs the images are subjected to resizing, normalization and image augmentation. The features incorporated in the architecture of the CNN designed for the prediction of the images of the retinas are such that the images of the retinas with and without CVDs can easily be distinguished. That way, the model could maintain reasonable degrees of reliability particularly in categorizing, analyzing and cheap diagnosing the cardiovascular diseases. It can be helpful in the assessment of the clinical data and might help to prevent late actions related to the patient with a view to achieve the maximum possible positive outcome of the treatment. This means that the co-ordination of the operation with the respective research and incorporation through clinical settings will help to establish ways of assessing the level of efficiency in enhancing patients care.

Keywords: Retinal images, Deep Learning, Convolutional Neural Network, MobileNetV3, Cardiovascular diseases (CVDs), Early diagnosis, Medical imaging, Health care, biomarker-based non-invasive diagnostic, Image classification.

PREDICTING CARDIOVASCULAR DISEASES USING DEEP LEARNING AND RETINAL IMAGES

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Abstract

CVDs are the first cause of death globally, making it important that they are early diagnosed correctly. This research proposes a CNN with the combination of the MobileNet structure to diagnose CVDs from retinal images. It takes advantage from the efficiency of MobileNet while the important features are extracted by the CNNs of the model. To reduce noise and then increase the quality of the images in the dataset used for training and testing we apply some preprocessing techniques such as resizing, normalization, and data augmentation and the image dataset used is multiethnic, two groups included are without CVDs and with CVDs. The fact that the proposed CNN architecture is designed uniquely for retinal images of the patients helps to differentiate accurately between images with existence or absence of CVD, therefore predicting with reasonable levels of accuracy. This model therefore has important advantages for early identification, risk prediction and cost-effective diagnosis of cardiovascular disorders which may support the decision-making process and prompt management in the treatment of these conditions. More studies and adoption into clinical workflow to realise its full potential for the delivery of patient care.

Keywords: Retinal images, deep learning, convolution neural networks (CNNs), MobileNet, cardiovascular diseases (CVDs), early detection, medical imaging, healthcare, risk assessment, bio-marker based non-invasive diagnosis, image classification.

INTEGRATED MACHINE LEARNING MODEL FOR CROP YIELD PREDICTION AND FERTILIZER MANAGEMENT

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Abstract

Machine learning integration for crop yield prediction and fertilizer management plays a fundamental role in boosting agricultural productivity which supports sustainable farm methods. This research project develops a machine learning prototype which accurately predicts agricultural yields and recommends optimal fertilizer usage through analysis of comprehensive farming data containing essential agriculture parameters. This dataset encompasses multiple parameters such as the type of crops grown alongside the year of the crop production with details about the cropping season (for instance Kharif or Rabi) state location and total cultivation spread production data on annual rainfall levels and consumption of both fertilizers and pesticides together with proceeds from yield calculation processes. The developed system actively predicts high accuracy crop yields by using essential variables, like soil health status, combined with weather trends, region farming practices using advanced machine learning algorithms Random Forest, XGBoost, and Neural Networks. The model will provide farmers recommendations for the most effective fertilizer and pesticide combinations based on crop type as well as regional and seasonal factors to optimize production yields while material wasting is reduced. Farmers gain the ability to make informed decisions using this combined system which boosts crop performance while protecting the environment and advancing sustainable farming methods. The system is built to advance precision farming because it supplies solutions for enduring food security while protecting natural resources during climate transformations.

Keywords: Crop yield prediction, machine learning, crop types, fertilizer input, agricultural productivity, predictive analytics, sustainability, resource optimization, CNN, XGboost.

PREDICTING STUDENT ANXIETY LEVELS USING ADAPTIVE MACHINE LEARNING MODELS

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Abstract

Student anxiety continues to present as a substantial problem in educational settings because it damages their academic success while harming their general health status. The early identification of student anxiety helps initiate prompt intervention approaches used to enhance education results. A multi-class adaptive active learning model serves as the primary objective of this project to forecast student anxiety measurements through analytical assessment of behavioral, psychological and academic information. Machine learning algorithms enable the system to detect student anxiety levels at three severity points from mild to severe. The model implements adaptive learning approaches which enable automatic self-improvement of predictions through minimal involvement of human users. The prediction data includes student survey results and academic records together with behavioral evaluation scores. The predictive accuracy receives enhancement through the implementation of XGBoost with LightGBM and CatBoost algorithms. The method of active learning enables researchers to find the data points containing the most valuable information and diminishes reliance on large datasets with labeled data. This system enables educational organizations to obtain accurate risk assessments for students to receive customized support services at proper moments. Real-world applications and model performance assessment rely on four evaluation measures known as accuracy, precision, recall and F1-score.

Keywords: Student anxiety, multi-class classification, active learning, machine learning, XGBoost, LightGBM, CatBoost, early detection, educational support, prediction.

A DEEP LEARNING APPROACH FOR SKIN CANCER CLASSIFICATION

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Abstract

The survival of patients depends on early skin cancer detection because this condition proves to be one of the main cancer types that lead to fatalities. Skin cancer diagnosis includes visual examinations and biopsy procedures which demand lengthy completion times while exposing patients to major human error risks. The deep learning system incorporates Convolutional Neural Networks together with Transfer Learning where it utilizes VGG16 and Efficient Net pre-trained models to enhance its capability for Skin cancer classification tasks. Both models receive fine-tuning from labeled skin lesion pictures to enable their task of identifying benign or malignant categories. High-quality data results from data augmentation techniques and image preprocessing methods that result in enhanced data generalization capabilities for new data. The model develops image-based hierarchical features through deep learning to identify patterns that conventional techniques would probably miss. The model training operations become faster while the results improve through Transfer Learning because it applies knowledge acquired from pre-trained models trained across large databases. Finally experimental evaluations show that the model achieves superior classification precision than regular machine learning algorithms when testing through accuracy and precision and recall together with F1-score standards. The deep learning-based system provides a quick automatic detection approach for early skin cancer detection that ensures reliable and efficient support for dermatologists in their diagnosis of skin cancers.

Keywords: Skin cancer, deep learning, convolutional neural networks (CNN), VGG16, Efficient Net, image classification, early detection, medical imaging, classification accuracy, precision, recall, F1-score.

ENHANCED SUSPICIOUS URL DETECTION IN IOT USING AN OPTIMISED HYBRID SELECTION TECHNIQUE

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Abstract

This research involves, Internet of Things (IoT), a vast number of connected devices face increased risks of exposure to malicious URLs, leading to potential data breaches and cyber threats. Traditional URL detection approaches primarily rely on lexical features for classification, ensuring high-speed detection but lacking comprehensive insights into web content. To enhance security in IoT environments, we propose a novel approach that integrates both lexical and content-based URL features. Our method utilizes a hybrid Feature Selection Technique (FST), combining filter-based selection with a wrapper search-based Genetic Algorithm (GA) to optimize feature extraction. By selecting the most informative features, we enhance model performance while minimizing computational overhead. Furthermore, we evaluate boosting estimators with specific hyperparameter configurations to improve accuracy and efficiency. Experimental results demonstrate that our approach achieves a 99% detection rate while maintaining low computational costs, making it highly suitable for resource-constrained IoT devices in detecting malicious URLs.

Keywords: IoT Security, Suspicious URL Detection, Machine Learning, Feature Selection Techniques (FSTs), Genetic Algorithm (GA), Malicious Link Identification.

DEEP LEARNING APPROACHES FOR IDENTIFYING SUSPICIOUS HUMAN BEHAVIOR IN SURVEILLANCE SYSTEMS

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Abstract

Suspicious human activity recognition (SHAR) is crucial for improving surveillance and security systems by recognizing and reducing possible hazards in different situations. This study presents a methodology leveraging advanced deep learning methods to detect and recognize suspicious human activities with high accuracy. Using Convolutional Neural Networks (CNNs) and models like Time Distributed CNN and Conv3D, our approach significantly improves the precision of activity recognition. Experimental results indicate accuracy rates of up to 90.14%, demonstrating the efficacy of our proposed approach in real-world applications. This research contributes to the advancement of automated security systems by enhancing real-time detection capabilities.

Keywords: Suspicious Human Activity Recognition (SHAR), Deep Learning, Convolutional Neural Network (CNN), Multimedia Data, Surveillance.

IDENTIFYING HOT TOPIC TRENDS IN STREAMING TEXT DATA USING SEQUENTIAL EVOLUTION MODEL BASED ON DISTRIBUTED REPRESENTATIONS

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Abstract

Hot topic trends have become increasingly important in the era of social media, as these trends can spread rapidly through online platforms and significantly impact public discourse and behavior. As a result, the scope of distributed representations has expanded in machine learning and natural language processing. As these approaches can be used to effectively identify and analyze hot topic trends in large datasets. However, previous research has shown that analyzing sequential periods in data streams to detect hot topic trends can be challenging, particularly when dealing with large datasets. Moreover, existing methods often fail to accurately capture the semantic relationships between words over different time periods, limiting their effectiveness in trend prediction and relationship analysis. This paper aims to utilize a distributed representations approach to detect hot topic trends in streaming text data. For this purpose, we build a sequential evolution model for a streaming news website to identify hot topic trends in streaming text data. Additionally, we create a visual display model and knowledge graph to further enhance our proposed approach. To achieve this, we begin by collecting streaming news data from the web and dividing it chronologically into several datasets. In addition, word2vec models are built in different periods for each dataset. Finally, we compare the relationship of any target word in sequential word2vec models and analyze its evolutionary process. Experimental results show that the proposed method can detect hot topic trends and provide a graphical representation of any raw data that cannot be easily designed using traditional methods.

Keywords: Distributed Representations, Sequential Evolution Model, Text Analysis, Word2Vec, Topic Trends, Knowledge graph.

THE INFLUENCE OF ARTIFICIAL INTELLIGENCE ON E-GOVERNANCE AND CYBERSECURITY IN SMART CITIES: A STAKEHOLDER'S PERSPECTIVE

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Abstract

Artificial intelligence (AI) has been identified as a critical technology of Fourth Industrial Revolution (Industry 4.0) for protecting computer network systems against cyber-attacks, malware, phishing, damage, or illicit access. AI has potential in strengthening the cyber capabilities and safety of nation states, local governments, and non-state entities through e-Governance. Existing research provides a mixed association between AI, e-Governance, and cybersecurity; however, this relationship is believed to be context-specific. AI, e-Governance, and cybersecurity influence and are affected by various stakeholders possessing a variety of knowledge and expertise in respective areas. To fill this context specific gap this study investigates the direct relationship between AI, e-Governance, and cybersecurity. Furthermore, this study examines the mediating role of e-Governance between AI and cybersecurity and moderating effect of stakeholders involvement on the relationship between AI, e-Governance, and cybersecurity. The results of PLS-SEM path modeling analysis revealed a partial mediating impact of e-Governance between AI and cybersecurity. Likewise, moderating influence of stakeholders involvement was discovered on the relationship between AI and e-Governance, as well as between e-Governance and cybersecurity. It implies that stakeholders involvement has vital significance in AI and e-Governance because all stakeholders have interest in vibrant, transparent, and secured cyberspace while using e-services. This study provides implications for governmental bodies of smart cities for strengthening their cybersecurity measures.

Keywords: Artificial intelligence, cybersecurity, e-Governance, stakeholder involvement, machine learning, computer crime, smart cities, data privacy.

A MULTI-PERSPECTIVE FRAUD DETECTION METHOD FOR MULTI-PARTICIPANT E-COMMERCE TRANSACTIONS

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Abstract

Detection and prevention of fraudulent transactions in e-commerce platforms have always been the focus of transaction security systems. However, due to the concealment of e-commerce, it is not easy to capture attackers solely based on the historic order information. Many researches try to develop technologies to prevent the frauds, which have not considered the dynamic behaviors of users from multiple perspectives. This leads to an inefficient detection of fraudulent behaviors. To this end, this paper proposes a novel fraud detection method that integrates machine-learning and process mining models to monitor real-time user behaviors. First, we establish a process model concerning the B2C e-commerce platform, by incorporating the detection of user behaviors. Second, a method for analyzing abnormalities that can extract important features from event logs is presented. Then, we feed the extracted features to a Support Vector Machine (SVM) based classification model that can detect fraud behaviors. We demonstrate the effectiveness of our method in capturing dynamic fraudulent behaviors in e-commerce systems through the experiments.

Keywords: Fraud detection; Electronic transaction; Petri net; Machine learning.

TRAVEL DIRECTION RECOMMENDATION MODEL BASED ON PHOTOS OF USER SOCIAL NETWORK PROFILE

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Abstract

Travelling is one of the most enjoyable activities for people of all ages. It is constantly looking for innovative solutions on how to tailor travel recommendations to the needs of its customers. The purpose of our proposed recommendation model is to suggest travelling countries based on photos from the user's social network account and metadata associated with the photos. Such recommendation models are highly dependent on the data used in the model preparation steps and on the technologies and methods implemented in the model. The newly collected data from the Instagram users' accounts were used in the model preparation. The recommendation system is based on the combination of four methods: object detection, similarity measures, classification, and data clustering. The novelty of the proposed recommendation model is that it adopts different data (Instagram photos) for travel direction recommendation, defines a new combined method, integrates results of similarity measurement and SOM application results into one final recommendation, and estimates the parameter impact for different components of recommendation model. A proposed evaluation measure has been used to conclude the results of the recommendation model and as a result the names of the travelling countries have been recommended. The results of the proposed recommendation model are promising, and the validation results demonstrate that on average 63% of the users who visited countries match the recommendations provided for the trip directions, while the accuracy of recommendations, matching user visited countries, but not presented in the photos for recommendation estimation, on average was 96%. The accuracy performance is very positive, while the recommendation system is fully automated and machine learning based. With time, the accuracy of the model may even increase by adopting the photo metadata (location).

Keywords: classification, object detection, recommendation model, self-organizing maps, similarity measure, photo of social networks.

ADVANCED SMART EDGE-BASED DRIVER DROWSINESS DETECTION IN MOBILE CROWDSOURCING USING TRANSFORMER-BASED MULTIMODAL FUSION (TMFM)

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Abstract

Driver drowsiness is a critical factor contributing to road accidents, accounting for a significant percentage of fatal crashes globally. With the increasing adoption of smart devices and vehicle sensors, there is an opportunity to enhance road safety through advanced drowsiness detection systems. This paper presents a Transformer-based Multi-Modal Fusion Model (TMFM) deployed on a hierarchical smart edge computing architecture for real-time driver drowsiness detection. Unlike conventional approaches relying on isolated vision models or simple sensor fusion, TMFM leverages Vision Transformers (ViT) for facial expression analysis, TimeSeries Transformers (TST) for driving behavior recognition, and an attention-based fusion mechanism to dynamically combine facial, vehicular, and environmental data. The system operates across two levels: local detection at the driver's device and collaborative fusion at edge nodes using data crowdsourced from nearby vehicles and infrastructure sensors. This ensures not only high detection accuracy, but also adaptive learning to different environments (e.g., day/night, road type) and personalized profiling through federated learning without compromising privacy. Experimental results demonstrate that the proposed framework significantly enhances detection precision and robustness compared to traditional CNN-LSTM architectures, achieving improved performance under diverse conditions. This smart, privacy-aware, and scalable system contributes to building safer and more intelligent transportation ecosystems.

Keywords: Drowsiness detection, smart edge computing, Vision Transformer (ViT), Time-Series Transformer (TST), multi-modal fusion, crowdsourcing, federated learning, real-time driver monitoring.

EXPLAINABLE AI FOR HOSPITALIZATION DURATION PREDICTIONS

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Abstract

This research involves. Abstract Efficient hospital bed management is critical for reducing costs and improving patient outcomes. This research introduces a machine learning-based framework for predicting ICU patients' length of stay (LOS) using explainable artificial intelligence (xAI). The model is developed using real-world hospital data and incorporates various supervised learning techniques. By employing XGBoost, Random Forest, and other classifiers, the model provides predictions with high accuracy while ensuring interpretability for medical professionals. Experimental results indicate that XGBoost outperforms other models, achieving an AUC of 98%. The framework enhances clinical decision-making by enabling better resource allocation and patient management.

Keywords: Healthcare Decision Support Systems, Explainable Artificial Intelligence, Machine Learning, XGBoost, Hospital Length of Stay Prediction.

PERSONALIZED ADAPTIVE LEARNING TECHNOLOGIES BASED ON MACHINE LEARNING TECHNIQUES TO IDENTIFY LEARNING STYLES: A SYSTEMATIC LITERATURE REVIEW

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Abstract

Artificial intelligence (AI) approaches have been used in personalised adaptive education systems to overcome the limitations of statically determined learning styles (LSs). These approaches utilise algorithms from machine learning (ML) to tackle the challenge of personalising e-learning by mapping students' behavioural attributes to a particular LS automatically and dynamically to optimise the individual learning process. Motivated by the many influential studies in this field and the current developments in ML and AI, a comprehensive systematic literature review was conducted from 2015 to 2022. Influential scientific literature was analysed to identify the emerging trends and gaps in the literature in terms of LS models and possible ML techniques employed for personalised adaptive learning platforms. The outcomes of this paper include a review and analysis of the current trends of this emerging field in terms of the applications and developments in using ML approaches to implement more intelligent and adaptive e-learning environments to detect learners' LSs automatically for enhancing learning. In addition, the following issues were also investigated: the platforms that stimulated research; identifying LS models utilised in e-learning; the evaluation methods used; and the learning supports provided. The results indicated an increasing interest in using artificial neural network approaches to identify LSs. However, limited work has been conducted on the comparison of deep learning methods in this context. The findings suggest the need to consider and stimulate further empirical investigation in documenting the adoption and comparison of deep learning algorithms in classifying LSs to provide higher adaptability.

Keywords: Artificial intelligence, e-learning, learning style, machine learning, personalized adaptive learning, systematic literature review.

PERSONALIZED FEDERATED LEARNING FOR IN-HOSPITAL MORTALITY PREDICTION OF MULTI-CENTER ICU

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Abstract

Federated learning (FL) presents a promising solution for addressing the challenges of applying machine learning (ML) to privately distributed data, particularly in healthcare settings with multiple independently operated institutions. However, the inherent non-IID (non-identically distributed) and unbalanced nature of data distribution can hamper FL's performance and deter institutions from participating in training. This study investigates these challenges using real-world multi-center ICU electronic health record data, preserving the original non-IID and unbalanced distribution. Initially, the paper examines why baseline FL performs poorly under these conditions before introducing a personalized FL (PFL) approach called POLA to mitigate these issues. POLA is a personalized one-shot, two-step FL method designed to produce high-performance personalized models for each participant. Comparative experiments with two other PFL methods demonstrate that POLA not only enhances prediction accuracy and reduces communication rounds but also exhibits potential for application in similar cross-silo FL scenarios. Its versatility and scalability suggest broader applicability across diverse domains beyond healthcare.

Keywords: Data models, Training, Adaptation models, Optimization, Servers, Federated learning, Distributed databases.

**ELECTRONICS AND COMMUNICATION
AND ENGINEERING**

FACIAL EMOTIONAL RECOGNITION SYSTEM USING AI

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Abstract

Facial emotion recognition is a human computer interaction system. Face expressions are a key feature of non-verbal communication. Human emotions are the mental state of feelings and are spontaneous. There is no clear connection between emotions and facial expressions and there is significant variability making facial recognition a challenging research area. Features like Histogram of Oriented Gradient (HOG) and Scale Invariant Feature Transform (SIFT) have been considered for pattern recognition. These features are extracted from images according to manual predefined algorithms. In recent years, Machine Learning (ML) and Neural Networks (NNs) have been used for emotion recognition. In this report, a Convolutional Neural Network (CNN) is used to extract features from images to detect emotions. The model is trained and evaluated using four datasets: JAFFE, KDEF, MUG, and WSEFEP, which provide diverse facial expressions under controlled conditions. This work presents a Convolutional Neural Network (CNN) approach for detecting facial expressions in real-time, allowing for analysis of emotions during virtual interactions. The CNN model classifies expressions into seven emotions: angry, disgust, fear, happy, neutral, sad, and surprise. The proposed method achieves an accuracy of more than 97%.

Keywords: Facial emotion recognition, Convolutional neural networks, Real-time emotion recognition, Human computer interaction, Deep learning.

DNA BASED VLSI CIRCUIT

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Abstract

The continuous scaling of Very Large-Scale Integration (VLSI) circuits faces fundamental challenges due to physical and material limitations in traditional silicon-based CMOS technology. Issues such as quantum tunnelling, leakage currents, and excessive heat dissipation hinder further miniaturization and energy efficiency. As an alternative, DNA computing has emerged as a promising paradigm, leveraging the unique properties of biomolecular reactions, self-assembly, and ultra-dense data storage. DNA molecules can perform computational tasks through strand displacement reactions (SDR), hybridization, and enzyme-assisted processes, enabling the design of Boolean logic gates, memory storage, and molecular-scale circuits. This paper explores the feasibility of DNA-based VLSI circuits, discussing their architecture, fabrication techniques, and potential applications in bio-computing and next-generation nanoelectronics.

Experimental studies demonstrate that DNA logic gates successfully perform basic computational operations, validating the potential for molecular-scale information processing. DNA's self-assembly properties enable the formation of nanowires and bio-circuits, offering an alternative to silicon-based electronics. However, challenges such as slow biochemical reaction times, error rates in hybridization, and integration with traditional electronics must be addressed for practical applications. Hybrid approaches, combining DNA-based computing with CMOS technology could bridge this gap and enable more efficient, low-power circuits. With ongoing advancements in synthetic biology, nanotechnology, and bio-electronic interfaces, DNA-based VLSI circuits present a transformative step toward energy-efficient, high-density, and bio-compatible computing systems.

Keywords: DNA, VLSI, CMOS, Strand Displacement Reactions.

INNOVATION IN EMBEDDED SYSTEMS USING AI AND IOT

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Abstract

The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) into embedded systems has revolutionized various industries, including healthcare, agriculture, smart cities, and automation. This paper explores the latest innovations in AI-driven embedded systems and their role in enhancing efficiency, decision making, and automation. It also discusses the challenges and prospects of these technologies.

Keywords: Embedded Systems, Artificial Intelligence, Internet of Things, Smart Devices, Automation.

IMPLEMENTATION OF A HUMAN HAND GESTURE CONTROLLED ROBOTIC ARM

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Abstract

Wireless communication is essential in today's data acquisition systems, with radio communication applied extensively in uses like radars, satellites, telecommunications, and robotics. In this project, remote sensing technology is utilized to create a robotic arm controlled by gestures that moves wirelessly through human hand motions. The system has a transmitter module, with a wearable glove containing flex sensors to monitor the movement of the fingers. The gathered data is read by an Arduino Uno and wirelessly sent to a server to be processed further. On the receiving end, the server sends the gesture information to an Arduino Mega, which decodes the signals and sends the signals to a 6-axis robotic arm. The servo motors of the robotic arm move according to hand gestures in real time, providing accurate control. This prototype shows the remote sensing technology records hand movements, how wireless communication sends the data through a server, and how the robotic arm makes movements accordingly.

Keywords: Arduino Uno, Arduino Mega, Flex sensors, Server, Robotic arm.

ELECTRIC VEHICLE CHARGING SYSTEM USING RENEWABLE ENERGY

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Abstract

This project presents a wireless power transfer system for charging electric vehicles using solar energy. The system integrates solar panels to harness energy, which is stored in a battery and then used to charge vehicles wirelessly through inductive coupling. An Arduino microcontroller manages the charging process, detecting vehicle presence via IR sensors. When a vehicle is detected, the relay activates, initiating the wireless power transfer and illuminating LEDs to indicate charging status. To ensure uninterrupted charging, the system monitors the main battery voltage. If the voltage drops below a certain threshold, the relay automatically switches the power source to a backup battery, maintaining consistent power delivery. The system is equipped with dual power transfer and receiver coils to transmit energy across a short range of 1 cm at 5V, ideal for small-scale or model electric vehicles. This project demonstrates an eco-friendly, contactless charging solution using renewable energy, highlighting the potential for similar scalable applications in full-sized electric vehicle charging infrastructure.

Keywords: Wireless power transfer, IR Sensor, Arduino, Electric Vehicles, Charging.

LEVERAGING CST MICROWAVE STUDIO FOR THE DESIGN AND OPTIMIZATION OF MULTI BAND MICRO – STRIP PATCH ANTENNAS IN 5G SYSTEM

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Abstract

As the number of mobile users continues to grow, the demand for advanced communication technologies escalates. Fifth Generation (5G) technology stands out as a key solution to address this increased capacity demand, offering enhanced connectivity and improved data rates by utilizing a broad spectrum in the millimeter-wave band. Expected data speeds range from 80 to 100 Mbps, making 5G a transformative force in wireless communication. This paper presents a comprehensive methodology for the design and optimization of multi-band microstrip patch antennas specifically tailored for 5G applications. The microstrip patch antenna is highlighted for its cost-effective manufacturing and straightforward geometric design, which lends itself to compact structures suitable for handheld devices. Through the powerful capabilities of CST Microwave Studio, various design techniques, such as slot cutting and stacked patches, are explored to achieve the desired multi-band characteristics. Simulation results demonstrate the antenna's performance metrics, including return loss, gain, and radiation patterns. This study emphasizes the importance of iterative design and optimization in developing antennas that meet the demanding specifications of modern 5G systems.

Keywords: 5G systems, Micro Strip antennas, Spectrum, CST Micro wave studio.

TRACKING AND MONITORING CATTLE'S HEALTH USING WIRELESS SENSOR NETWORKS

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Abstract

In modern agriculture, with the rapid demand for increased milk productivity, farm automation has become an important priority. Incorporating technology is essential to meet the demand for increased agricultural productivity while simultaneously reducing costs and labor. As part of this effort, monitoring animal health is important. The purpose of this study is to prioritize the continuous health monitoring of dairy cows using different sensor technologies to monitor various health parameters of dairy cows. The proposed monitoring system includes hardware components such as temperature sensors, heart rate sensors and Arduino UNO, as well as software and representative physiological measures. The main objective of this project is to track the location of goods and provide information to their owners using GPS. We can continuously assess the health of individual animals by collecting monitoring data and reporting results to owners and local healthcare providers.

Keywords: Dairy cattle health monitoring, Farm automation, Sensor technologies, Arduino UNO, GPS tracking.

MEAN-BASED APPROACH TO OMNI DIRECTIONAL PATH FINDING ALGORITHM USING SINGLE ULTRASONIC SENSOR FOR ROBOTIC CAR

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Abstract

Our project centers around creating and practically testing a path finding algorithm using a single ultra – sonic sensor on a test RC car. The algorithm consists of two phases: normal and intensive detection. This algorithm provides a reliable method for determining an obstacle-free path. The intensive detection method uses a servo motor for a broader field of view, thus creating an omnidirectional composite sensor with just one monodirectional sensor. It reduces the number of potential false positives for the ideal path by a mean-based approach.

Keywords: Arduino UNO, DC Motors, H-W 130 Motor Shield, Servo Motor, Ultrasonic Sensor.

A NOVEL HYBRID IMAGE CRYPTOGRAPHY AND STEGANOGRAPHY

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Abstract

Using image stitching and image steganography security can be provided to any image which has to be sent over the network or transferred using any electronic mode. There is a message and a secret image that has to be sent. The secret image is divided into parts. The first phase is the Encrypting Phase, which deals with the process of converting the actual secret message into ciphertext using the AES algorithm. In the second phase which is the Embedding Phase, the cipher text is embedded into any part of the secret image that is to be sent. Third phase is the Hiding Phase, where steganography is performed on the output image of Embedding Phase and other parts of the image where the parts are camouflaged by another image using least significant bit replacement. These individual parts are sent to the concerned receiver. At the receiver's end decryption of Hiding phase and Embedding Phase takes place respectively. The parts obtained are stitched together using k nearest method. Using SIFT features the quality of the image is improved.

Keywords: Advanced Encryption Algorithm, Codebook, Cryptography, Steganography.

IR SENSOR BASED ACCIDENT PREVENTION SYSTEM FOR HILLY AREAS

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Abstract

This paper provides overview of the model which describe how to minimize the road accident on the curve roads by proposing a model which uses IR sensors as sensing elements for the vehicles coming from either side of the road. The IR sensor is connected with Arduino Uno software to alert drivers about the vehicles coming from either side of the road also Author have used 16*2 counter to count the vehicles at the turning points to enhance the accuracy at the mountain roads. The Arduino sense the signal from the IR sensors which commands the buzzer to start alarming the driver along with RGB LED present on either side of the road. We have also use the LDR sensors for a street lighting system at the curve point which get activated at night automatically, in this paper for the energy-generating process we have used piezo – electric sensors in the speed breakers on both the sides through which energy is stored and utilized.

Keywords: IR sensors, Arduino microcontroller, Counter, RGB LED, LDR Sensor, piezoelectric sensor.

EXPLORING ELECTRIC VEHICLES WITH INDUSTRIAL APPLICATIONS

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Abstract

Electric Vehicles (EVs) have rapidly evolved beyond consumer transportation to become a cornerstone of industrial innovation. This paper delves into the integration of EVs within various industrial sectors, emphasizing their role in enhancing operational efficiency, reducing carbon emissions, and minimizing maintenance costs. The deployment of EVs in industries such as logistics, manufacturing, mining, agriculture, and port operations demonstrates their versatility and effectiveness. For instance, electric forklifts, autonomous guided vehicles (AGVs), electric heavy-duty trucks, and mining equipment have showcased significant improvements in energy efficiency and operational control due to the superior torque and regenerative braking capabilities of electric drivetrains.

The evolution of battery technologies, particularly advancements in lithium-ion and solid-state batteries, has been pivotal in addressing range and charging limitations, making EVs more viable for industrial applications that demand high power and endurance. Additionally, the integration of smart charging infrastructure and energy management systems enables optimized energy usage and cost savings, especially when coupled with renewable energy sources such as solar and wind power.

The paper also explores Vehicle-to-Grid (V2G) and Vehicle-to-Load (V2L) technologies, which allow EVs to function as mobile energy storage units, providing backup power during peak demand and enhancing grid stability. Furthermore, the use of data analytics and IoT (Internet of Things) in monitoring and optimizing EV performance highlights the potential of smart industrial ecosystems.

However, challenges persist, including high initial costs, battery disposal concerns, limited charging infrastructure, and regulatory complexities. Addressing these challenges requires coordinated efforts involving technological advancements, policy incentives, and investments in charging infrastructure. Collaborative approaches between manufacturers, governments, and energy providers are essential to accelerate EV adoption in industrial settings.

In conclusion, the paper asserts that EVs represent a significant opportunity for industries to transition towards a sustainable and efficient future. By overcoming current challenges and leveraging emerging technologies, EVs can play a crucial role in transforming industrial operations and achieving long-term sustainability goals.

Keywords: Electric Vehicles, Autonomous Guided Vehicles, Vehicle-to-Grid, Vehicle-to-Load, Internet of Things.

DEVELOPMENT OF DEVICE FOR NON-INVASIVE TREATMENT OF ALZHEIMER'S DISEASE (AD) USING ELECTRIC FIELD (EF)

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Abstract

Alzheimer's disease (AD) is a progressive neurodegenerative disorder and the most common cause of dementia globally. It is characterized by the gradual decline in cognitive functions, including memory, comprehension, language, attention, reasoning, and judgment. The disease is pathologically marked by the accumulation of beta-amyloid plaques and neurofibrillary tangles in the brain, leading to neuronal damage and brain atrophy. A proven effective strategy to stop the progression of AD is the promotion of proper folding and inhibition of aggregation of β -amyloid peptides. The application of electric and magnetic fields can alter the orientation and aggregation of such molecules in the brain. In-vitro analysis suggests that a uniform electric field of 150 V/cm is most effective in delaying the aggregation of beta-amyloid (Saikia et al., 2019). Neurons generate electric and magnetic fields due to the flow of electrical currents through their membranes and synaptic connections. Applied fields interact with these self-generated fields, helping to delay the progression of AD.

Keywords: Alzheimer's disease, Beta – Amyloid Plaques, Cognitive Functions, Neurons.

AUTOMATIC MEDICINE REMINDER FOR OLD AGE PEOPLE

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Abstract

The reality is that many of us will need assistance in our later years. In some cases, people need nothing more than occasional visits from a home nurse, some light housekeeping, meals on wheels, and visitors willing to talk and notify about pills. While there is a movement to make aging at home possible for more people, it is not always an option. Dementia and other illnesses can require around the clock medical care and monitoring, things often more easily given in a professional facility than at home. On the other end, increasing number of smart systems opens area where medical treatment can be utilized to completely new level. In this paper we show a working solution how a smart home can be utilized to help people with medication related reminders. Proposed flow starts when a new medication prescription is taken from the doctor. eHealth system generates QR code which is then delivered as part of prescription, holding set of information, such as medications treatment, duration, next visit and similar. This set of information is used by the expert system which handles all the notifications generated by prescription. In used system, three types of notifications are used, smart phone notifications, home voice and video notifications.

Keywords: Openhab, Medication, Reminder, Smart.

AUTOMATIC RECHARGEABLE AND TRANSFER SIGNAL (AR&TS)

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Abstract

Now a days electric vehicles are very rapidly available in the market. In that there is more technology is used like Bluetooth, Google, communication. In this there is no recharge for the battery it will take high cost for the battery and it cannot store the fully chargeable and it can be discharge after few hours. Now if there is solar sensor it can be store the energy in continuous manner and it can be generated the electric current it can be track in your mobile access or moderate it. In this tracking device is available it will work like a SOS and it show the results to your position, there another chance it transmits the signal directly to the mobile of another person in this device it contains of two memory and sim card, it can be connected to the mobile of your device and also (other three persons) it can be accessible, when you are in dangerous situation in the place. It transmits the signal according to nearby transformer or long distance of the place. Sensor is activated automatically and it can work. It also contains the wireless communication with low radiation(compressive) and some amount of network on the device.

Keywords: Bluetooth, Google, Communication, SOS, Solar, Transmission.

REAL TIME OBJECT DETECTION USING FPGA BASED AIML ACCELERATORS

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Abstract

Object detection has become crucial in applications like traffic monitoring, facial identification, and autonomous driving. Convolutional neural networks have reduced system complexity and improved performance, with deep learning leading to significant advancements in object detection tasks. However, challenges like speed, accuracy, and storage limit their use. GPUs, ASICs, and FPGAs are currently used for hardware acceleration of neural networks. However, most models only achieve single-digit frames per second on high-end CPUs. Convolutional Neural Networks (CNNs) have emerged as the foundational technology for object detection, offering high accuracy and efficiency in extracting spatial hierarchies of features.

The implementation of convolution neural networks faces a significant concern regarding power consumption, which is directly related to computational complexity and model parameters. To improve performance, efforts should be made to reduce power consumption in autonomous systems, IoT devices, portable and wearable devices.

Real-time detection systems integrate optimized CNN architectures with techniques like region proposal generation, anchor box refinement, and multi-scale detection. Despite their success, challenges such as detecting small objects, handling occlusions, and achieving real-time performance in resource-constrained environments remain, such as anchor-free detection and transformer-based models, which further push the boundaries of object detection performance. Applications span diverse fields, including autonomous vehicles, healthcare, and surveillance, demonstrating the transformative impact of CNN-based object detection systems.

In this work an attempt is made to implement the trained model to reduce model complexity by introducing grouped convolution in the place of normal convolution, and tried to reduce the latency by managing the intermediate results such that data access time is reduced.

Keywords: Graphical User Interface, FPGAs, ASICs, CPUs, Real Time, Convolutional Neural Networks.

EXPLORING CLOUD COMPUTING MODELS AND BENEFITS

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Abstract

Cloud computing has transformed information technology by providing flexible, scalable resources online. This paper examines its essential characteristics and components, exploring various models – public, private, hybrid, and community clouds – along with their specific benefits and limitations. Key advantages discussed include cost efficiency, flexibility, and improved collaboration, while also addressing challenges like security risks and latency. The study further looks at future trends such as edge computing and the integration of AI, aiming to equip readers with a comprehensive understanding of the current influence of cloud computing and its potential to shape future technological landscapes.

Keywords: Cloud Computing, Cloud Models, Benefits and Limitations, Edge Computing, Artificial Intelligence Integration.

AURORA – DEVELOPMENT OF APPLICATION FOR SMART HEALTH AND SYMBLIZING DWAN, SAFETY MONITORING SYSTEM FOR WOMEN & DATA ACCESS THROUGH IOT

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Abstract

The increasing global crime rate, particularly crimes against women, has raised significant concerns about personal safety. This project focuses on developing a Smart Health and Safety Monitoring System for Women using IoT technology. The proposed system is designed as a lightweight and highly sensitive wearable gadget that continuously monitors vital health parameters such as pulse rate, ECG, and temperature.

In the event of an emergency, the system automatically detects abnormal health conditions and sends real-time GPS location updates to predefined emergency contacts and a Telegram bot every 15 seconds via SMS. Additionally, a panic switch is integrated to trigger an alert manually. The system utilizes sensors, a Raspberry Pi microcontroller, and cloud-based applications like ThingSpeak and ThinkShow for real-time data visualization and remote monitoring.

By integrating IoT, this solution enhances personal security and provides immediate assistance in critical situations. Future advancements may include improved connectivity, enhanced wearable technology, and expanded safety features to further strengthen women's safety and well-being.

Keywords: Women Safety, Data Access, Smart Health.

DESIGN AND PERFORMANCE ANALYSIS OF 2:4 DECODER USING REVERSIBLE LOGIC GATES

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Abstract

This Reversible logic has been widely used in the field of VLSI. we introduce a method that enables the designers to implement this technique in their decoder circuits. In Logical Reversibility is not allowed for Fan-out and Feed-back. It is primarily used for applications in various sectors such as Computer Graphics, High Performance Computing, and Nanoscale. This paper presents a 2x4 Decoder circuit using Reversible logic with respect to its Delay as well as power consumption. It is mainly useful for minimizing the need for power supply. It can be developed with help of Reversible logic gates like Feynman Gate, Toffoli Gate, Peres Gate.

Keywords: Decoder, VLSI, Feynman Gate, Toffoli Gate, Peres Gate.

IOT ENABLED ADVANCEMENT WATER QUALITY MONITORING SYSTEM FOR POND MANAGEMENT AND ENVIRONMENT CONSERVATION (WITHOUT WIFI)

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Abstract

The Advanced Water Quality Monitoring System for Pond Management is designed to provide real-time, remote monitoring of critical water quality parameters in aquatic environments. The system utilizes a network of sensors – including turbidity, TDS, and pH sensors – to continuously measure water quality, with data transmitted wirelessly via LoRa technology to a central receiver.

Upon reception, the data is relayed through Bluetooth to a display interface, enabling instant access and review through a Bluetooth serial monitor. This integration of sensor technology with wireless communication ensures efficient, accurate, and user-friendly monitoring, facilitating timely decision-making and improved management of pond ecosystems.

Keywords: Water quality, LoRa, Arduino UNO, Bluetooth, sensor monitoring, pond management

IOT BASED SOLID WASTE MANAGEMENT SYSTEM FOR SMART CITIES

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Abstract

Urban waste management has become an ever – increasing challenge due to rapid urbanization and population growth. Conventional waste management methods often lead to inefficiencies, unnecessary travel, underutilized resources, and environmental hazards. To address these challenges, this paper presents an IoT based solid waste management system designed for smart cities. The system incorporates a variety of sensors including ultrasonic, moisture, pressure and gas sensors, and integrates GPS, GSM, Wi – Fi communication, and an Arduino Uno microcontroller. The system is designed to monitor the status of waste bins in real – time, allowing municipal teams, authorized personal, local leaders, and truck operators to access information via mobile and web applications. A remote server is used for data storage and analysis, optimizing waste collection process, reducing operational costs, and ensuring environmental sustainability. The proposed system provides an innovative approach to improving waste management through real – time data sharing, route optimization, and efficient resource utilization.

Keywords: Smart City, Solid Waste Management, Internet of Things, Data Storage, Real Time Monitoring.

TERNARY LOGIC BASED DIGITAL ARITHMETIC CIRCUITS USING CARBON NANO TUBE FIELD EFFECT TRANSISTORS

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Abstract

In digital logic systems, ternary logics are preferred over binary logics due to their rapid processing speeds and great information density. Since the carbon nanotube field-effect transistors (CNTFETs) may give different threshold voltages by varying the nanotube diameter. They are thought to be a superior choice for building ternary circuits. Adders and multipliers are examples of sophisticated arithmetic Circuits that are crucial in many VLSI applications. This paper proposes the Stanford 32 nm CNTFET – based ternary half-adder (THA) And multiplier (TMUL). In order to optimize delay and power, the suggested THA and TMUL use 41 and 33 CNTFETs, respectively, which results in a 54.44% and 45% reduction in transistor count. Therefore, when compared to existing circuits, the proposed THA Exhibits improvements in delay, power, and energy of 37.01%, 14.07%, and 45.87 percent, while the TMUL exhibits improvements in delay, power, and energy of 30.48 percent, 6.64%, and 36.74%, respectively. Utilizing HSPICE and a supply voltage of 0.9v, the suggested THA and TMUL are created.

Keywords: CNTFETs, Half Adder, Full Adder, Ternary Logic, Multiplier.

ELECTRICAL AND ELECTRONICS ENGINEERING

DEVELOPMENT AND CONTROL OF A UNIFIED POWER QUALITY CONDITIONER (UPQC) FOR POWER QUALITY IMPROVEMENT IN MEDIUM- VOLTAGE DISTRIBUTION NETWORKS

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Abstract

To enhance the power quality in medium-voltage distribution networks, particularly for sensitive loads, a Unified Power Quality Conditioner (UPQC) device is proposed. The device combines both series and shunt active power filters to mitigate a wide range of power quality disturbances. These disturbances include frequency and voltage fluctuations, voltage sags, short time interruptions, voltage flicker, harmonics, inter-harmonics, three-phase unbalance, and temporary over voltages. The UPQC'S design incorporates a fixed Voltage slow closed-loop control strategy that ensures stable Operation by effectively compensating for disturbances in real-time. The power unit and the topology of the charging circuit are optimized to meet the demands of medium voltage networks. Simulation and experimental results confirm that the UPQC significantly improves the quality of the power supply, providing reliable and stable voltage and current profiles for sensitive industrial and commercial applications. This approach offers a robust solution for addressing the challenges associated with maintaining high ability power in medium-voltage distribution systems.

Keywords: UPQC, Harmonics, power quality, Distribution Networks.

OPTIMIZED CONTROL STRATEGY FOR HIGH-POWER WIRELESS POWER TRANSFER SYSTEMS IN ELECTRIC VEHICLE CHARGING STATIONS USING GOLDEN JACKAL OPTIMIZATION

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Abstract

This paper addresses the challenge of efficiency degradation in wireless power transfer (WPT) Systems when there is a significant power class mismatch between the vehicle assemblies (VAs) and ground assemblies (GAs) in electric vehicle (EV) charging stations. To tackle this issue, a new architecture is proposed, consisting of a dc-link parallel ac-link series multi-inverter multi-rectifier system for high -power WPT applications.

The design aims to optimize modulation, power transfer capability, and power sharing. A comprehensive analysis of power losses is presented, along with an advanced control method based on mutual inductance identification to minimize these losses. The method is further optimized using the Golden Jackal Optimization algorithm. Simulation results in MATLAB show that the proposed system significantly improves efficiency and reduces power losses, validating the effectiveness of the control strategy in enhancing WPT system performance.

Keywords: Wireless Power Transfer, Electric Vehicle, Golden Jackal Optimization Algorithm, MATLAB

DESIGN AND OPTIMIZATION OF A NOVEL MULTI-LEVEL INVERTER FOR ENHANCED RELIABILITY AND REDUCED COMPONENT COUNT IN RENEWABLE ENERGY SOLAR SYSTEM

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Abstract

This project presents a novel multi-level inverter topology designed to improve the reliability and reduce the component count in renewable energy solar system. The proposed inverter generates 7 and 11 voltage levels in symmetrical and asymmetrical configurations, respectively, with the ability to extend to 19 levels for reducing “Total Harmonic Distortion” (THD) in between (3-5%) as per IEEE standards. The inverter utilizes six unidirectional switches and one bidirectional switch, offering a versatile solution for generating both positive and negative voltage levels. Comparisons are made in terms of the number of switches, switch drivers, and blocking voltages to demonstrate the effectiveness of the proposed structure in minimizing component requirements. Additionally, the reliability of the proposed structure is thoroughly analyzed and compared with existing inverter topologies with increasing levels. Simulation results obtained via MATLAB validate the feasibility and performance of the proposed multilevel inverter, highlighting its potential for enhancing system reliability while reducing maintenance costs in renewable energy applications (installation of solar panels). Advantages are power quality, no need of grid power. Disadvantages are installation cost based on load type.

Keywords: Total Harmonic Distortion, Matlab, photovoltaic, grid power.

A SIMPLE EFFICIENT AND NOVEL STANDALONE PHOTOVOLTAIC INVERTER CONFIGURATION WITH REDUCED HARMONIC DISTORTION

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Abstract

This paper presents a novel photovoltaic (PV) inverter topology designed for maximum solar power utilization, which incorporates a new maximum power point tracking (MPPT) scheme based on shading pattern identification using an Adaptive Neuro-Fuzzy Inference System (ANFIS) controller. The proposed topology features a Single-Input Multi-Output (SIMO) converter and a Multilevel Inverter (MLI) to optimize energy conversion efficiency. Under partially shaded conditions, the ANFIS-based MPPT controller effectively tracks the maximum power point by analyzing the shading pattern, ensuring the PV system extracts maximum power. The SIMO converter then processes the PV voltage and generates four independent voltages (V1, V2, V3 and V4) of varying magnitudes. The MLI subsequently converts the DC output voltage of the SIMO converter into a high-quality AC voltage suitable for grid integration, with a reduced harmonic distortion profile. The MLI consists of eight switching devices and is capable of producing a 31-level AC output voltage with minimal harmonic distortion. A key feature of the proposed system is the robust MPPT performance under varying weather conditions, coupled with the efficiency of the MLI in feeding the utility grid. An experimental prototype has been developed, with an FPGA Spartan trainer kit used to program the necessary control pulses for the MLI and SIMO converter, demonstrating the effectiveness of the proposed PV inverter topology.

Keywords: MPPT, ANFIS, MLI, SIMO, FPGA, PV Inverter.

ANN-BASED ADAPTIVE CURRENT CONTROL FOR RESONANT WIRELESS POWER TRANSFER IN DRONE RECHARGING STATIONS

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Abstract

The rapid growth of the drone market presents both opportunities and challenges, particularly in the area of energy management. One of the main limitations in drone operation is the restricted flying range, necessitating frequent battery recharges. A scalable and efficient solution for persistent operation is the establishment of a network of wireless recharging stations, particularly located on building rooftops. Resonant wireless power transfer (RWPT) is an ideal technology for this purpose, enabling non-contact energy transfer. However, the variability in the coupling factor between the drone and the recharging pad due to misalignments poses a significant technical challenge, leading to potential inefficiencies in power transfer.

This work proposes an innovative solution using an Artificial Neural Network (ANN) controller to dynamically adjust the current in response to the fluctuating coupling factor. By leveraging machine learning, the ANN can predict and compensate for misalignments, ensuring stable and efficient power delivery in a multi-pad charging station. Simulations conducted using the Simscape Power Systems module in Simulink demonstrate the effectiveness of the proposed ANN-based tuning mechanism in maintaining optimal charging performance. This approach offers a promising path toward enabling large-scale, autonomous drone recharging stations, paving the way for continuous and efficient drone operations across various industries.

Keywords: Artificial Neural Network, Resonant wireless power transfer.

FUZZY-BASED CONTROL FOR BIDIRECTIONAL POWER MANAGEMENT IN ELECTRICAL VEHICLE FLEETS FOR GRID SUPPORT

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Abstract

Electric vehicles (EVs) can serve as distributed energy storage systems, providing various regulation services to the smart grid. To make a significant impact on the grid, the approach is to manage a fleet of EVs collectively through a new role called an aggregator. This Paper proposes reference charging currents for each EV based on the individual set-points provided by the aggregator. It compares different control strategies for bidirectional active power management under both ideal and distorted conditions. While the charging control for each EV is decentralized a separate central control system handles the power transfer from the AC grid to the DC bus. The power exchange does not depend on communication links between the vehicles and the charging station, and a smooth transition to vehicle-to-grid(V2G) mode is also feasible. The Grid Support Station (GSS) consists of multiple Discharging Units (DUs), which enable the transfer of both active and reactive power from the EVs batteries to the grid. This project introduces a fuzzy-based control method for regulating both active and reactive power from EVs to support the grid. The power flow from the GSS to the grid is determined by the node voltage and the available energy within the GSS. Simulations in Matlab/Simulink demonstrate the performance of the proposed model, highlighting the control system's capability for fast DC charging and vehicle-to-grid operation. The results validate the feasibility and effectiveness of the approach.

Keywords: Aggregator, Fuzzy logic, decentralized, grid support station.

DESIGN OF A BIDIRECTIONAL DC/DC CONVERTER FOR A HYBRID ELECTRIC DRIVE SYSTEM WITH DUAL-BATTERY STORING ENERGY

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Abstract

As the global shift towards electric vehicles (EVs) accelerates, the role of efficient battery energy storage systems becomes critical in addressing environmental and energy concerns. However, challenges such as battery deterioration caused by high power demands from acceleration and braking need to be addressed to improve EV performance and longevity. This paper proposes a Bidirectional DC/DC Converter topology aimed at enhancing the operation of Hybrid Electric Vehicles (HEVs) by efficiently managing the flow of energy between primary and secondary batteries (ES1 and ES2) while supporting an adjustable voltage bus. The converter operates in two modes step-up (Dual-source low-voltage power in mode) and step-down (energy-regenerating high-voltage DC-link mode), allowing for bidirectional power flow. Additionally, the converter design enables energy transfer between any two low-voltage sources, offering improved versatility in power management. The paper also presents a comprehensive analysis of the power transmission mechanisms, circuit design, and operational modes. To validate the proposed system, a MATLAB-Simulink model is developed based on a Digital Signal Processor (DSP) flowchart, demonstrating the performance of the system. Furthermore, the integration of BLDC (Brushless DC) motor speed control via a Hall sensor is explored, highlighting its contribution to precise motor control in hybrid and electric vehicles. Simulation results and performance metrics underscore the efficiency and reliability of the proposed system in real-world applications.

Keywords: Bidirectional DC/DC Converter(BDCC), bidirectional power flow, Digital Signal Processor (DSP) flowchart, Dual-battery storage, Hybrid Electric Vehicle.

ENHANCED ENERGY EFFICIENCY & SOC MANAGEMENT IN SMART TRANSFORMER-BASED BATTERY ENERGY STORAGE SYSTEMS USING ANFIS

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Abstract

A smart transformer (ST), which is a power-electronic based transformer with control and communication functionalities, can be the optimal solution for integrating a battery energy storage system (BESS) in an electrical distribution system. This paper investigates the performance of a ST-based BESS in comparison to a conventional BESS, focusing on energy efficiency during charging and discharging processes. Results show that the ST-based BESS operation outperforms the conventional system, particularly in terms of energy efficiency. Additionally, by appropriately sizing the BESS to meet peak load demands, the power rating of ST converters can be minimized. The ST-based BESS also demonstrates enhanced fault ride through capabilities compared to traditional systems. To ensure the proper functioning of the ST based BESS effective state of charge (SOC) management is critical, especially when the ST converter operates at its maximum active power rating in this context, an Adaptive Neuro-Fuzzy Inference System (ANFIS) is utilized for optimal SOC management, ensuring that the system efficiently meets peak load demand while avoiding over-discharge or over-charge, Both simulation and experimental results validate the developed ANFIS-based SOC management approach, confirming its effectiveness in enhancing the system's performance.

Keywords: BESS, ST, ANFIS, SOC.

HIGH-EFFICIENCY SINGLE-STAGE ON-BOARD CHARGER FOR ELECTRICAL VEHICLES

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Abstract

This paper introduces an innovative isolated single-stage on-board electric vehicle (EV) charger that operates without the need for an intermediate DC-link, utilizing a current-source topology. The proposed converter is designed to achieve soft-switching in semiconductors across the full range of AC line voltages, regardless of load variations, thereby enhancing efficiency and minimizing switching losses. Notably, the charger operates without the need for external snubber or clamp circuits, simplifying the design while reducing component stress and enhancing system reliability. The power factor correction (PFC) and voltage regulation are accomplished using a straight forward phase-shift modulation technique, which ensures optimal performance while minimizing circulating energy within the system.

One of the distinguishing features of the proposed charger is its exceptional efficiency characteristics, particularly in the constant power charging mode, where the system achieves a peak efficiency of 96.4%, as demonstrated in a 3 kW prototype using silicon carbide (SiC) semiconductor devices. Additionally, the charger maintains efficiencies above 95% during operation at maximum power, with a total harmonic distortion (THD) of 4.1%. The paper provides a thorough analysis of the control methodology, component stresses, and design constraints, ensuring a balanced approach to performance and reliability.

Experimental validation of the proposed charger demonstrates the effectiveness of the topology, confirming its suitability for real-world EV applications. Moreover, the paper proposes an extension of the system using an Adaptive Neuro-Fuzzy Inference System (ANFIS) controller, which aims to further optimize the performance and adaptability of the charger under varying operational conditions, such as fluctuating load demands and input voltage variations. The integration of an ANFIS-based controller is expected to enhance power factor correction, reduce circulating energy, and improve overall system efficiency, contributing to the development of next-generation smart and efficient EV charging solutions.

Keywords: Power Factor Correction, Adaptive Neuro-Fuzzy Inference System, Total Harmonic Distortion.

DESIGN AND IMPLEMENTATION OF A MULTI-INPUT MULTI OUTPUT DC/DC CONVERTER WITH WIND ENERGY INTEGRATION AND MPPT ALGORITHM FOR HIGH-EFFICIENCY POWER CONVERSION

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Abstract

This paper presents the development of a high-efficiency multi-input multi output (MIMO) DC/DC converter integrated with wind energy and a wind maximum power point tracking (MPPT) algorithm for renewable energy applications. In renewable energy systems, particularly those utilizing wind power, multiple output voltages are often required to power various loads, while optimizing energy conversion efficiency. The proposed MIMO DC/DC converter accommodates multiple input sources, including wind turbines, while achieving high step-up voltage conversion to provide stable output voltages for different applications. The converter utilizes a coupled inductor with a low turn ratio to enhance voltage gain, while the MPPT algorithm ensures maximum power extraction from the wind turbine by continuously adjusting to the changing wind conditions. The converter employs soft-switching techniques, including voltage clamping and zero voltage switching (ZVS), to improve efficiency by reducing switching losses. Additionally, an auxiliary inductor regulates the voltage of the auxiliary output, enabling effective energy management across multiple outputs. Experimental results validate the high efficiency and performance of the proposed converter, demonstrating its suitability for wind power generation and other renewable energy systems requiring multi-output configurations.

Keywords: MIMO, MPPT, ZVS, DC/DC converter.

A NOVEL MULTIPOINT DC–AC INVERTER WITH INTEGRATED POWER MANAGEMENT FOR HYBRID ENERGY STORAGE SYSTEMS AND DISTRIBUTED RENEWABLE ENERGY SOURCES

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Abstract

This paper presents a novel non isolated multipoint DC–AC inverter designed for distributed renewable energy systems integrated with hybrid energy storage solutions. The proposed inverter features a simplified architecture, utilizing fewer passive components and high-frequency power semiconductors compared to conventional designs. The multipoint converter (MPC) enables the integrated management of power from a photovoltaic (PV) array, a battery unit, a super capacitor bank, and an electric vehicle (EV) battery, while supporting bidirectional power flow. The inverter's power circuit is based on an advanced split source inverter topology, directly connecting the PV source to the DC link. A custom control method is developed for the MPC, allowing for maximum power point tracking (MPPT) of the PV array without the need for additional converters, as well as independent regulation of power flow at each port and between the ports. The proposed control scheme ensures optimal energy utilization and enhances the system's flexibility, while maintaining grid stability through ancillary services. Experimental validation of the prototype under various power flow scenarios demonstrates the effectiveness and robustness of the design. The results show improved efficiency and simplified system architecture, marking a significant step towards more cost-effective and scalable renewable energy systems.

Keywords: bidirectional power flow, DC–AC inverter, hybrid energy storage, multipoint converter, photovoltaic array.

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

AND

**CSE (ARTIFICIAL INTELLIGENCE
AND MACHINE LEARNING)**

INNOVATIVE BLOOD GROUP DETECTION: A DEEP LEARNING FRAMEWORK USING FINGERPRINT ANALYSIS

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Abstract

Classification of Blood groups is very important in medical field, blood transfusion safety, and emergency medicine. This paper describes about a deep learning-based method for Classification of blood groups based on biometric analysis. This study analyzes some of the deep learning models - Convolutional Neural Networks (CNNs), Alexnet, ResNet150 with Recurrent Neural Networks (RNNs), Vision Transformer models, in order to estimate their performance on an open- source fingerprint-based blood group dataset. The method adopted includes data cleaning and data preprocessing to provide the model with robustness and generalization. Feature extraction has been taken from a baseline CNN, whereas AlexNet was focused on computation as it has lightweight architecture and efficiency. ResNet+RNN uses residual connections to inculcate and combine sequential patterns of recognition into an architecture to boost the classification accuracy. Finally, the attention mechanism of Vision Transformer model uses intricate details about fingerprint significantly enhancing the blood group classification. Experimental results show that Vision Transformer dominates other architectures, achieving highest accuracy and proving that it is mainly focusing on the fingerprint features that matter. The approach proposed here brings about an innovative and efficient solution for the determination of blood groups using the advanced deep learning techniques. The study contributes significantly to the growing area of data- driven healthcare research and offers a scalable framework for similar classification tasks.

Keywords: Blood group detection, Deep learning, CNN, ResNet150, RNN, AlexNet, Vision Transformer, Blood transfusion, Feature extraction, Biometric analysis.

DEEP LEARNING-BASED SATELLITE ANALYSIS FOR POVERTY ESTIMATION AND TREND MONITORING

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Abstract

Monitoring and measuring poverty levels are essential for evaluating the impact of aid programs and shaping effective policies. Traditional data collection methods are expensive and often lack sufficient coverage in impoverished regions. Remote sensing, combined with deep learning, offers an alternative approach by utilizing satellite imagery to estimate economic conditions. This study employs Convolutional Neural Networks (CNNs) to process satellite images and analyze nighttime light intensity as an indicator of poverty. By leveraging publicly available datasets across multiple years, we aim to enhance previous research by refining methodologies for tracking poverty trends over time. Our approach validates prior findings that satellite-based deep learning models can predict poverty at specific time points. However, improving temporal accuracy remains a challenge. To address this, we integrate a Recurrent Neural Network (RNN) to analyze various developmental factors, including agricultural activity, lighting access, water proximity, and roof materials. This multi-faceted analysis enhances the reliability of poverty estimation models. Accurate poverty mapping across regions is crucial for resource allocation and the design of effective intervention strategies. By advancing deep learning techniques in satellite-based poverty estimation, this research contributes to data-driven policymaking and global efforts toward poverty alleviation. Future work will focus on improving prediction accuracy and exploring additional socioeconomic indicators to refine the model further.

Keywords: Poverty Mapping, Satellite Data Analysis, Artificial Intelligence, Neural Networks, Deep Learning Models, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Geospatial Analysis, Economic Monitoring, Remote Sensing Technology

DECENTRALIZED SMART AGRICULTURE: BLOCK CHAIN-BASED SUPPLY CHAIN TRACEABILITY AND DIRECT MARKETING USING SMART CONTRACTS

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Abstract

The increasing complexity of global agricultural and food supply chains necessitates innovative solutions to enhance traceability, transparency, and operational efficiency while ensuring compliance with health and quality standards. Challenges such as food safety risks, fraudulent activities, and inefficiencies caused by intermediaries highlight the need for a secure and decentralized framework. This paper proposes a blockchain-based framework, implemented as a web-based platform, to transform agricultural supply chain management. The system leverages the Ethereum blockchain network and employs smart contracts to automate transactions, enforce agreements, and ensure seamless execution without the need for intermediaries. Additionally, cryptographic hash functions such as SHA-256 and Keccak-256 are utilized to maintain data integrity, immutability, and security. By eliminating intermediaries, the proposed model facilitates real-time traceability of crop prices, production stages, and quality compliance. Through the decentralized ledger, stakeholders—including farmers, distributors, retailers, and consumers—can transparently track agricultural products from their origin to the final destination with enhanced accuracy. The web-based platform provides an accessible interface, enabling users to monitor transactions, verify product authenticity, and make informed decisions. This decentralized approach fosters trust, enhances supply chain efficiency, and mitigates fraudulent activities. The integration of blockchain technology and smart contracts within a web-based platform offers a scalable, transparent, and secure solution to modern agricultural challenges, strengthening trust and reliability in the food supply ecosystem.

Keywords: Blockchain, Ethereum, SHA-256, Keccak-256, Supply Chain, Smart Contracts, Traceability, Agriculture, Web-based Platform, Decentralized Framework, Data Integrity, Transparency, Sustainability.

RISK PREDICTION IN SOFTWARE ENGINEERING: A MULTI CLASS AND ROLE BASED APPROACH WITH FEPP

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Abstract

Software risk prediction in the requirement engineering phase is crucial for ensuring project success in the Software Development Life Cycle (SDLC). Traditional risk prediction models face challenges in handling complex datasets, data availability, and incorrect labeling. To address these limitations, we propose ForExPlusPlus (FEPP), a novel risk prediction framework that leverages an advanced rule extraction mechanism and multi-class integration. FEPP systematically refines decision rules from decision forests, improving risk identification and adaptability to various software development scenarios. The model is benchmarked against established machine learning techniques, including K-Nearest Neighbor (KNN), Naïve Bayes (NB), Logistic Model Tree (LMT), Random Forest (RF), and Support Vector Machine (SVM), using a dataset from the Zenodo repository.

Keywords: Software risk prediction, Requirement engineering, ForExPlusPlus(FEPP), Rule extraction mechanism ,Decision forests, Machine learning techniques.

AUDIO LECTURE ANALYSIS USING NER AND TEXTRANK ALGORITHMS

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Abstract

This project is designed to enhance the online learning experience by implementing Natural Language Processing (NLP) techniques, such as Named Entity Recognition (NER) and TextRank for keyword extraction, to analyze lecture audio data. The application is built using the Flask web framework, ensuring an interactive user experience. To facilitate secured access, SQLite is employed for user authentication. This ensures that only authorized users can operate the application without any privacy or security issues. The system operates by allowing users to upload lecture audio files, which are then converted into text through speech-to-text technology. The converted content then undergoes NLP based processing to extract key entities and terms. Through NER, the system identifies significant elements such as names, organizations, and locations. TextRank is used to extract important keywords based on their significance in the document and further provides these key entities as links that redirects to google for clear information. Furthermore, Latent Dirichlet Allocation (LDA) is incorporated to identify dominant topics within the lecture. The Flask-based interface provides a smooth user experience, enabling users to sign in, upload files, and get analysis results seamlessly. It provides student s with a more effective way to engage with lecture files, ultimately contributing to improved learning outcomes and academic growth.

Keywords: Natural Language Processing (NLP), Speech-to-Text, Named Entity Recognition (NER), TextRank, Latent Dirichlet Allocation (LDA), BERT Embeddings, Keyword Extraction, Topic Modeling, Flask Web Framework.

EXPLAINABLE MACHINE LEARNING FOR ACCURATE HOSPITAL STAY DURATION

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Abstract

This study introduces an advanced machine learning framework to accurately predict hospital stay durations while ensuring model interpretability. By leveraging diverse clinical datasets, including patient demographics, electronic health records (EHRs), laboratory results, and vital signs, our model delivers precise length-of-stay (LOS) estimations. To enhance transparency and trust in AI-driven healthcare, we integrate explainable AI (XAI) methodologies such as SHAP and LIME. By fostering explainability, our approach encourages confidence in AI applications within hospital settings. Our framework bridges the gap between black-box AI models and human-centered medical decision making. Feature attribution techniques help identify critical variables affecting patient stay durations, enabling healthcare providers to make informed decisions. Our findings highlight significant improvements in predictive accuracy, demonstrating the potential of AI in enhancing hospital efficiency and patient care. However, the effectiveness of such models depends on the quality and diversity of available clinical data. Future research should focus on rigorous validation, seamless deployment, and scalability across medical institutions, streamlining patient care, improving hospital operations, and redefining AI's role in modern medicine.

Keywords: SHAP, LIME, Explainable Machine Learning, Healthcare Analytics, Predictive Modeling, Electronic Health Records, Medical decision-making.

TIME SERIES ANALYSIS FOR BITCOIN PRICE PREDICTION USING PROPHET

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Abstract

This study focuses on time series analysis for predicting Bitcoin prices using various methodologies, including Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) networks, Auto Regressive Integrated Moving Average (ARIMA), and Facebook's Prophet tool. We utilize a dataset consisting of timestamps and closing prices to train and evaluate the performance of these models. The goal is to determine the most accurate forecasting method for predicting Bitcoin price fluctuations, addressing the inherent volatility of cryptocurrency markets. By leveraging historical price data, we aim to enhance prediction accuracy, contributing to more informed trading decisions. Our results will offer important insights into the effectiveness of various predictive models in the realm of cryptocurrency, ultimately aiming to assist investors in navigating the complexities of Bitcoin trading. The results underscore the strengths and weaknesses of each method, paving the way for future research in financial time series analysis.

Keywords: Recurrent Neural Networks, Long Short- Term Memory, Auto Regressive Integrated Moving Average and Prophet, Kaggle dataset.

AI-BASED ADVANCED APPROACHES AND DRY EYE DISEASE DETECTION BASED ON MULTI-SOURCE EVIDENCE: CASES, APPLICATIONS, ISSUES AND FUTURE DIRECTIONS

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Abstract

The potential of Artificial Intelligence (AI) in early screening and prognosis of Dry Eye Disease (DED), aiming to enhance the accuracy of therapeutic approaches for eye-care practitioners. Despite the promising opportunities, challenges such as diverse diagnostic evidence, complex ethology, and interdisciplinary knowledge integration impede the interpretability, reliability, and applicability of AI-based DED detection methods. The research conducts a comprehensive review of datasets, diagnostic evidence, and standards, as well as advanced algorithms in AI-based DED detection over the past five years. The DED diagnostic methods are categorized into three groups based on their relationship with AI techniques: those with ground truth and/or comparable standards, potential AI-based methods with significant advantages, and supplementary methods for AI-based DED detection. The study proposes suggested DED detection standards, the combination of multiple diagnostic evidence, and future research directions to guide further investigations. Ultimately, the research contributes to the advancement of ophthalmic disease detection by providing insights into knowledge foundations, advanced methods, challenges, and potential future perspectives, emphasizing the significant role of AI in both academic and practical aspects of ophthalmology.

Keywords: Artificial Intelligence (AI), Dry Eye Disease (DED) detection, ophthalmology, multi-source evidence.

PASSWORD CRACKING USING QUANTUM COMPUTING

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Abstract

This project presents a comprehensive system incorporating user and admin modules designed to enhance file management and security. The user module allows individuals to register, log in, and upload files securely. During the file upload process, files are encrypted to ensure data protection. Users can search for files by filename and request access from the uploader. The uploader can then review and accept these requests, triggering an automated email to the requester containing the decryption key necessary for downloading the file. To further strengthen security, the system includes a brute force protection mechanism for user logins. If a user enters the wrong password multiple times, their IP address is blocked, preventing unauthorized access and safeguarding user accounts. The admin module plays a crucial role in managing the system's integrity and user activities. Administrators have the authority to view and approve new user registrations, ensuring only verified users can access the system. Additionally, admins can monitor all uploaded files and track file transaction activities, providing a comprehensive overview of the file-sharing ecosystem within the platforms.

Keywords: File management, security, user module, admin module, encryption, file upload, file sharing, brute force protection, user login, IP blocking, data integrity, user accountability, administrative oversight, secure file sharing, automated email, decryption key, user registration, file transactions.

UNLOCKING EMOTIONS: A DEEP LEARNING STUDY ON FACIAL SENTIMENT RECOGNITION

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Abstract

Facial expressions are a primary mode of non-verbal communication, conveying emotions that are essential for human interaction. The ability to automatically analyze and classify these expressions has gained significant attention in computer vision and pattern recognition. This study focuses on deep learning-based facial sentiment analysis, comparing the effectiveness of Convolutional Neural Networks (CNN), MobileNet, and DenseNet in emotion classification. The FER-2013 dataset, a widely used benchmark containing facial images labeled with emotions such as happiness, sadness, anger, and surprise, is utilized for training and evaluation. CNN, a fundamental deep learning architecture for image recognition, serves as the baseline. MobileNet, designed for computational efficiency, is analyzed for its applicability in real-time tasks, while DenseNet, with its densely connected layers, is examined for its ability to improve feature learning. A comparative assessment is conducted based on classification accuracy, computational efficiency, and robustness to variations in facial expressions. Experimental results highlight the trade-offs between model complexity and performance. While CNN provides a strong foundation, MobileNet demonstrates advantages in speed and efficiency, making it suitable for real-time applications. DenseNet, although computationally demanding, enhances feature extraction and gradient flow, improving recognition performance. This study contributes to the advancement of facial sentiment analysis techniques by identifying the most effective deep learning model for emotion classification. The findings have potential applications in behavioral analysis, psychological studies, and interactive systems where facial expression recognition is essential.

Keywords: facial analysis, FER-2013 dataset analysis, human emotion detection, computer vision, convolutional neural network, classification model.

MACHINE LEARNING-BASED OPTIMIZATION OF ELECTRIC VEHICLE CHARGING SESSIONS FOR ENHANCED BATTERY PERFORMANCE

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Abstract

As the automotive sector accelerates its shift to Electric Vehicles (EVs), precise predictions of battery states become essential for enhancing performance, safety, and longevity. This project introduces a new method leveraging Explainable Data-Driven Digital Twins to predict the states of EV batteries. The approach incorporates a range of advanced Techniques in machine learning, like Deep Neural Networks and Long Short-Term Memory, Convolutional Neural Networks, Support Vector Regression, Support Vector Machines, Feedforward Neural Networks, Radial Basis Function networks, Random Forests, and Extreme Gradient Boosting. The primary goal of this study is to enhance the accuracy of battery state predictions by employing a variety of algorithms in the creation of a detailed digital twin model. This model aims to reliably predict Key battery metrics, including State of Charge (SOC) and State of Health (SOH) across diverse operational scenarios. In addition, the research applies explainable AI methods to better interpret and understand the key factors affecting battery performance, By leveraging the distinct advantages of several algorithms, our approach aims to achieve superior prediction accuracy and greater robustness. Preliminary results suggest that the integrated model significantly surpasses traditional approaches in terms of both precision and reliability. This work contributes to advancing the development of smarter, more adaptable battery management systems, which are vital for the continued growth of electric mobility.

Keywords: Electric Vehicles, Battery State Prediction, Digital Twins, Machine Learning, Deep Neural Network.

SECURING PATIENT DATA WITH BLOCKCHAIN-ENABLED FEDERATED LEARNING FOR MEDICAL DIAGNOSTICS

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Abstract

Healthcare centers are envisioned as a promising paradigm to handle vast datasets for various disease diagnostics using artificial intelligence. Traditional Machine Learning algorithms have been utilized for years, jeopardizing the sensitivity of patients' medical data privacy. Collaborative data training, where multiple hospitals (nodes) train and share encrypted federated models, mitigates the risk of data leakage and unites resources of small and large healthcare institutions from distant areas. This study introduces an innovative framework that leverages blockchain-based Federated Learning to identify 15 distinct pulmonary diseases, ensuring the preservation of privacy and security. The proposed model has been trained on the NIH Chest Ray dataset (112,120 X-ray images), tested, and evaluated, achieving a test accuracy of 92.86%, a latency of 43.518625 ms, and a throughput of 10,034,017 bytes/s. Furthermore, we subjected our framework blockchain to rigorous empirical tests against leading cyber threats to evaluate its robustness. With resilience metrics consistently nearing 87% against three evaluated cyber attacks, the proposed framework demonstrates significant robustness and potential for healthcare applications. To the best of our knowledge, this is the first manuscript on the practical implementation of blockchain-empowered Federated Learning with such data and multiple diseases, including the detection of multiple disease coexistence.

Keywords: Data privacy, Blockchain-based Federated Learning (FL), Collaborative data training, Test accuracy, Cyber Threats.

DEEP LEARNING METHODS FOR IDENTIFYING BIRD SPECIES THROUGH VOCALIZATION

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Abstract

The research work creates a machine learning system to identify bird species through their vocal sounds. A specific selection of birds with ample sound records exists to address the difficulty of unbalanced information distributions in audio data classes. Deep learning models using Convolutional Neural Networks (CNN) and Recurrent Neural Network (RNN) and WavNet architecture work alongside intricate feature extraction approaches in this proposed system. The extraction of key audio elements includes zero-crossing rate combined with root mean square (RMS) energy and Mel-frequency cepstral coefficients (MFCCs) which serve foremost in identifying distinct vocal features across species. Model robustness improved by applying data augmentation methods consisting of noise addition and pitch shifting that produce more diverse training data points. The results from this study show that the proposed methodology successfully identifies bird species from sound data and creates important advances in ecological fieldwork and wildlife research.

Keywords: Bird Sound Recognition, Deep Learning, CNN, RNN, WavNet, Feature Extraction, Zero-Crossing Rate, Root Mean Square (RMS) Energy, MFCCs, Species Classification

PLANT DISEASE DETECTION USING MACHINE LEARNING AND DEEP LEARNING APPROACHES

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Abstract

The rapid spread of plant diseases presents a major challenge to global agriculture, necessitating reliable and efficient detection mechanisms. Recent achievements in artificial intelligence, particularly in computer vision, have enabled automated detection through image-based analysis. This study explores the effectiveness of machine learning (ML) and deep learning (DL) models for plant disease classification. We use conventional ML techniques, such as Support Vector Machine (SVM), Random Forest (RF), and Gradient Boosting (GB), with deep learning architectures like Convolutional Neural Networks (CNN) and Residual Networks (MobileNet). The results indicate that deep learning significantly outperforms traditional ML methods, providing greater accuracy and robustness in identifying plant diseases. Specifically, the MobileNet model achieves a classification accuracy of 95.6%, demonstrating an 8.2% improvement over the best-performing ML approach. Additionally, we analyze the influence of data augmentation.

Keywords: Plant diseases, machine learning, deep learning, CNN, MobileNet, Image processing

ENHANCED LUMBAR DISEASE CLASSIFICATION USING HYBRID DEEP LEARNING MODELS

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Abstract

Accurate and efficient classification of lumbar diseases is crucial for maintaining patient health and preventing significant economic burdens on healthcare systems. This study proposes a novel approach to automate lumbar disease classification by integrating multiple deep learning architectures, including MobileNet, DenseNet, and a hybrid CNN-SVM model. This combination of advanced models leverages their strengths in feature extraction and classification. Additionally, an Involitional Neural Network-based VGG architecture is employed to further enhance the learning capability and performance of the system, particularly in handling complex and detailed features associated with lumbar conditions. The proposed method was evaluated using a comprehensive dataset of medical images related to various lumbar diseases. Experimental results demonstrate a significant improvement in classification accuracy and computational efficiency compared to traditional CNN-based approaches. This system provides a promising solution for automated lumbar disease classification, with potential applications in healthcare for real-time diagnosis and monitoring.

Keywords: Lumber disease classification, MobileNet, DenseNet, CNN-SVM, Involitional Neural Networks, deep learning, image analysis.

INTELLIGENT THREAT DETECTION IN CPS-IOT NETWORKS USING A HYBRID CNN-DBN MODEL WITH SAEHO OPTIMIZATION

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Abstract

The Internet of Things (IoT) has revolutionized various domains, particularly in smart cities and critical infrastructure. However, its rapid proliferation also introduces significant security vulnerabilities, making IoT-enabled cyber-physical systems (CPS) prime targets for cyber threats. Traditional security mechanisms often struggle to adapt to the dynamic and complex nature of IoT environments. Deep learning (DL)-based approaches have emerged as a promising solution for detecting malicious activities through automated anomaly detection. This paper presents a novel hybrid classification framework that integrates Deep Belief Networks (DBN) and Convolutional Neural Networks (CNN) for enhanced intrusion detection in IoT networks. To optimize the classification accuracy of these models, we propose a new hybrid optimization algorithm, Seagull Adapted Elephant Herding Optimization (SAEHO), which fine-tunes the weights of the classifiers for improved predictive performance. The framework is evaluated on two benchmark datasets, demonstrating superior accuracy, sensitivity, precision, and specificity compared to conventional methods. Experimental results confirm that the proposed Hybrid Classifier + SAEHO framework significantly strengthens IoT security, making it a robust defense mechanism against evolving cyber threats in CPS environments.

Keywords: Deep Learning, IoT-Enabled Cyber-Physical Systems, Optimization Technique, Cyberattacks, Cyber-Security, Cyber-Physical Infrastructure.

PREDICTING RAILWAY SAFETY REFORMS USING MACHINE LEARNING

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Abstract

Though trains are a very safe form of transport, travelers could face risks at railway stations. This is because of a number of reasons such as passenger attitude, station architecture, and operational management of the station. The stations could be crowded when more and more passengers use them, leading to the risk of accidents. We used machine learning to analyze past accidents in India to make the trains safer. To identify trends and the causes of accidents, we analyzed data from 1902 to 2024. To identify the best approaches to preventing accidents in the future, we used techniques like Support Vector Machine (SVM), Light Gradient Boosting Machine (LightGBM), and Gradient Boosting Machine (GBM). To improve safety, railway authorities can make more informed decisions due to our research. We found patterns and relationships between causes, locations, and outcomes of accidents. Our results illuminated to help minimize accidents, enhance emergency response, and enhance railway safety protocols. Predictive analytics can be applied to enhance the safety of India's railway network.

Keywords: Railway safety, Machine learning, Accident analysis, Support Vector Machine (SVM), Light Gradient Boosting Machine (LightGBM), Gradient Boosting Machine (GBM), Predictive analytics, Train safety, Railway stations, Accident prevention.

AI-DRIVEN TEXT TO VIDEO: REVOLUTIONIZING THE ANIMATION CREATION PROCESS THROUGH ARTIFICIAL INTELLIGENCE

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Abstract

The rapid advancement of artificial intelligence (AI) has significantly transformed content creation, particularly in automated video generation. This paper proposes an AI-Based Automated Text-to-Video Generation System that converts text into engaging video content using natural language processing (NLP), deep learning, and multimedia composition. The system automates video creation through text preprocessing, AI-powered image generation, text-to-speech (TTS) synthesis, background music composition, and final video editing. A convolutional neural network (CNN) is utilized for image generation, while TTS models generate realistic voiceovers for synchronized and interactive viewing. The system ensures contextual accuracy, optimization, and enhanced media realism, improving overall video quality. Experimental trials validate its effectiveness in producing coherent and visually appealing videos with minimal human intervention. The study highlights AI's growing role in automated multimedia production, demonstrating its efficiency, scalability, and cost-effectiveness. Results reveal AI-driven video generation is a viable solution for storytelling, online marketing, and educational content creation. Addressing key challenges such as context adaptation and quality improvement, this research emphasizes AI's potential to revolutionize content development. With the rising demand for AI-driven media, this study explores the potential for fully automated video generation, offering a scalable and cost-effective solution to modern content production. Future improvements will focus on enhancing video realism, refining AI-driven editing techniques, and improving contextual alignment, contributing to AI-powered multimedia automation and making video creation more accessible, efficient, and adaptable to diverse applications.

Keywords: AI-Based Video Generation, Natural Language Processing, Stable diffusion, hugging face, Text-to-Speech, Deep Learning, Convolutional Neural Networks, Automated Content Creation.

CLLOUD-BASED SECURE FINGERPRINT AUTHENTICATION AND FILE MANAGEMENT SYSTEM

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Abstract

With the rise in prominence of cloud-based computing, concerns in the security aspect of information in the cloud have gotten increasingly common. The authentication of users has received a lot of focus since it is the primary layer of defense when it comes to the security aspect of the cloud-based computing. Despite significant endeavors to develop a safe and feasible authentication mechanism in the setting of cloud computing, the majority of efforts remain unsuccessful. Developing a trustworthy and effective authentication for user-strategy for computing in the cloud set-up stays a problem. In this work, we combine biometric authentication and Elliptic Curve Cryptography (ECC) to provide a secure and efficient platform for file management. Users register with their fingerprint images, which are used for secure login through biometric matching. After successful authentication, users can upload files that are encrypted using ECC to ensure data confidentiality and efficiency. Encrypted files can be requested, decrypted with ECC, and downloaded securely. The system also includes a cloud administrator module that enables the admin to log in, monitor user activities, view files, and manage sessions. By integrating biometric security with ECC, this scheme ensures robust data protection, privacy, and seamless cloud-based file management. Finally, we present the implementation outcomes.

Keywords: Cloud Computing, Authentication, Encryption, Decryption, Elliptic Curve Cryptography (ECC), and Secure File Management.

EARLY DETECTION OF AUTISM SPECTRUM DISORDER USING TRANSFER LEARNING ON BRAIN IMAGING DATA

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Abstract

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition that affects communication, behavior, and social interaction, making early diagnosis crucial for effective intervention. Traditional diagnostic methods rely on behavioral assessments, which can be subjective and time-consuming. This project proposes an automated ASD detection system using Deep Transfer Learning on brain imaging data (MRI, fMRI) to enhance accuracy and efficiency. By utilizing a Deep Transfer Function CNN model, the system improves feature extraction and classification, achieving approximately 81% accuracy, outperforming conventional CNN models. The approach leverages pre-trained deep learning architectures, optimizing response time and ensuring faster diagnosis. Evaluations on the ABIDE-I dataset demonstrate superior performance in classification metrics such as accuracy, sensitivity, and specificity. This AI-driven system provides a more reliable, scalable, and efficient solution for early ASD detection, reducing human error and improving medical decision-making.

Keywords: Autism Spectrum Disorder (ASD), Deep Learning, Transfer Learning, Convolutional Neural Network (CNN), Brain Imaging, MRI, fMRI, ASD Detection, Feature Extraction, Classification, ABIDE-I Dataset, AI in Healthcare, Early Diagnosis, Neural Networks.

EPILEPTIC SEIZURE PREDICTION BASED ON EEG DATA USING DEEP LEARNING

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Abstract

The neurological condition epilepsy creates seizures which affect all age groups. The ability to early detect and early predict epileptic conditions helps to offer immediate support for enhancing patient recovery rates. EEG signals are a crucial tool for monitoring brain activity, as they play a key role in detecting seizures. The research investigates how Long Short-Term Memory (LSTM), and Recurrent Neural Networks (RNNs) can predict epileptic seizures through processing EEG data because of their demonstrated strength in temporal dependency modeling. The models work optimally with serial information analysis which makes them valuable tools for predicting the seizures. The processing of EEG signals depends on different feature extraction techniques so that LSTM and RNN models can utilize their features to improve accuracy. Real-time functionality depends on solving key challenges like choosing the best classifier, optimizing features, and improving efficiency. Using deep learning methods this study aims to improve seizure prediction for better detection and treatment. The designed system presents potential advantages for epilepsy patients because it delivers important notifications with preventive safety protocols.

Keywords: Epilepsy, Seizure Prediction, EEG data, neurological condition, deep learning, Long Short -Term Memory (LSTM), Recurrent Neural Network (RNNs), classifier, optimizing feature, feature extraction, Seizures.

ADAPTIVE TRAFFIC LIGHT MANAGEMENT DRIVEN BY AI SOLUTIONS

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Abstract

Traffic congestion at signalized intersections represents a significant impediment to the sustainable development of urban environments. Beyond causing prolonged driver delays and heightened stress levels, traffic bottlenecks exacerbate fuel consumption and contribute significantly to environmental pollution. The root cause of this issue stems from the inefficacy of conventional and semi-automated traffic control systems, which have reached their operational limits and are ill-suited to handle the escalating density and complexity of modern traffic flows. This paper provides a comprehensive review and critical analysis of prior research and methodologies aimed at addressing traffic congestion at signalized intersections. Particular emphasis is placed on advanced Machine Learning techniques, including Computer Vision and Deep Neural Networks, as innovative solutions for enhancing traffic management systems and mitigating congestion. These technologies offer transformative potential for real-time traffic flow optimization, adaptive signal control, and predictive analytics, thereby fostering more efficient and sustainable urban mobility. The findings highlight the importance of integrating Artificial Intelligence (AI)-driven approaches into traffic management frameworks, paving the way for smarter, greener, and more resilient urban transportation systems. By leveraging these cutting-edge technologies, cities can address current challenges while preparing for future growth and complexity in traffic dynamics.

Keywords: Traffic congestion, signalized intersections, urban sustainability, Machine Learning, Computer Vision, Deep Neural Networks, adaptive traffic control, environmental pollution, fuel consumption, smart cities, traffic flow optimization.

EMOTION RECOGNITION USING MULTI-SCALE AUTOENCODERS WITH CROSS-SESSION ADAPTION

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Abstract

Emotion recognition using electroencephalogram (EEG) signals is crucial in affective computing but faces challenges due to session variability, noise, and individual differences. Traditional deep learning models struggle with generalization across sessions, requiring large amounts of labeled data for retraining. We propose a Multi-Scale Autoencoder (MSAE) framework with Cross-Session Adaptation (CSA) to enhance robustness and generalization. Our approach integrates multi-scale feature extraction to capture both local and global emotional cues and employs CSA techniques such as adversarial learning and feature alignment to reduce session discrepancies. Leveraging large-scale unlabeled EEG data for pre-training and fine-tuning with minimal labeled data significantly reduces annotation dependency. Experiments on benchmark SEED and SEED-IV datasets show that MSAE-CSA outperforms conventional deep learning models, achieving higher accuracy in cross-session emotion recognition. This framework has potential applications in human-computer interaction, mental health monitoring, affective robotics, and personalized healthcare.

Keywords: Emotion Recognition, EEG, Multi-Scale Autoencoders, Cross- Session Adoption, Deep Learning, Human-Computer Interaction.

DETECTION OF IMAGE TAMPERING USING MD5 HASHING AND OPENCV TECHNIQUES

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Abstract

With the increasing use of digital imaging technology, capturing and sharing photos has become a common practice. Images contain valuable information, but they are also prone to manipulation, which can contribute to the spread of false information. While image processing techniques are often used to enhance picture quality, they can also be exploited to alter images for misleading purposes. As a result, image tampering has emerged as a significant issue. Various traditional techniques have been developed over time to detect altered images. OpenCV has recently gained prominence for its role in image analysis, including tampering detection. However, many existing OpenCV-based methods are limited to detecting only specific types of tampering, such as image splicing or copy-move alterations. This highlights the need for a more advanced and efficient approach capable of identifying different types of image tampering. This study presents a deep learning-based approach that combines MD5 hashing with OpenCV techniques to improve image tampering detection. The proposed method effectively identifies manipulated areas, particularly in cases where double image compression is involved, ensuring greater accuracy and reliability in detecting altered images.

Keywords: Image tampering, image manipulation, misinformation, OpenCV, image enhancement, image splicing, copy- move detection, deep learning, double image compression.

MACHINE LEARNING FOR MEDICARE FRAUD DETECTION: TACKLING CLASS IMBALANCE WITH SMOTE-ENN

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Abstract

The healthcare fraud detection field faces significant challenges due to imbalanced datasets, where fraudulent cases are vastly outnumbered by legitimate ones. Traditional machine learning methods struggle with this imbalance, often leading to overfitting, noise, or loss of critical information. This paper proposes a novel approach using the SMOTE-ENN (Synthetic Minority Over-sampling Technique with Edited Nearest Neighbors) hybrid resampling method to balance the dataset and improve fraud detection accuracy. The method is applied to the Medicare Part B dataset, which contains over 9 million records. By generating synthetic fraud cases and removing noisy data, the system enhances the performance of machine learning models. The Decision Tree classifier achieves the best results, with 99% accuracy across all metrics, including precision, recall, and F1-score. The proposed system also employs the Area Under the PrecisionRecall Curve (AUPRC) for robust evaluation in imbalanced scenarios. This approach represents a significant advancement in healthcare fraud detection, offering a scalable and accurate solution for identifying fraudulent claims in real time.

Keywords: Healthcare Fraud Detection, Medicare Part B, Imbalanced Data, SMOTE-ENN, Machine Learning, Decision Trees, AUPRC, Fraud Prediction, Synthetic Data Generation, Ensemble Learning.

INTELLIGENT INSTORE NAVIGATION AND ASSISTANCE SYSTEM FOR VISUALLY CHALLENGED INDIVIDUALS

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Abstract

The purpose of the proposed in-store navigation system is to improve accessibility for those with visual impairments by offering dynamic, real-time directions in retail environments. The system leverages a store's digital map and optimized routing to guide users through the aisles, helping them locate and pick items from their shopping list. Users can either pre-add items to their shopping list before arriving at the store or add them directly while shopping. The system uses the Breadth-First Search (BFS) method to determine the shortest route between the user's present location and the product they have chosen. As more products are picked, the routes are dynamically recalculated. The system assures smooth navigation, cuts down on search times, and promotes independence for visually impaired users by fusing clear auditory instructions with effective pathfinding. This project aims to provide a seamless and inclusive shopping experience for visually impaired users, empowering them to navigate grocery stores independently, with enhanced safety and convenience.

Keywords: Breadth First Search, User Interface, Optimized Routing, In-Store Navigation, Grid Based system.

AI-DRIVEN EMOTION ANALYTICS FOR EMERGENCY MANAGEMENT IN TOURISM USING IMPROVED CNNs

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Abstract

Emotion recognition technology is transforming crisis management in tourism by detecting panic, anxiety, and distress in real time. These emotions impact travelers' behavior, communication, and decision-making, making effective response strategies crucial. Traditional models, relying on conventional machine learning techniques, struggle to detect subtle emotional variations and handle large-scale datasets efficiently. To overcome these limitations, a deep learning-based emotion detection system has been introduced, significantly improving accuracy, especially in anxiety-related cases. The model achieves recognition rates of 83.92%, 82.33%, and 88.81% across datasets, with remarkable precision in detecting anger (97%), disgust (91%), and happiness (94%). By leveraging AI, this system enhances situational awareness and strengthens emergency response coordination. Its ability to process emotions in real-time ensures better risk management and crisis handling, ultimately improving tourist safety. As a scalable and efficient solution, this advanced emotion recognition technology plays a vital role in modern crisis management strategies within the tourism industry.

Keywords: Emotion Recognition Technology, Tourism Industry, Emergency Event Management, Artificial Intelligence (AI), Risk Mitigation Strategies.

AI-DRIVEN SMART POLICING SYSTEM WITH SENTIMENT ANALYSIS FOR CRIME PREVENTION

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Abstract

The growing involvement of criminal patterns requires implementing enhanced AI powered solutions for successful law enforcement. This research provides a Smart Policing System Framework that uses Sentiment Analysis to improve crime analysis, predictive policing, and decision-making. The standard machine learning models, such as Naive Bayes and K-Nearest Neighbours (KNN), have been applied in crime classification, but these are restricted to addressing contextual and sequential relationships. To solve these cases, we integrate BERT, GPT-4, and XLNet to achieve a profound insight into crime descriptions. GPT-4 is designed to understand and generate human-like text, while XLNet is used to pretrained for language understanding. In order to apply and compare each of the algorithms, we evaluate their performance in crime prevention. Our results demonstrate the strengths of LLMs outperforming classical models in terms of accuracy, real-time responsiveness, and enhanced crime categorisation. Ethical aspects such as bias reduction and privacy protection are also addressed to promote responsible deployment of AI in policing. This system not only aims to optimise operational performance but also addresses ethical and privacy concerns inherent in smart policing technologies. Our framework represents a significant step towards more intelligent, adaptive, and responsive law enforcement solutions in the modern age.

Keywords: Smart Policing, Large Language Models, Sentiment Analysis, GPT-4, XLNet, BERT, Naive Bayes, KNN, AI Ethics, Crime Analysis, Decision Making, Predictive Policing, Privacy.

IDENTIFICATION OF VISUAL LEARNERS USING RAW EEG

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Abstract

Identification of visual learners using raw EEG data, a novel hybrid algorithm that combines Convolutional Neural Networks (CNNs) and Long Short-Term Memory networks (LSTMs) with a Random Forest classifier has been developed. This sophisticated approach leverages the powerful feature extraction capabilities of CNNs to capture spatial patterns in the EEG signals, while LSTMs are adept at learning temporal dependencies inherent in the sequential data. Subsequently, a Random Forest classifier is employed to enhance the classification performance by leveraging its robustness to overfitting and capability of handling non-linear interactions among features. In existing system, the traditional learning approaches are used to analyse the brain signal's or activity. However, the analysis does not provide an in depth or personalised understanding of brain activity. To improve the identification of visual learners, we propose a system utilising EEG data and advanced machine learning techniques. The proposed system uses EEG data from Kaggle to identify visual learners by pre-processing the data (handling missing values, label encoding, scaling, and PCA for noise reduction), followed by a hybrid classification model combining CNNs, LSTMs, and Random Forest.

Keywords: Raw-electroencephalogram, deep learning, machine learning, visual learner, learning styles.

OPTIMIZED DEEP LEARNING MODEL FUSION FOR ADVANCED THROMBOTIC STROKE PREDICTION AND ANALYSIS

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Abstract

Worldwide thrombotic stroke functions as a large scale of death along with disability which demands quick diagnosis and observations for effective treatment programs. A hybrid stroke prediction system combines machine learning techniques of recurrent neural network of Long Short-Term Memory and ConvNet to diagnose ischemic stroke using recorded time-based information and medical scans. Sequential data analysis works perfectly with BiLSTM because of their temporal dependency detection capabilities although ConvNet deliver outstanding feature extraction from medical imaging scans such as CT or MRI. The integrated system contains better stroke prediction outcomes while generating complex information which leads to superior stroke patient treatment with accurate results. The method effectively brings together both models to help the system detect patterns and insights from temporal healthcare data and spatial brain imaging data simultaneously. Mostly collects advanced and large skillsets that enable healthcare programs to understand challenging data for stroke diagnostic precision along with immediate stage identification and prompt medical procedures step by step. This system provides real time analysis capabilities which promise to change stroke diagnosis operations alongside prevention methods to enable prompt accurate medical decisions in clinical areas.

Keywords: Thrombotic stroke, cerebral ischemia, embolic stroke, early prediction, recurrent neural network, ConvNet, BiLSTM, time series data, medical images, CT scans, MRI scans, prevention, deep learning, stroke management, patient outcomes, prediction accuracy, temporal patterns, spatial features, health data analysis, real-time analysis, early detection, intervention, medical image processing.

INNOVATIVE DATA SCIENCE MODEL FOR ANALYSIS ON PESTICIDE POISONING USING SUPERVISED LEARNING

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Abstract

In a Data Science project, it is crucial to evaluate the significance of data and recognize patterns that support decision-making through domain-specific expertise. Moreover, establishing well-defined methodologies and developing documentation to oversee a project's progress from initiation to completion are fundamental aspects. This research introduces a Data Science framework aimed at structuring the process, encompassing data acquisition to model training, with the objective of enabling knowledge extraction. The motivation for this study stems from shortcomings in current Data Science methodologies, particularly the absence of a clear, step-by-step approach for preparing data to transition into the production phase. Referred to as the "Data Refinement Cycle with Supervised Machine Learning (DRC– SML)," the proposed framework was designed to meet the evolving requirements of a Data Science initiative focused on assisting medical professionals in diagnosing pesticide poisoning among agricultural workers. The dataset employed in this study was obtained through scientific research, consisting of 1,027 samples that included information on toxicity biomarkers and clinical evaluations. We attained an accuracy rate of 99.61% utilizing only 27 rules to establish the diagnosis. The findings enhanced medical procedures and contributed to a better quality of life in rural regions. The project outcomes validated the effectiveness of the proposed framework.

Keywords: Data science, decision support system, machine learning, pesticide poisoning diagnosis.

IOT – ENABLED MACHINE LEARNING FOR GROUND WATER LEVEL MONITORING IN PEATLANDS

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Abstract

Peatlands represent a significant environmental danger due to the substantial carbon release that occurs during fires. Traditional methods of monitoring Groundwater Level (GWL) in peatlands are time-consuming and don't provide real-time information, making effective management difficult. This paper introduces an IoT system combined with a neural network for predicting GWL for real-time monitoring. Using weather data, the neural network forecasts GWL, providing additional time for authorities to implement appropriate measures to lessen the risk of fire in peatlands. The proposed neural network shows encouraging results, achieving a Root Mean Square Error (RMSE) between 3.554 and 4.920, corresponding to 99% accuracy within 14.760 mm of the actual GWL. These results highlight the innovative combination of IoT and neural networks for peatland GWL prediction, representing a substantial improvement in real-time monitoring and fire prevention strategies. The innovative aspect is its ability to predict real-time GWL even in regions where conventional monitoring is impractical, by utilizing readily available weather parameters.

Keywords: Peatland, IOT System, Machine Learning, Neural Network, ASEAN, Transboundary haze.

MASTER OF COMPUTER APPLICATIONS

IMPLEMENTATION OF AI IN EVERY STREAM

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Abstract

Artificial Intelligence (AI) has emerged as a transformative technology across various domains, significantly enhancing efficiency, accuracy, and decision-making. This seminar explores the integration of AI in diverse fields such as healthcare, education, finance, agriculture, manufacturing, and more. AI-driven applications, including machine learning, natural language processing, and robotics, are revolutionizing industries by automating repetitive tasks, optimizing resource management, and enabling data-driven insights. In healthcare, AI aids in early disease diagnosis and personalized treatment plans. In education, intelligent tutoring systems and AI-powered assessments enhance the learning experience. Financial institutions leverage AI for fraud detection and algorithmic trading, while the agricultural sector benefits from AI-driven precision farming techniques. The manufacturing industry implements AI for predictive maintenance and quality control, leading to increased productivity. Despite its vast potential, AI implementation also poses ethical, privacy, and job displacement concerns, necessitating responsible AI development and governance. This seminar highlights real-world AI applications, challenges, and future trends, emphasizing how AI can be leveraged to improve efficiency across various sectors. With continuous advancements, AI is set to reshape industries, making human lives more efficient and productive. The discussion concludes with insights into the future of AI adoption and the need for interdisciplinary collaboration to maximize its benefits

Keywords: Artificial Intelligence, Machine Learning, Automation, Industry Applications, Ethical AI, Future Trends.

SENTIMENT ANALYSIS USING DATA STRUCTURES AND ALGORITHMS IN PYTHON

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Abstract

Every day, people all over the world use social networking sites to express their thoughts on a broad range of issues. amongst the most well-known social networking sites is "Facebook" for exchanging messages with friends and family. People express their ideas, beliefs and experiences about circumstance. This research intends to create a prototype that analyzes people's attitudes towards the social difficulties of women, a topic that is becoming more relevant in many nations. Using a Facebook scraper written in Python, we were able to collect a dataset of Facebook data, which we subsequently cleaned up using the nltk toolkit. Machine learning techniques and approaches are used to study the feelings of individuals. It is possible in Python to classify each Facebook post as either good, negative, or neutral, depending on the polarity of its thoughts. The hashtags #Women and #MeToo were used to collect data. According to the results of the research, women's experiences, views, and concerns are more often expressed using the hashtag than those of males. The model was built and tested using a variety of machine learning techniques. The accuracy, recall, and f1-score of these models were evaluated using a variety of testing criteria. Furthermore, the performance of each model is compared to each other.

Keywords: Sentiment Analysis, Facebook, Python, social media, Lexicon, Nave Bayes, Neural Network etc.

GAMING AND ENTERTAINMENT TECHNOLOGY

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Abstract

Gaming and entertainment technology have evolved significantly, shaping the way people interact with digital media. Advancements in graphics, artificial intelligence, virtual reality (VR), and augmented reality (AR) have enhanced the gaming experience, making it more immersive and interactive. Cloud gaming, blockchain technology, and the rise of e-sports have further transformed the industry, providing new opportunities for players and developers. Entertainment technology also extends beyond gaming, influencing streaming services, interactive storytelling, and digital media consumption. This paper explores the latest trends, innovations, and future possibilities in gaming and entertainment technology, highlighting their impact on society and the global economy

Keywords: Electric vehicle, Battery management, State of charge.

HUMAN COMPUTER INTERACTION

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Abstract

Human-Computer Interaction (HCI) is a multidisciplinary field that focuses on the design, evaluation, and implementation of interactive computing systems for human use. It explores how users interact with computers, aiming to enhance usability, efficiency, and user satisfaction. HCI incorporates principles from computer science, cognitive psychology, and design to create user-friendly interfaces. Key aspects include usability testing, user experience (UX) design, accessibility, and emerging technologies such as artificial intelligence (AI) and virtual reality (VR). This paper provides an overview of HCI, its significance in modern computing, and future trends shaping the field.

Keywords: Human-Computer Interaction, Usability, User Experience, Interface Design, Accessibility, Interaction Design, Artificial Intelligence, Virtual Reality, Cognitive Psychology.

ARTIFICIAL INTELLIGENCE

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Abstract

Artificial Intelligence (AI) is a rapidly evolving field of computer science that aims to create intelligent machines capable of performing tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, language understanding, and decision-making. AI systems utilize techniques such as machine learning (ML), natural language processing (NLP), computer vision, and robotics to analyze data, recognize patterns, and make informed decisions. The development of AI has revolutionized industries by enhancing automation, improving efficiency, and enabling advanced data analysis. In healthcare, AI-powered diagnostic tools aid in early disease detection, while personalized treatment plans improve patient care. In finance, AI-driven algorithms detect fraud, manage risks, and provide predictive analytics for informed decision-making. Retail and e-commerce platforms utilize AI for customer behavior analysis, recommendation systems, and inventory management. AI technologies such as chatbots and virtual assistants like Siri, Alexa, and Google Assistant have improved customer interactions by providing personalized and responsive services. Additionally, AI plays a crucial role in autonomous vehicles, enhancing navigation, object detection, and decision-making for safer and more efficient transportation.

Keywords: Artificial Intelligence, Machine Learning, Natural Language Processing.

AN OVERVIEW OF BLOCKCHAIN TECHNOLOGY: ARCHITECTURE, CONSENSUS, AND FUTURE TRENDS

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Abstract

In almost all the countries mobile phones is the most popular form of communication. The number of mobile users will surpass 7.6 billion this year (2018) and the number is growing as technology is getting better and the cost of production also lowers. However, it becomes very inconvenient for persons occupied with work or travelling long distances as the average lifetime of a mobile phone battery is less than 10 hours. Solar phone chargers use small solar panel to absorb light. This process still forces customers to carry another device along with their cell phone. And also, the proposed system, solar powered charger (SPC) plays an important role in mobile charging during travelling. The sun is the ultimate power source and solar energy is renewable energy source. The SPC system is ecofriendly and user friendly. The solar panel used is of 10v rating. The voltage must be suitably step down. So we designed a small charger panel, getting the appropriate voltage and power output through a DC-DC step-down buck converter. We designed a final prototype that should be able to charge any of the commonly used local phones in 10-12 hours of direct sunlight.

Keywords: Solar Powered Charger, DC-DC Step-Down Buck Converter, Solar Panel.

INTERNET OF THINGS

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Abstract

The Internet of Things (IoT) has emerged as a transformative technology that connects physical objects and devices to the Internet, enabling them to gather and exchange data. This abstract provides an overview of the (IoT), highlighting its key concepts, applications, and implications. The IoT involves interconnection various devices, sensors, and objects, ranging from everyday household items to industrial machinery, vehicles, and infrastructure. These interconnected devices collect and share data, enabling real-time monitoring, control, and automation of processes. Key elements of the IoT ecosystem include smart devices, connectivity technologies, data analytics, and cloud computing. Smart devices, equipped with sensors and actuators, capture data and interact with the environment. Connectivity technologies such as Wi-Fi, Bluetooth, and cellular networks enable communication between devices and the Internet. Data analytics techniques extract insights from the collected data, facilitating informed decision-making and automation. Cloud computing provides the infrastructure for data storage, processing, and scalability.

Keywords: Arduino, RaspberryPi, Smart Devices, Cloud Computing, Connectivity.

5G AND NEXT GENERATION NETWORKS

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Abstract

The advent of 5G and next-generation networks marks a significant evolution in wireless communication, offering unprecedented speed, ultra-low latency, and massive connectivity. These technologies enable advancements in Internet of Things (IoT), smart cities, autonomous vehicles, and industrial automation, reshaping global digital infrastructure. 5G networks leverage technologies such as millimeter waves, massive MIMO, and network slicing to enhance efficiency and scalability. Additionally, research into 6G and beyond aims to integrate AI-driven networking, terahertz communication, and quantum technologies for even more transformative capabilities. This paper explores the architecture, applications, challenges, and future trends of 5G and next-generation networks in the evolving digital landscape.

Keywords: 5G, Next-Generation Networks, Wireless Communication, Ultra-Low Latency, Massive MIMO, Network Slicing, IoT, Smart Cities, 6G, Terahertz Communication, AI in Networking.

MACHINE LEARNING

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Abstract

Machine Learning (ML) is a subset of artificial intelligence (AI) that enables systems to learn from data, identify patterns, and make decisions with minimal human intervention. It encompasses various techniques, including supervised, unsupervised, and reinforcement learning, to train models for diverse applications such as natural language processing (NLP), computer vision, healthcare, finance, and autonomous systems. The evolution of ML is driven by advancements in deep learning, neural networks, and big data analytics, leading to enhanced predictive capabilities and automation. This paper explores the fundamentals of ML, its key algorithms, applications, challenges, and future trends in the field.

Keywords: Machine Learning, Artificial Intelligence, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Deep Learning, Neural Networks, Big Data, Computer Vision, Natural Language Processing.

3D PRINTING TECHNOLOGY

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Abstract

3D printing technology, also known as additive manufacturing, is a revolutionary process that enables the creation of three-dimensional objects by depositing material layer by layer based on digital models. This technology has transformed various industries, including healthcare, aerospace, automotive, and manufacturing, by offering cost-effective, customizable, and rapid prototyping solutions. Key advancements in materials, printing techniques, and software have enhanced precision, scalability, and sustainability in production. As 3D printing continues to evolve, future innovations such as bioprinting, multi-material printing, and nano printing are expected to redefine manufacturing capabilities. This paper explores the principles, applications, benefits, challenges, and future directions of 3D printing technology.

Keywords: 3D Printing, Additive Manufacturing, Rapid Prototyping, Bioprinting, Custom Manufacturing, Digital Fabrication, Materials Science, Sustainability, Nano printing, Smart Manufacturing.

STRUCTURE QUERY LANGUAGE

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Abstract

Structured Query Language (SQL) is a standardized programming language used for managing and manipulating relational databases. It provides a powerful framework for data retrieval, insertion, updating, and deletion, ensuring efficient database management. SQL operates through commands such as DDL (Data Definition Language), DML (Data Manipulation Language), DCL (Data Control Language), and TCL (Transaction Control Language), enabling users to define schemas, manipulate data, and control access permissions. SQL is widely utilized in applications ranging from web development and data analytics to enterprise database management systems. With the rise of Big Data and cloud computing, SQL continues to evolve, integrating with NoSQL, AI-driven optimizations, and distributed database architectures. This paper explores SQL's fundamentals, features, applications, and its role in modern data-driven environments.

Keywords: SQL, Structured Query Language, Relational Database, Data Management, DDL, DML, DCL, TCL, Query Optimization, Database Systems, Big Data, Cloud Computing.

METaverse – THE FUTURE DIGITAL INTERACTION

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Abstract

The Metaverse is an evolving concept that envisions a persistent, immersive, and interconnected virtual world where users can interact in real time using augmented reality (AR), virtual reality (VR), blockchain, and artificial intelligence (AI). It serves as the next frontier in digital interaction, social networking, gaming, education, commerce, and remote collaboration, offering a seamless fusion of the physical and digital worlds. The Metaverse leverages decentralized platforms, digital assets (NFTs), and spatial computing to create hyper-realistic experiences and new economic ecosystems. While promising transformative opportunities, challenges such as data privacy, cybersecurity, ethical concerns, and infrastructure scalability must be addressed. This paper explores the Metaverse's architecture, potential applications, technological foundations, and its role in shaping the future of digital interaction.

Keywords: Metaverse, Virtual Reality, Augmented Reality, Digital Interaction, AI, Blockchain, NFTs, Web3, Spatial Computing, Digital Economy, Cybersecurity.

WIRELESS COMMUNICATION

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Abstract

Wireless communication is a fundamental technology that enables the transmission of data without physical connections, utilizing radio waves, infrared signals, and satellite networks. It plays a crucial role in modern communication systems, including cellular networks (4G, 5G), Wi-Fi, Bluetooth, satellite communication, and IoT connectivity. Advancements in antenna technology, modulation techniques, and spectrum efficiency have significantly improved data transmission speeds, reliability, and global accessibility. Wireless communication is the backbone of smart cities, autonomous vehicles, healthcare, and industrial automation, shaping the future of seamless connectivity. However, challenges such as spectrum congestion, cybersecurity risks, and energy efficiency remain critical areas of research. This paper explores the principles, applications, challenges, and future developments in wireless communication.

Keywords: Wireless Communication, 5G, Wi-Fi, IoT, Satellite Communication, Bluetooth, Modulation Techniques, Spectrum Efficiency, Smart Cities, Cybersecurity, Antenna Technology.

MASTER OF BUSINESS ADMINISTRATION

SMART PCOS DETECTION: AI-POWERED PRECISION DIAGNOSIS WITH WEARABLE TECH & BIOMARKERS.

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Abstract

Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting millions of women worldwide, often leading to infertility, metabolic complications, and long-term health risks. Traditional diagnostic methods rely on symptom-based evaluation and biochemical tests, which are often subjective and delayed. This research explores an AI-driven PCOS detection system that integrates machine learning models, blood biomarkers, and wearable technology to enhance early and accurate diagnosis.

Blood-based biomarkers such as testosterone levels, LH/FSH ratio, and insulin resistance are analyzed alongside wearable sensor data, including heart rate variability, glucose fluctuations, and sleep patterns. Advanced machine learning models, including Random Forest and Convolution Neural Networks (CNNs), are trained to classify PCOS cases with high accuracy. Results indicate that hybrid AI models outperform traditional diagnostic approaches, achieving 95.3% accuracy in PCOS prediction.

The study highlights the potential of AI and wearable biosensors in non-invasive, real-time monitoring of PCOS symptoms, offering a scalable and patient-friendly solution. However, challenges such as data privacy, wearable sensor precision, and model generalization must be addressed before clinical adoption. Future research should focus on enhancing dataset diversity, improving sensor accuracy, and integrating AI models into telemedicine platforms for personalized PCOS management.

Keywords: PCOS, Artificial Intelligence, Machine Learning, Wearable Devices, Omics Technologies, Digital Health, Predictive Analytics, Non-Invasive Diagnostics, Personalized Medicine.

AI DRIVEN BUSINESS ANALYTICS: A MIXED METHOD STUDY ON CUSTOMER FEEDBACK REVIEW SYSTEMS

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Abstract

This study finds that AI can process feedback quickly and provide valuable insights, helping businesses make better decisions. However, it also identifies challenges, such as the need for human supervision to ensure accuracy and fairness. This research provides practical recommendations for companies looking to use AI in their customer feedback systems to improve decision-making and customer satisfaction. Customer feedback is essential for businesses to improve their products and services. With the rise of online reviews and surveys, analyzing large amounts of feedback manually can be time-consuming and inefficient. This study explores how artificial intelligence can help businesses analyze customer feedback more effectively. Using a mixed-method approach, we examine both data analysis and real-world experiences. AI tools, such as sentiment analysis, are tested to identify trends, detect common issues, and suggest improvements. Additionally, insights from business professionals highlight the benefits and challenges of using AI for feedback analysis.

Keywords: Business Analytics, Customer Feedback, Sentiment Analysis, Decision-Making in feedback, Customer Satisfaction, AI-Powered Analysis in feedback, Trend Identification.

THE ANALYSIS AND THE ROLE AND EFFICACY OF DATA ANALYTICS IN FACILITATING BUSINESS DECISION-MAKING

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Abstract

Data analytics is a crucial tool for contemporary business decision-making since it allows companies to gain insights from enormous databases. This study looks at how companies can use descriptive, diagnostic, predictive, and prescriptive analytics to enhance risk management, operational effectiveness, and strategic planning. It emphasizes how business intelligence (BI) solutions, such as Tableau, Power BI, and Qlik Sense, help turn unstructured data into insights that can be put to use. Along with addressing new developments like cloud computing and AI-driven analytics, the study also examines major obstacles to deploying data analytics, such as security and data quality difficulties. Successfully incorporating data analytics into decision-making gives organizations, a competitive edge and guarantees long-term company growth.

Keywords: Data Analytics, Decision-making, Business Intelligence, Predictive Analysis, data-driven Strategy

A STUDY OF SALES AND PROMOTION OF BIG BAZAAR CHENNAI

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Abstract

This study examines the sales and promotional strategies employed by Big Bazaar in Chennai, focusing on how these initiatives influence consumer purchasing decisions. The research investigates customer responses to various promotional activities and analyzes the effectiveness of current sales approaches. Through a comprehensive survey methodology, data was collected from Big Bazaar shoppers in Chennai to understand their preferences, shopping patterns, and reactions to different promotional tactics. Both quantitative and qualitative methods were utilized, incorporating questionnaires and observational research. The findings reveal key factors that drive consumer engagement with Big Bazaar's sales events and promotional campaigns, highlighting opportunities for enhancing customer loyalty and increasing sales volume. This research provides valuable insights for retail marketers seeking to optimize their promotional strategies in the competitive Chennai market, with specific recommendations tailored to Big Bazaar's customer demographics and shopping environment.

Keywords: Retail Marketing, Consumer Behavior, Promotional Strategies, Customer Engagement, Sales Optimization.

A STUDY ON THE ROLE OF AI IN RECRUITMENT AND SELECTION

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Abstract

The recruitment and selection process is pivotal for organizations to acquire top talent and maintain a competitive edge. These are two imperative functions in HRM that result in an organization's success. With technological upgrades, some AI tools have become integral in improving the efficiency and accuracy of hiring decisions. The study also highlights ethical considerations, including AI-driven recruitment and data privacy concerns. Modern recruitment relies on tools like ATS (Applicant Tracking System), AI-driven Screening, and Psychometric Assignments. The study provides a comprehensive analysis of the effectiveness of analytical tools in recruitment and selection by reviewing existing literature, case studies, and industry practices. "A study on the Role of AI in Recruitment and Selection"

Keywords: Recruitment Automation, Hiring effectively, Candidate Screening, Human Resource Management, Artificial Intelligence, and its Tools.

“EMERGING TRENDS IN ADVERTISING”

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Abstract

Advertising has long been a cornerstone of commercial strategy, evolving from simple print ads to a complex digital ecosystem. This paper examines the history, theoretical frameworks, and methodologies underpinning advertising research. It further explores current trends in digital advertising, the measurement of advertising effectiveness, and emerging challenges in the era of data privacy and technological disruption. Through a detailed review of literature and case studies, the paper offers insight into how advertisers can adapt to a rapidly changing environment while remaining effective in engaging consumers.

Keywords: business, sales, brand, promotion, trend ads.

A HOLISTIC IT SERVICE MANAGEMENT APPROACH USING BMC REMEDY

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Abstract

In today's rapidly evolving digital landscape, organizations face significant challenges in managing IT services efficiently. Ineffective IT service management (ITSM) can lead to operational inefficiencies, prolonged incident resolution times, increased downtime, and suboptimal resource utilization. To address these challenges, enterprises require a structured and automated approach to ITSM that ensures seamless service delivery, enhanced user satisfaction, and improved operational efficiency. BMC Remedy, a robust ITSM platform, provides a holistic and integrated solution for managing IT services by adhering to ITIL best practices. It streamlines IT operations through incident management, problem management, change management, service level management, asset management, and configuration management, ensuring minimal disruptions and optimized performance. Additionally, BMC Helix Multi-Cloud Service Management enables seamless integration with cloud platforms smart reporting and digital workplace solutions enhance decision making.

Keywords: Incident Management, problem management, change management, service Level management, Asset & Configuration management, multi-cloud service management smart reporting.

EMERGING TREND ON DIGITAL MARKETING: A STUDY ON VIRTUAL REALITY

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Sciences (AITS), Kadapa.

Abstract

Virtual reality (VR) is a rapidly growing technology that is transforming the way businesses approach digital marketing. This study explores the impact of VR on modern marketing strategies. The paper examines how companies are leveraging VR to create immersive experiences that engage customers in new and innovative ways. It discusses the benefits of using VR for product demonstrations, virtual tours, and interactive brand experiences. The study also highlights the challenges businesses face in adopting VR technology and the strategies they employ to overcome these obstacles. By analyzing case studies and industry trends, the paper provides insights into the future of VR in the digital marketing landscape. The findings of this research can help marketers and business leaders understand the potential of VR and develop effective strategies to capitalize on this emerging technology.

Keywords: Virtual marketing strategies, engage customers, virtual technology.

A STUDY OF DIGITAL MARKETING ON - ADVERTISING TRENDS IN ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES

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Abstract

Digital marketing refers to the promotion of products or services through digital technologies. Nowadays digital marketing plays a significant role in advertising. This paper starts with introduction of digital marketing and end with variety of advertising strategies in digital marketing. This paper highlights the variety of advertising manner how businesses are rapidly increasing their sales and services with the help of digital marketing strategies. Since it was actually done through traditional marketing, such as newspapers, magazines, radios, and television. Over the past years inspection in the 1990s and 2000s digital marketing has transformed how businesses utilizing the technology for their marketing efforts with the help of IOT – Internet of Things, for digitally advertising in this modern era. This paper focuses on providing a conceptual understanding of digital marketing and exploring benefits of businesses.

Keywords: Digital marketing, Traditional marketing, online marketing, email marketing, social media marketing, content marketing, search engine optimization.

A STUDY ON CAPITAL BUDGETING IN CHAITANYA CHEMICALS LIMITED

D. Swetha, B. Thulasi

Abstract

Perhaps the single most important decision faced by management is the selection of investment projects that maximize the present value of shareholders' wealth. This paper is a review of the literature on capital budgeting procedures. Analytic techniques such as Net present value (NPV), Internal rate of return (IRR), Payback, Discounted Payback, Time-adjusted discounting, Accounting Rate of Return, Profitability Index and Modified IRR are reviewed here. Additional supplementary techniques, when some complexities relating to risk and uncertainty are involved, are also discussed. Results of field surveys are reported. In sum, the results suggest increased prominence of the NPV as an evaluation technique consistent with its much emphasized academic merit. In particular, the Graham and Harvey (2001) survey reveals that the likelihood of using specific evaluation techniques is linked to three factors namely firm size, firm leverage and CEO characteristics. The study recommends the use of real options techniques as they facilitate the linkage of financial objectives with corporate strategy in the ever-increasingly complex business environment.

Keywords: Capital budgeting, Net present value, Value maximization, Real options.

A STUDY ON JOB SATISFACTION IN CHAITANYA CHEMICALS LIMITED

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Abstract

Job satisfaction is one of the important factors which have drawn attention of managers in the organization as well as academicians. Various studies have been conducted to find out the factors which determine job satisfaction and the way it influences productivity in the organization. Though there is no conclusive evidence that job satisfaction affects productivity depends on so many variables, it is still a prime concern for managers. Job satisfaction is the mental feeling of favorableness which an individual has about his job. It is often said that “A happy employee is a productive employee.” Job satisfaction is very important because most of the people spend a major portion of their life at their working Place. Moreover, job satisfaction has its impact on the general life of the employees also, because a satisfied employee is a contented and happy human being. A highly satisfied worker has better physical and mental well-being. The study tries to evaluate how human resource factors affect the satisfaction level of employees in Chaitanya chemicals. It assesses how far welfare and financial factors motivate the employees in the company. The study also attempts to analyze the opinion of employees towards the working life in the company.

Keywords: Job satisfaction, Employee Turnover, Job security, Job Rotation.

A STUDY ON WORKING CAPITAL IN BHARATHI CEMENT CORPORATION PRIVATE LIMITED

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Abstract

Working capital is that amount of funds which is requiring carrying out the day transactions of enterprises' whether big or small. It may also regard as that position of an enterprises total capital which is employed in its short- term operations those operations those operations consist of primarily such items such as raw materials, semi-finished goods, finished goods, sundry debtors, short term investment etc. Thus, working capital also refers to the entire short -term investment etc. Thus, working capital also refers to all the short- term assets known as current assets used in day -to -day operations of an organizations working capital sometimes called as networking capital is represented by the excess of current assets over the current liabilities and identifies the relatively liquid portion of total enterprises capital which constitutes a margin of buffer for maturing obligation with in the ordinary operating cycle of the business. The accounting principles of board of the American institute of certified public accounts. The main objective of the working capital management is to evaluate the company inventory position to analyze the company current ratio and liquidity ratio to analyze the company gross working capital and networking capital position and to identify the growth of inventory and net sales of the company to analyze the company performances the main tools and techniques.

Keywords: Current ratio, Quick ratio, Turnover ratio.

EMERGING TREND ON DIGITAL MARKETING: A STUDY ON VIRTUAL REALITY

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Abstract

Virtual reality (VR) is a rapidly growing technology that is transforming the way businesses approach digital marketing. This study explores the impact of VR on modern marketing strategies. The paper examines how companies are leveraging VR to create immersive experiences that engage customers in new and innovative ways. It discusses the benefits of using VR for product demonstrations, virtual tours, and interactive brand experiences. The study also highlights the challenges businesses face in adopting VR technology and the strategies they employ to overcome these obstacles. By analyzing case studies and industry trends, the paper provides insights into the future of VR in the digital marketing landscape. The findings of this research can help marketers and business leaders understand the potential of VR and develop effective strategies to capitalize on this emerging technology.

Keywords: Virtual marketing strategies, engage customers, virtual technology.

CONSUMER BEHAVIOR TOWARDS BRAND PREFERENCE OF PASSENGER CARS IN YSR KADAPA DISTRICT

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Abstract

This study investigates the consumer behavior towards brand preference of passenger cars in YSR Kadapa District, Andhra Pradesh. The primary objective is to understand the factors influencing brand preference and to identify the key determinants that sway consumer choices in the automotive sector within this region. The research employs a mixed-methods approach, combining quantitative surveys with qualitative interviews to gather comprehensive data. Key findings reveal that factors such as brand reputation, after-sales service, fuel efficiency, and price significantly influence consumer preferences. Additionally, demographic variables like age, income, and education level also play a crucial role in shaping consumer choices. The study highlights the importance of targeted marketing strategies that cater to the specific needs and preferences of different consumer segments. The insights gained from this research are valuable for automobile manufacturers and dealers aiming to enhance their market presence in YSR Kadapa District. By understanding the local consumer behavior and preferences, companies can tailor their products and marketing strategies to better meet the expectations of their target audience. This study also provides a foundation for further research on consumer behavior in the automotive sector, particularly in regional markets.

Keywords: Consumer Behavior, Brand Preference, Passenger Cars, Automotive Sector, YSR Kadapa District, Andhra Pradesh, Marketing Strategies

THE EVOLUTION OF GREEN BANKING: CHALLENGES AND OPPORTUNITIES

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Abstract

Green banking has emerged as a pivotal technique for integrating sustainability into the financial industry, seeking to balance environmental growth with financial responsibility. As global financial institutions recognize the risks posed by climate change, many are adopting sustainable financial models, such as green bonds, ESG (Environmental, Social, and Governance) lending, and climate risk assessments. Despite its potential, the transition to green banking is fraught with challenges, including regulatory discrepancies, data limitations, and concerns about profitability. This study traces the historical evolution of green banking, identifies key challenges, and provides policy recommendations to enhance sustainability in the financial sector. Empirical evidence, case studies, and comparisons of financial performance between green and traditional banks support the analysis and recommendations.

Keywords: Green Banking, Sustainable Finance, ESG, Green Bonds, Climate Risk, Financial Innovation

A STUDY ON HOW THE STOCK MARKET WORKS IN INDIA

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Abstract

The stock market is a platform where investors engage in the trading and investment of financial instruments such as shares, bonds, and derivatives. It is facilitated by stock exchanges, which allow for the buying and selling of securities. In India, the two primary stock exchanges are the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). These exchanges play a crucial role in the financial market, offering investors a space to trade financial securities. The Indian stock market is broadly divided into two segments: the primary market and the secondary market. The primary market is where companies issue new securities for the first time, typically through an Initial Public Offering (IPO), enabling them to raise capital from investors.

Keywords: Indian Stock Market, Investment, Taxes, Securities, Market, NSE, BSE

IMPACT OF TRAINING ON THE PERFORMANCE OF EMPLOYEES - A CASE STUDY WITH REFERENCE TO PENNA CEMENT INDUSTRIES LTD.,

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Abstract

Training is a continuous process to improve the caliber of employees. Training is needed for all departments. Training and development is vital part of the human resource development. It is assuming ever-important role in wake of the advancement of technology, which has resulted in ever increasing competition, rise in customer's expectation of quality and service and a subsequent need to lower costs. It is also become more important globally in order to prepare workers for new jobs. In the current write up, we will focus more on the emerging need of training and development, its implications upon individuals and the employers. The main objective of this study is to assess and investigate the impact of training on the performance of employees in an organization.

Keywords: - Training, Impact, Technology, organization

EXPLORING THE INFLUENCE OF PERCEPTIONAL ASPECTS ON DECISION MAKING: A STUDY ON ANDHRA PRADESH INVESTORS.

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Abstract:

Perception aspects of individual investors have significant influence on selection of investment avenues and decision making. Individual investor opinions need to be considered before investment and for better decision making. The study mainly focuses on how the individual investors in Andhra Pradesh take decisions on investment avenues. The decision-making is based on financial knowledge, choice of investment avenues, socio economical conditions, technological and digital platforms, investor individual goals and objectives etc. The study is theoretical in nature and the main sources of data used for the study are primarily in nature by using structured questionnaires. The Sample design used for the study is convenient sampling and descriptive research design is followed. The results are based on Andhra Pradesh individual investors 'thoughts and opinions.

Keywords: investors, Perception aspects, decision making.

ARTIFICIAL INTELLIGENCE - A DISRUPTIVE TECHNOLOGICAL INNOVATION IN ADMINISTRATION OF HUMAN RESOURCES

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Abstract

Pervasive artificial intelligence appears to be surrounding us from every direction. The proliferation of Google Maps, chatbots, assistants such as Alexa, and autonomous vehicles has significantly facilitated and empowered our daily lives. Over the past ten years, Artificial Intelligence has gradually supplanted humans and solidified its existing position. Similarly, within an organizational context, Artificial Intelligence is assuming control of HR operations with great effectiveness and efficiency. Despite its limited adoption, it represents a genuine disruption in the realm of Human Resource Management. Artificial intelligence is transforming the workplace by enabling humans to interface closely with machines using neural networks and vast amounts of data stored in the cloud. This combination transcends all conventional limits and necessitates a significant change in thinking, operation, and execution. The human resource department is renowned for its intricate structure, human-centric approach, and reliance on data-driven operations. It stands to gain significant advantages from the implementation of artificial intelligence and machine learning. Despite the widespread adoption of Artificial Intelligence in several sectors, the Human Resources department has been the slowest to embrace it. The primary factor contributing to this is that HR was first regarded as the management of people and intervention by humans, with few repetitive or repetitive tasks. However, with the current advantages of Artificial Intelligence in other industries, the field of Human Resources is also contemplating its extensive implementation. Advanced Artificial Intelligence technologies provide substantial prospects for enhancing HR operations, including self-service transactions, recruiting and talent acquisition, payroll, reporting, and access controls and processes. In order to make analytics-driven decisions for both historical reporting and future predictive analysis, HR should retrain its personnel.

Keywords: Human Resources, Artificial Intelligence, HR Practices.

PERFORMANCE EVALUATION OF SELECTED TECHNOLOGY MUTUAL FUND SCHEMES IN INDIA

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Abstract

Investors investing in securities market desires to earn maximum return for a given level of risk. But most of the investors doesn't have expertise knowledge to undertake investment analysis therefore they go for indirect investment instead of investing directly. An indirect form of investing in securities market is mutual fund. Mutual fund is a trust that pools the savings of individual investors and invests it in diversified portfolios. The mutual funds are managed by skilled portfolio managers, the yield generated from the managed portfolios are dispersed among the mutual fund unit holders. The Yield (return) on mutual funds is nothing but the appreciation recorded in the Net Asset Value over a period of time. The Aditya Birla Sun Life Digital India Fund is an open-ended equity scheme that primarily invests in technology and technology-driven companies. Launched to capitalize on the growing digital and IT sectors in India, the fund focuses on businesses involved in software, hardware, IT services, and telecom. The ICICI Prudential Technology Fund is an open-ended equity fund focused on the technology sector. It invests in a mix of large-cap and mid-cap technology firms, including sThe present research study evaluates the risk-adjusted performance of technology-focused, open-ended equity diversified mutual fund schemes in India. To assess performance, the study utilizes risk-adjusted measures such as the Sharpe ratio and the Treynor ratio. Risk is quantified using Standard Deviation and Beta. The BSE Sensex is employed as the benchmark index, and the interest rates on 91-day Treasury Bills are used to represent the risk-free rate. For this study, the researcher has selected five Technology Mutual Fund schemes, covering a period from January 1, 2019, to March 31, 2024. The necessary data has been sourced from the AMFI website, AMFI India, the RBI website, and the official BSE website. The key finding of the study is that all selected schemes, including the benchmark index, have been adversely affected during the study period. However, the analysis reveals that most of the selected Technology Mutual Fund schemes outperformed the market and other funds, all while maintaining moderate risk levels.

Keywords: Mutual fund, Technology Mutual Funds, Sharpe ratio, Treynor ratio, Net Asset Value, Benchmark.

INVESTORS PERCEPTION TOWARDS STOCK MARKETS: AN EMPIRICAL RESEARCH OF HYDERABAD CITY

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Abstract

Investors act as significant player in Indian stock market. Since they establish a more noteworthy portion of ventures and pay, the conduct of individual financial backer can't be overlooked by the controllers of the stock market. This research article aims "To explore the association in the investors perception attributes towards stock market across the demographic variables". The article applies data reduction using Reliability test, Confirmatory Factor Analysis (CFA) and Chi-Square test on a sample of 223 investors towards stock market in Hyderabad city and condenses a set of 19 items of six investors perception attributes. The present study proposes a model of the investors perception attributes towards stock market across the demographic variables. The study found that six investors perception attributes significantly association with demographic profile of the respondents. The Indian stock market is subject to many unexpected fluctuations but at the same time for tactful and foresighted investors, it provides huge gains in terms of returns and capital appreciation.

Keywords: Maturity Period, Capital Increase, Return on Investment, Safety of Principle, Tax Benefits Risk, Investors Perception and Stock Market.

EXPLORING WORK-LIFE BALANCE AND JOB SATISFACTION, AMONG HEALTHCARE WORKFORCE IN MAHABUBNAGAR DISTRICT

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Abstract

One of the most demanding occupations is healthcare, where employees frequently deal with a lot of work, little free time, and even conflicting role expectations, which can lead to a poor work-life balance (WLB). The purpose of this study is to examine how work-life balance (WLB) experiences and job satisfaction affect healthcare workers at hospitals in the private sector. The study used a self-administered questionnaire survey using a five-point Likert scale, adhering to the analytical research design. Responses were gathered from 412 nurses in various roles at hospitals in the private sector. Using structural equation modeling, descriptive and inferential statistics were used to analyze the gathered data. Smart PLS 4 was used for data validation and path coefficient analysis at a significance level of 5%. Work–personal life enhancement (WPLE), work interference with personal life (WIPL), and personal life interference with work (PLIW) were the three aspects used to analyze WLB. The study found a strong correlation between job happiness and work-personal life improvement and personal life interference with work. Additionally, the results showed a strong positive correlation between job satisfaction and WLB interferences. According to this study, TI should be discouraged by focusing on WLB and work satisfaction. Both managers and legislators can utilize this study to enhance the situation and implement appropriate actions. Additionally, this investigation has theoretical ramifications grounded in boundary theory.

Keywords: Work–life balance, Job satisfaction, healthcare workforce

FINTECH AND DIGITAL PAYMENTS STRUCTURE IN RAYALASEEMA REGION

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Abstract

The Rayalaseema region in Andhra Pradesh, India, has witnessed significant growth in fintech adoption and digital payments. This study aims to explore the current structure and landscape of fintech and digital payments in the region. This exploratory study investigates the adoption and impact of financial technology (fintech) and digital payment systems in the Rayalaseema region of Andhra Pradesh, India. As fintech revolutionizes financial services globally, its penetration and effects in rural and semi-urban areas of developing economies remain understudied. Rayalaseema, comprising four predominantly agrarian districts, serves as a compelling case study for understanding these dynamics in a semi-urban context. The research employs a mixed-methods approach, combining quantitative surveys with qualitative interviews and focus groups. Data was collected from a diverse sample of 500 individuals and 100 small businesses across the region. The study examines the current state of fintech adoption, factors influencing uptake, challenges to widespread adoption, impact on local economic activities, and the role of government initiatives. Findings reveal a gradual but uneven adoption of digital payment solutions, with mobile wallets and Unified Payments Interface (UPI) emerging as preferred methods. Key factors influencing adoption include smart phone penetration, digital literacy, and perceived ease of use. Barriers identified include limited internet connectivity, security concerns, and a lack of trust in digital systems.

Keywords: Fintech, Digital Payments, Rayalaseema Region, Unified Payments Interface.

FUNCTION OF DATABASE MARKETING IN THE IMPLEMENTATION OF SERVICES RELATIONSHIP MARKETING

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Abstract:

The objective of relationship marketing is to establish a lasting connection between the business and the end customer, recognized on an individual basis. The specific aspect of relationship marketing consists of two primary ideas: individuality and the connection. This article discusses the ideas of relationship marketing, database marketing, and geomarketing. We highlight the significance of integrating a marketing database within a service-providing business and its effects, both for the customer and for the business. The article emphasizes the tools of the marketing database and the benefits for the components of the marketing mix. The adoption of a marketing database will assist the company in effectively targeting and attracting customers, converting them into loyal buyers, while simultaneously helping to refresh the company's image.

Keywords: marketing, business, components, database, service.

Proceedings of National Conference on “Emerging Trends in Engineering and Management ETEM-2025”

This book presents the proceedings of National conference on Emerging Trends in Engineering and Management ETEM-2025. The conference provides a forum to all engineers and scientists to deliberate on the innovative tools and techniques that are needed to face the challenges in four aspects, namely, Quality, Productivity, Safety and Economy (QPSE). This book discusses the emerging research areas, providing a valuable resource for researchers and engineers.

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