Lecture Notes in Electrical Engineering

L. M. Patnaik
G. T. Raju
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Emerging Research in Computing, Information, Communication and Applications

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Emerging Research in Computing, Information, Communication and Applications

ERCICA 2024

Lecture Notes in Electrical Engineering

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Preface

The International Conference on "Emerging Research in Computing, Information, Communication and Applications," ERCICA 2024 is an annual event organized at BGSCET, Bengaluru, India in association with Laghu Udyog Bharati (LUB – Karnataka) and technology partner National Research Development Corporation (NRDC), Ministry of Science and Technology, Govt. of India.

The aim of the conference is to effectively bring its stakeholders from across the world on its platform to discuss among start-ups, entrepreneurs, researchers, engineers and scientists in order to promote research and exchange of knowledge. These endeavors aim to enhance the technological ecosystem and actively contribute to India's digital transformation.

ERCICA-2024 received more than 500+ papers from all over the world viz. from China, UK, Africa, Saudi Arabia and India. The ERCICA Technical Review Committee has followed all necessary steps to screen all the papers by going through six rounds of quality checks on each paper before selection for Presentation/Publication in Springer' LNEE (Lecture Notes in Electrical Engineering) proceedings, is SCOPUS indexed.

July 2024

Editors

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An Unique Comprehensive Analysis for Detecting Vitamin Deficiencies using Picture Analysis through Image Processing

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Abstract— Vitamins are indispensable constituents of our daily intakes; also their consumption plays a pivotal role in maintaining overall health. Inadequate intake of vitamins can lead to the development of deficiencies, which can have serious health consequences. This project presents an innovative solution for the early diagnosis of vitamin insufficiencies through the use of artificial intelligence (AI). In particular, it presents a free desktop application that is easy to use and makes use of pictures of patients' tongues, eyes, lips, and nails to determine possible vitamin deficits without using conventional blood samples.

The application offers customers a comprehensive report on any potential vitamin deficiencies they may have, along with recommendations for dietary modifications to increase intake and decrease shortfalls. The AI software is trained to distinguish between images of individuals with healthy features and those displaying signs of vitamin deficiency, making it a valuable tool for early identification.

Keywords—ECG, Machine Learning, Deep Learning, Concurrent Neural Network, ECG Signals, Arrhythmia.

Machine Learning Algorithm is used to identify Autism Spectrum Disorder in humans being

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Abstract — Autism spectrum syndrome is a neurological pre-disease that impacts a person's business, correspondence, and functional abilities. Regardless of the fact that disparities in intellectual ability should be possible at some point in life, secondary outcomes usually develop in the first two many years of life, but they expand with time. Mental awkwardness sufferers experience a wide range of concerns, including cognitive difficulties, learning disabilities, motor difficulties, complex issues, and internal ailments such as hypertension, debilitation, and others. Despite this, they walk a diverse group of workout routines in a similar way, which makes it hard for coaches to recognize the process. At the moment, it is common to use exceptional approaches to survey them throughout, without mentioning their cohesion or specific characteristics. The proposed strategy includes intellectual coping based on a knowledgeable education collaborator. This provides smart courseware via means of concerning a early life expressly. A random strategy that combines mental, preliminary, and lead thinking science is utilized to start a substance unevenness evaluation model, with the use of which a unique courseware is offered to the children To get the younger character's consistent responses, a herbal chatbot is utilized as an affiliation spotlight group up with him. Chatbots or chatter bots are employed to combat drug discomfort. Compound unevenness is the most gorgeous neuro enhancement grievance normal set up in kids. Modern inadequate evaluation patterns last a long time and are also mismatched to remain aware of the case records of the brain protesting In this effort, a chatbot has been created that can examine the solidity of protesting based on stoner's direction e book founded queries. It consists of programming language for significance start and makes use of Decision Trees to depict a case with recognize to viable complaint. From stoner's inverse, programming language unit extracts which means of watchwords describing pressure of complaint's aftereffects. The proposed form proves to be an effective method for detecting Autism. It's beneficial for ace investigators When compared to the results of mortal clinicians, this procedure saves time and money and achieves a delicacy 88%.

Keywords: Autism, Machine Learning, Sensor, Anxious 1ess.

Predictive Traffic Management and Deep Learning Based Vehicular Congestion Mitigation

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Abstract: Increased vehicle usage resulting from accelerating population growth and ease of access poses significant challenges to modern traffic management systems. This research article explores the amazing capabilities of Deep Learning traffic prediction models by suggesting a unique hybrid traffic management framework that depends on Convolutional Neural Networks and Long Short-Term Memory Networks to determine space and time-varying attributes respectively, finding joint spatial-temporal correlations in historical traffic flow data. Efficient hyperparameter tuning is ensured through Particle Swarm Optimization and Bayesian Optimization. Real-time decision-making is facilitated through the integration of Deep Reinforcement Learning, thus seamlessly adapting to ever-changing traffic conditions and mitigating vehicular congestion, offering promising applications in urban traffic management systems.

Keywords: Long Short-Term Memory, Convolutional Neural Network, Particle Swarm Optimization, Deep Reinforcement Learning, Bayesian Optimization.

Comprehensive analysis of Smart Greenhouse Monitoring System

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Abstract— In the pursuit of enhancing conventional greenhouse technologies, numerous studies have been examined to address the limitations of existing monitoring systems. This paper presents a comprehensive review of various research papers, culminating in the development of a proposed system that seeks to overcome the shortcomings observed in current monitoring practices. The primary focus is on creating a versatile solution capable of monitoring and controlling the climatic conditions within the greenhouse environment. The proposed autonomous greenhouse monitoring system revolutionizes agriculture with user-friendly, IoT-driven technology. It autonomously tracks temperature, humidity, and soil moisture, ensuring optimal plant growth. Features include smart climate control, soil moisture management, and resource optimization, all accessible through a user-friendly interface. By providing the ability to modulate and regulate these environmental factors, the system aspires to create an optimal climate for plant cultivation. Through advanced sensor technologies and automated controls, the system ensures real-time tracking of environmental conditions. This data is not only monitored but also recorded systematically, enabling users to analyze trends over time. The approach for greenhouse monitoring and control is geared towards sustainability and efficiency, with a vision to maximize plant growth and yield. The simplicity and user-friendliness of the system contribute to its accessibility, making it an asset for both experienced horticulturists and those new to greenhouse cultivation.

Keywords—IoT, Optimization, Agriculture, Monitoring, Sensors, Greenhouse.

Cybersecurity threat detection of anomaly based DDoS attack using machine learning

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Abstract-- In today's world, network attacks are a major security concern due to the fast-paced progress of the internet and technology. DoS attacks are complex threats that are hard to combat. Distributed denial of service(DDoS)attacks are even more hazardous as they can cause significant disruptions. Furthermore, they are particularly challenging because they can strike unexpectedly and quickly cripple a victim's communication or computing resources. DDoS attacks are a constantly evolving threat which is increasingly challenging to detect and effectively mitigate. To counter this menace, we have explored diverse techniques and methods on the DDoS attack dataset i.e. SDN specific dataset .Machine learning has improved DDoS detection by implementing various algorithms, including Decision Trees,Support Vector Machine, Naive Bayes, K-Nearest Neighbour, MultiLayer Perceptron, Quadratic Discriminant, Stochastic Gradient Descent (SGD), Logistic Regression, XGBoost, and deep learning methodologies such as Deep Neural Networks (DNN). An extensive comparative analysis of these algorithms has evaluated their performance based on accuracy metrics.

Keywords-- Cyber security, Distributed Denial of service (DDOS) detection, Machine learning, Deep learning, Accuracy, DDoS attack.

Deep Learning-Based Biometric Verification in a Secure Cloud Environment

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Abstract— This paper introduces a pioneering biometric authentication system designed for secure cloud environments, combining facial recognition and signature verification through deep learning techniques. The facial recognition network achieved a commendable accuracy of 96.2%, while the signature verification network excelled with an impressive 98.2% accuracy. These results affirm the system's robustness in distinguishing between genuine and fraudulent signatures and facial images, crucial for secure cloud-based authentication. The study emphasizes the system's efficacy, with facial recognition accuracy ensuring correct user verification in nearly 96.2% of cases. The inclusion of a human verification feedback loop addresses discrepancies, enhancing overall reliability and trust in the biometric authentication process. Securely stored face-signature pairs in a cloud-based database facilitate continuous system improvement through iterative retraining, adapting to evolving security challenges. In conclusion, the research demonstrates the viability of deep learning-based biometric verification in secure cloud environments. The high accuracy rates, coupled with a human verification safety net and iterative retraining, provide a foundation for the implementation of robust and adaptive cloud-based authentication systems, ensuring security and reliability in the face of evolving technological landscapes.

Keywords—Biometric authentication, cloud security, deep learning, facial recognition, signature verification, Siamese network.

Mobile Application to Detect Sugarcane Damaged Billets

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Abstract— Sugarcane plays an essential role in global agriculture due to its significance in the production of sugar, ethanol, and bagasse. Modern sugarcane cultivation often relies on billets, making it imperative to maintain healthy billets for optimal yield. However, the use of harvesting machines introduces the potential for billet damage, which can lead to disease spread and reduced quality. Developing a robotic solution that employs computer vision and deep learning to detect the damaged billets is important. Conventional methods for damage detection are hindered by complex backgrounds, necessitating the development of an efficient model for sugarcane billet damage categorization.
The work presents the Sugarcane Billet Damage Detection App, which integrates advanced image processing techniques and the FDHOA-based DMN model. The applications user-friendly interface includes informative content on sugarcane cultivation and a robust billet damage detection feature. The FDHOA-based DMN model, leveraging fractional calculus and optimization algorithms, achieves remarkable accuracy in categorizing sugarcane billet damage, contributing to more efficient and intuitive sugarcane harvesters.

Keywords— Crop disease classification, Sugarcane billet damage, Fractional Calculus (FC), Deer Hunting Optimization (DHO) algorithm, Deep Maxout Network (DMN).

Android Security: Genetic Algorithm-Based Malware Detection System

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Abstract— The expansion of Android devices in today's digital landscape highlights the critical demand for robust security actions to counteract the escalating threat of malware. The influence of Android malware extends beyond smartphones. While Android is mainly utilized on smartphone devices presently, its reach will expand to include Internet of Things (IoT) devices. Notably, an Android-based operating system tailored for IoT, initially named "Android Things" and later rebranded as "Brillo," has already been presented. As an outcome, Android malware will increasingly impact a broader scope of devices beyond just smartphones. This research paper aims to provide a comprehensive learning of the Android architecture, and the general landscape of malware threats and proposes a genetic algorithm-based security framework for malware detection. We employed the random forest and ANN classifiers and got 91.441 % and 97.206 % accuracy respectively. We expect that this research will inspire researchers to work in this direction.

Keywords—Android, Android Architecture and Threat Model, Machine Learning.

Fire Detection using Transformer Based Model

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Abstract— Fire detection is important for safety purposes and early detection of fire hazard will mitigate major losses. Traditional sensor based fire detection systems suffer from false detection rates and are not suitable for constrained environments. Therefore, there is a need for an automatic fire hazard detection system, to achieve this deep learning models are used. Vision transformer has highest image classification accuracy, this research work aims to develop fire detection system using a Transformer-based model. The Google Vision Transformer, version-4.10.1 model is used and the model is trained on RawFire dataset obtained by combining two Kaggle datasets – TrainFire and TrainSmoke. The combined RawFire dataset contains three classes- Fire, Smoke and Normal. Each of these classes contain 2525 image samples. The number of images for training is 6060, validation is 756 and for testing is 759. Vision transfer model parameters were optimized through experimentation the model has been run for 10 epochs with batch size 32, learning rate 0.0002, logging steps 50, weight decay 0.01, Adam Beta1 0.9 and Adam Beta2 is 0.999 and warm up steps 100. The number of attention heads of vision transformer model were 12 and image. The model performance achieved us accuracy of 0.99, F1 score is 0.99 and precision is 0.99 and recall 0.99. Further experimentation is carried out to determine optimal number of attention heads by varying its value with 6, 8, 12, 16 and 24. The model gave best performance for 8 number of attention heads.

Keywords— Fire detection, deep learning, transformer model, attention mechanism, data augmentation.

NFT Marketplace for Exchange of Digital Artifacts Using Smart Contract

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Abstract— NFTs are altering the way we buy and sell digital art by utilising blockchain as proof of ownership. However, there are issues with the clarity, safety, and usability of the current NFT markets. To address these problems, this research proposes utilising blockchain smart contracts to create a new marketplace. It is intended to be an easy-to-use, secure platform where artists can produce, exchange, and validate their ownership of NFTs; blockchain ensures that all information is transparent and unchangeable. This study demonstrates how everyone in the NFT world may find it simpler to access and trust digital assets thanks to this new marketplace.

Keywords—Blockchain Technology, Digital Artifacts, Ethereum, Meta Mask Wallet.

Multi-Facial Recognition using Multitask Cascaded Convolutional Neural Networks

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Abstract— Effective attendance monitoring in educational institutions is crucial for shaping academic performance, particularly as student enrolment rises. Conventional methods, reliant on manual recording and paper-based sign-in sheets, are proving cumbersome and time-consuming. Existing automated systems, including mobile applications, RFID, Bluetooth, and fingerprint models, face challenges related to inaccuracies and inefficiencies. Hence these limitations can be overcome by adopting a smart attendance monitoring system utilizing facial recognition technology, offering a non-intrusive and promising solution. The proposed work introduces a time-integrated model that systematically records the attendance status periodically at regular intervals of time throughout lectures thus enhancing accuracy. A recommended multi-camera system ensures comprehensive coverage of the classroom. An experiment has already been conducted by considering the smart attendance monitoring system in a specific class at the University of KwaZulu-Natal (UKZN), based on facial recognition and the outcome clearly exhibited a reliable average accuracy rate of 98%, presenting a robust and efficient solution to address challenges posed by traditional attendance methods for academic institutions aiming to enhance attendance monitoring practices.

CROP-CONNECT : Empowering Farmers through Digital Community

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Abstract— Crop Connect is a cutting-edge social media platform tailored to empower farm- ers worldwide and reshape the agricultural landscape. It fosters seamless communi- cation, knowledge exchange, and collaboration among farmers, leveraging advanced features such as real-time weather forecasts, crop yield management tools, plant dis- ease detec- tion, soil analysis and real time crop-monitoring. Moreover, its marketplace functionality facilitates direct transactions of agricultural products, fostering economic opportunities and reducing reliance on intermediaries. Despite challenges like unre- liable internet access and farmer illiteracy in rural India, Crop Connect addresses these obstacles through farmer education initiatives and infrastructure development. Additionally, it highlights the significance of agricultural digitalization, aided by tech- nologies like AI and IoT, in enhancing farming practices. By strategically integrating training, infrastructure development, and advocacy, Crop Connect aims to unlock the transformative potential of social media in agriculture, ushering in a new era of con- nectivity, efficiency, and prosperity for farmers globally.

Keywords: Crop Connect Platforms, Social Media in Agriculture, Information exchange , Knowledge dissemination, Farming communities, Agricultural extension, Rural development, Connec- tivity, Empowerment.

A Novel System for Authentication of Identity Cards using YOLO v5 & YOLO v8

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Abstract-- This paper introduces an advanced authentication system leveraging the You Only Look Once (YOLO) object detection technique, specifically YOLO v5 and YOLO v8. The system identifies individuals within an institution based on the detection of their ID cards. Upon detection, the ID cards are isolated from the image frame for further processing. The isolated card images are then subjected to another round of YOLO detection, targeting specific text fields. After the text is localized, Optical Character Recognition (OCR) is utilized for precise extraction of the textual information for identity verification. This streamlined process boosts security of the organization, facilitating the prompt identification of non-compliant individuals and efficient verification of others. The system's promising results indicate broader potential applications in various settings that demand reliable identity verification protocols.

Keywords— YOLO, FPN, OCR, mAP50, SPPF.

Tailored Garment Recommendations Using Computer Vision and Machine Learning

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Abstract— In the realm of online shopping, despite the many advancements made in this specific field, the dilemma of finding the best clothing items that are right fit and meet the style preference of a consumer and avoid returns is yet to be completely solved. This problem has often resulted in customer dissatisfaction. The proposed system intends to deal with this problem by analysing the user's body size and suggesting the best fitting garment that suits their size and style with the help of advanced computer vision and machine learning technologies. This approach not only provides an improved online shopping experience with personalized recommendations, it furthermore contributes towards reducing the environmental impact caused by the return of ill-fitting clothing hence promoting sustainability.

Keywords— Environmental sustainability, Clothing recommendations, Future of fashion, Virtual fitting rooms, Computer vision, customer satisfaction, Histogram of Oriented Gradients (HOG).

Brain Diseases Prediction using ML

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Abstract— The human brain and stress are closely connected, and understanding this relationship is crucial in neurology. By using advanced machine learning (ML) techniques, this research aims to uncover how neurological symptoms can help predict brain diseases. The data for this study is considered from the HOPE CARE mental health clinic. Sophisticated algorithms like Support Vector Machine (SVM), Gaussian Naive Bayes, and Random Forest classifiers were used to analyze the patterns in neurological symptoms, which could provide the way for better disease management. The preliminary results are promising, with the Random Forest classifier achieving an impressive 97% accuracy in predicting brain diseases. This research represents a significant advancement in the field of neurology, with the potential to enable early detection and personalized treatment of brain diseases.

Keywords— Machine learning, Brain disease, Artificial Intelligence, SVM, Classifiers.

Assisting Visually Challenged Individuals to Distinguish Authentic Currency From Counterfeit

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Abstract— The inability of visually impaired people to independently recognize and handle currency can have an adverse effect on their capacity to conduct everyday activities and conduct financial transactions. This research uses the most advanced object identification algorithm YOLOv8 along with the Roboflow annotation tool for effective dataset labeling to construct an inclusive cash detection system and identify fake invalid currency for visually impaired people. The dataset, which consists of various pictures of counterfeit Indian currency notes, is annotated to produce bounding boxes around the currency regions. Following the trained YOLOv8 model's picture prediction, the discovered currency information is processed using the GTTS (Google Text-to-Speech) library to generate speech. Through this integration, the system may speak out the details of the detected currency, including its type, denomination, and validity or falsity, giving visually impaired individuals access to real-time information. To ensure strong performance, the system's evaluation takes into account important metrics like F1 score, precision, recall, and mean average precision(MAP).When combined with GTTS, the final model offers a complete solution that improves accessibility by offering auditory money recognition for people who are visually impaired. Therefore, cash detection technology plays a critical role in empowering people with visual impairments by giving them the means to handle their finances on their own, encouraging autonomy, and promoting inclusion in a variety of spheres of life.

Keywords— YOLOv8, Visually Impaired People, Roboflow Annotation, Mean Average Precision, GTTS.

Zenify.me - Your AI companion for a happier, healthier you

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Abstract— Mental health has been on an alarming rise. This is due to societal stigma, health disorders, and more, leading to the need for a support system. This paper introduces the need to use technology that acts as a support system and also introduces Zenify.me, an innovative application poised to revolutionize mental health care by seamlessly integrating technology, personalized support, and real-time monitoring. Compared to recent research and cutting-edge advancements, Zenify.me offers a holistic approach to mental well-being, catering to the diverse needs of individuals facing various mental health challenges. Zenify.me's user-friendly interface empowers individuals to proactively manage their mental well-being by providing comprehensive support. Key features include profile creation, connection with specialists, access to organized resources, and self-assessment tools aligned with World Health Organization standards. Notably, Zenify.me's groundbreaking integration with smartwatches enables real-time monitoring of vital signs - like temperature, step count, and more, and stress levels, facilitating personalized care and early intervention. Addressing societal attitudes, Zenify.me promotes openness, reduces stigma, and offers real-time alerts and dialogue-promoting resources to support individuals globally.

Keywords— Stress, Machine Learning, Random Forest Algorithm, K Means, Chatbot.

An Ideal Machine Learning Method That Uses URL Information to Identify Phishing Attempts

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Abstract— More websites have started gathering personal data in recent years for a variety of purposes, including banking, internet access, government services, and more. All personal information, including Aadhar, PAN, date of birth, phone number, etc., must be provided by the public. Through URL modification, personal data like Aadhar, PAN, date of birth, and phone number can be utilized for phishing attacks. Terrorists can make SIM cards using their names and other information since the public has lost money. It is of great importance to international security. In order to get around this, we employ the suggested techniques to identify phishing attempts by looking at factors such as the URL, site traffic, customer reviews, and the length of the business. These parameters allow the suggested optimal machine learning-based algorithm (OmLA), which was used to analyze historical URL data, to determine whether or not a given URL is phishing- or non-phishing-based. The suggested approach beats traditional techniques like random forest, support vector machine (SVM), and genetic algorithms by 8%, 18%, and 23%, respectively, in terms of accuracy, according to simulation and performance analysis. Furthermore, it excels in response times of 0.45%, 0.56%, and 0.62%, and achieves detection times of 0.2%, 0.6%, and 0.9%, respectively.

Keywords— random forest, support vector machine (SVM), Uniform Resource Locator (URL), optimal machine learning-based algorithm (OmLA) and genetic algorithms.

IoT-Powered Hydroponics System: A Real-Time Monitoring and Control System

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Abstract— This research investigates the integration of IoT technology in hydroponics to advance sustainable agriculture through real-time monitoring and automated control. The IoT-enabled hydroponic system utilizes sensor networks to gather critical environmental data, including temperature, humidity, pH balance, and nutrient levels. This data is analyzed using advanced algorithms to support informed decision-making.

Farmers can remotely access an intuitive interface to precisely control the hydroponic environment, optimizing fertilizer application, adjusting pH levels, and fine-tuning temperature settings in response to environmental changes. Automation enhances efficiency by enabling autonomous actions based on predefined parameters, such as automated nutrient dosing adjustments or corrective actions to mitigate adverse conditions.

The incorporation of IoT technologies in hydroponics holds significant promise for advancing precision agriculture. By delivering real-time insights and automated control, the system empowers farmers to adopt sustainable and efficient crop cultivation practices in a technology-driven era.

Keywords— Smart agriculture, hydroponics, automation, sensors, IoT, precision farming, sustainable agriculture, real-time monitoring and controlling.

A D-Tect System for Robust Human Target Detection and Acquisition to enhance safety

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Abstract— Robust human target recognition and acquisition is a leading area of research attracting researcher all over the world. Identification and tracking of human subjects in various settings and circumstances are part of the procedure. This method improves the precision and consistency of human target recognition by abstracting sophisticated computer vision techniques, like deep learning and feature extraction. The present paper discusses a D-tect system for precise human target detection and data acquisition to enhance human safety in situations involving crimes. It helps enhance safety, automation, and decision-making by effectively locating and monitoring human targets.

Keywords— Occlusion, human-target detection, data acquisition, YOLOv8.

Prediction of Patient Progression Using Deep Fusion Approach in IoT-based Distributed Healthcare System

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Abstract— The Internet of Things-based Distributed Healthcare System (IoT-DHS) collects diverse medical data in the form of electronic health records (EHRs) from local or remote health monitoring devices. The utilization of multiple EHRs presents valuable opportunities for comprehending a patient's health status across different phases, particularly regarding the enhancement of their physical strength. However, prior efforts in this domain have faced several challenges. Many studies have overlooked the intricate interdependencies among various medical entities, leading to biased modeling of patient status and hindering accurate prediction of future physical conditions. To address these issues, this research proposes an improved detection technique for predicting patients' hospital length of stay, aiming to extract patterns of physical improvement and enable precise outcome prediction. Data is collected from MIMIC 3D and then preprocessed for quality improvement. Twin-RSA extracts heterogeneous features, CA-SLSTM classifies, and WHetF combines them. The method outperforms existing state-of-the-art techniques with high accuracy (99.2%), recall (98.5%), precision (98.5%), F-measure (98.5%), specificity (99.5%), and Kappa scores (98.0%).

Keywords— Things-based Distributed Healthcare System (IoT-DHS), Electronic health records (EHR), Data Fusion, Twin Recurrent stacked autoencoder (Twin-RSA), Weighted Heterogeneous Fusion (WHetF), Convolutional attention, Stacked LSTM, Archer optimization.

Software Effort Estimation using AIML and a User-interface: A Comprehensive Literature Review

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Abstract— Efficient software effort estimation plays a pivotal role in project management, aiding in resource allocation, scheduling, and overall project success. Traditional methods often rely on historical data and statistical models, which may fall short in capturing the dynamic nature of software development projects. This paper introduces a pioneering strategy that harnesses the capabilities of Artificial Intelligence (AI) and UI technologies to elevate precision and dependability. Integrating AI into software effort estimation involves deploying adaptive ML algorithms that analyze historical project data, code repositories, and team dynamics. These algorithms continuously improve their predictive capabilities over time, adapting to changing project parameters. Additionally, a User interface enhances user experience, facilitating natural language interactions for easy input of project details and instant estimate retrieval by project managers, developers, and stakeholders.

Keywords— Efficiency in Project Management, Limitations of Traditional Methods, Innovation through AI and UI Technologies, AI-Driven Analysis, Adaptive Algorithms, Continuous Improvement, User Interface for User-Friendly Platform, Real-Time Estimates, Enhanced Communication.

A Semi-supervised Centroid Base Object Tracking in Video Surveillance Using Deep Detector and Salience Estimation

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Abstract— Deep learning-based semi-supervised object tracking system plays a pivotal role in the field of Visual Object Tracking (VOT), due to its high accuracy. In the existing object tracking algorithm, object region is chosen manually. However, many computer vision applications have worked without human interference in recent days. In this consequence, we introduce a semi-supervised tracking algorithm with the help of a deep network, Customized Encoder-Decoder SegNet (CEDSegNet), and salience features, for tracking an object in videos. Specifically, deep learning model employs detection and extraction of object region, says region of interest (ROI) of an object, in a video frame. We use this ROI for estimation of the salience of an object in subsequent frames using log-likelihood. Finally, we apply the mean shift algorithm on detected object for tracking of the object. The qualitative results are obtained from the CDNet2024 dataset. The experimental results showcase the effectiveness of the proposed tracking system.

Keywords— Object detection, Salience Estimation, Log-likelihood, Mean shift, Tracking.

Recognizing personality traits from handwriting with machine learning technique

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Abstract— Handwriting is considered as a reflection of mood changes and characterises the state of mind of a writer at that moment. Graphology is the dedicated field for analysing handwriting and getting knowledge about personality traits. The process can be made faster and affordable using the machine learning technique. Handwriting analysis is done considering the features like baseline angle, top margin, letter size, line spacing, word spacing, pen pressure and slant. Using SVM and random forest classifier along categorised features, insights about different personality traits are obtained. The robust system is evaluated against f1 score and is found to be 100% accurate provided the given handwritten sample is clear and precise.

Keywords— Handwriting analysis, graphology, personality traits prediction, slant, baseline, top margin.

Exploring the causes of Maternal mortality in Karnataka and Crafting Strategies for Prevention

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Abstract— The objective of this study is to analyze the factors that cause maternal deaths and the effect of medications given to reduce them in Karnataka. To carry out this work,3 years data (2017-2020) is collected from the Official Karnataka government website (Health Man-agement System) which describes both maternal and infant health and causes of deaths district-wise in Karnataka. Maternal data is extracted and analyzed by grouping the districts into 4 administrative divisions. A linear regression process is used for selecting the relevant factors. Over-all maternal deaths decreased by 0.09% from 2017 to 2020, with sig-nificant increases seen in Bengaluru Urban (0.189%), Bijapur (0.356%), and Yadgir (0.07%), and notable decreases in Belagavi (0.495%), Gul-barga (0.415%), and Dharwad (0.138%). Bengaluru Urban recorded the highest deaths (83) in 2019-20. Factors contributing to maternal deaths include severe anaemia (p=0.9999), GDM (p=0.962), and obstetric com-plications (p=0.02). Districts with high mortality rates also had spikes in severe anaemia, GDM, and obstetric complications, while districts like Bengaluru Rural, Hassan, Uttar Kannada, and Shivamogga saw reduced mortality rates.Interestingly, these districts also showed a reduction in severe anemia and gestational diabetes mellitus (GDM) cases. Based on the analysis, it can be concluded that addressing the treatment of ane-mia, reducing the prevalence of GDM , and effectively managing obstetric complications are crucial steps toward achieving the goal of a maternal mortality rate.

Keywords— Maternal death, severe anaemia, obstetric complications,gestational diabetes mellitus.

Utilizing Deep Learning Features to Categorize WBCs in Blood Smear Images

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Abstract— Automated categorization of WBCs (white blood cells) is essential not just to identify infections, autoimmune ailments, and blood-related disorders, but also in the pivotal decision-making process concerning patient treatment and the efficient management of diseases. In this paper an advanced approach for WBC type classification using smear images is proposed. The VGG16 model is utilized to capture intricate features of the images, which are then provided to an XGBoost classifier. This integration enables precise classification into 5 distinct WBC types. Our model shows a significant accuracy score of 92.3%, demonstrating its capability in accurately identifying WBC types from smear images. Proposed technique provides a promising pathway for automating WBC classification, thereby enhancing efficiency in disease diagnosis and decision-making within clinical settings.

Keywords— VGG16, XGBoost, WBC, blood smear image, Deep learning.

Enhancing Data Security and Cloud Performance with Confidentiality-Based Classification-As-A-Service (C2aas) for Big Data Processing and Storage

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Abstract— The research aims to examine the viability and effectiveness of C2aaS in enhancing data security and cloud performance, therefore filling present research gaps. The method follows a novel path using Multi-Head Self-Attention and Bacterial Colony Optimization (BCO) inside a cloud computing environment. By letting simultaneous focus on several parts of input sequences, Multi-Head Self-Attention maximizes resource allocation depending on different work and data needs. Inspired by bacterial foraging activity, BCO constantly adapts to changing conditions, provides best distribution of computational resources, and solves system overload problems. The results show the double use of the model in optimal resource allocation and secured threat classification. The self-attention approach helps to combine threat classification, thereby enabling the identification and categorization of security issues in line with C2aaS's objectives. The results reveal how realistically the proposed approach could raise data security and cloud performance.

Keywords— Big Data, Confidentiality-Based Classification-as-a-Service, Multi-Head Self-Attention, Cloud Computing, Bacterial Colony Optimization.

SmokeEye: An AI-ML based Dehazing and Desmoking System

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Abstract— The paper introduOces an innovative method for enhancing video clarity by employing a deep learning framework to address haze distortion architecture specifically designed for image dehazing: the SmokeEye. The method tackles video dehazing in a casing-by-outline way, utilizing the SmokeEye's capacity to catch long-range conditions and complex connections inside pictures. The dehazed frames are sewed back to a video sequence, resulting in a clear and haze-free output. This approach offers several advantages like effectiveness in dehazing various video scenes, potential to outperform prior art based on image quality metrics and integration with established video processing frameworks. Our research contributes to the field of video enhancement by demonstrating the applicability of SmokeEye's for video dehazing tasks.

Keywords— Video dehazing, Deep learning, Frame-based processing, Image dehazing, Long-range dependencies, Video enhancement, Computer vision.

Hybrid Approach Using Machine Learning for Leaf Disease Detection and Glucoma Detection

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Abstract— The agricultural sector is vital to human existence. Approximately sixty percent of people work in agriculture, either directly or indirectly. Farmers are afraid of increasing their agricultural productivity day by day because the existing system lacks the technologies needed to identify diseases in different crops in an agricultural environment.Early detection is crucial because crop diseases have an impact on the growth of the corresponding species. One of the most significant agricultural products in the world, tomatoes are used in many different cuisines all over the world. For the purpose of detecting leaf disease, numerous conventional models have been presented. Lately, nevertheless, both supervised and unsupervised learning tasks have demonstrated improved results. Accordingly, a convolutional neural network (CNN)-based work has been proposed here.The dataset, which includes six distinct disease kinds that affect tomato leaves and has a sample size of 6000, was obtained from Kaggle.com and used in the experiment. The dataset's leaf photos are fed into the leaf disease detection system, where they undergo pre-processing before features are extracted. The final component of CNN, the softmax classifier, receives the extracted features. With this dataset, an accuracy of 99.3% was obtained overall. We have utilized Flask for the entire framework and testing, CNN for training and validation, Python for model building, and the OpenCV package for image capture and storage.
Glaucoma is a condition that affects the optic nerve and can be linked to diabetes,which raises pressure inside the eye.If not caught early,it can lead to significant loss.Machine learning can automate the detection of this disease.With the plant leaf disease detection,this paper also explores how CNN can be used in mobile apps to effectively detect glaucoma,focusing on identifying the most important factors for accurate detection systems.

Keywords— Plant Disease,Glaucoma, Machine Learning , Deep Learning ,CNN.

Hybrid Model of SRGAN CNN-LSTM for Classifying Dysgraphia in Primary school children using Handwritten Images

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Abstract— The current study is classification of dysgraphia from hand-written images using an ensembled Super-Resolution Generative Adversarial Networks (SRGAN), CNN(Convolutional Neural Networks), and LSTM(Long Short-Term Memory networks). The proposed model aims to address the challenges of dysgraphia classification by leveraging the high-resolution image generation capabilities of SRGAN, the feature extraction capabilities of CNNs, and the sequential modelling capabilities of LSTMs. The authors trained their model using primary set of handwriting samples collected from individuals with and without dysgraphia 101 images. We first employ SRGAN to enhance the resolution of input images, thereby improving the quality of features extracted by subsequent layers. Next, a CNN architecture is utilized to extract discriminative features from the enhanced images. Finally, an LSTM network is employed to capture the temporal dependencies in the sequence of extracted features, enabling the model to effectively classify dysgraphia. The performance model was evaluated using standard metrics such as precision, recall, and F1-score. The results of the study have revealed that the ensembled model achieved a high classification accuracy for dysgraphia, indicating its potential usefulness as a diagnostic tool for dysgraphia.

Keywords— Dysgraphia, specific learning disorder , SRGAN, LSTM,CNN .

Securing Evidence in Digital Forensics Using Blockchain

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Abstract— Blockchain ensures transparency, authenticity, and integrity of every transaction and is considered a breakthrough in cryptocurrency and cybersecurity due to its decentralised nature. With the growth of digital presence among mankind, Cybercrime, particularly the manipulation of digital evidence in court proceedings, becomes an escalating concern. Digital evidence holds a crucial role in providing justice in court proceedings. In this work, evidence is secured using blockchain by preventing manipulation along the supply chain with Chain of Custody (COC) ensuring digital trustworthiness. CoC is a continuous documentation of records as digital evidence travels from its original location to the courtroom. The Ethereum-based blockchain approach will help track data intruders and ensure the reliability of data provided during court proceedings. It allows the system participants to view evidence during court proceedings but does not allow manipulation of the evidence.

Keywords— Blockchain, Digital Forensics, Ethereum, Chain of Custody (CoC).

A Tri-Model Ensemble Approach for Phishing URL Detection using Explainable AI and Hyperparameter Tuning Techniques

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Abstract— Phishing attacks continue to pose significant risks in cybersecurity, requiring advanced detection mechanisms to combat evolving threats effectively. This paper presents a comprehensive approach for phishing URL detection, integrating ensemble learning, hyperparameter tuning, and Explainable AI techniques. Leveraging a dataset from Kaggle comprising 100,078 instances and 20 features, various machine learning classifiers were trained and fine-tuned using hyperparameter optimization methods. Among these models, AdaBoost, XGBoost, and Random Forest emerged as the top three performers. These three models were subsequently combined to form a tri-model ensemble, capitalizing on their complementary strengths to enhance accuracy and robustness. Integration of Explainable AI techniques, such as LIME and SHAP, enhances transparency and interpretability in the ensemble model's predictions. Results demonstrate significant performance gains, with the ensemble model achieving an accuracy of 92.8%. The interpretive analysis offers insights into prediction factors, fostering trust and informed decision-making in cybersecurity. This framework holds promise for bolstering defenses against phishing attacks and advancing cybersecurity efforts in an increasingly complex threat landscape.

Keywords— Phishing, URL, Hyperparameter Tuning, ensemble model, Machine Learning, Explainable AI, SHAP, LIME.

Exploring Advanced Techniques in Evaluating Water Quality Safety: A Comparative Analysis of Machine Learning and XAI Approaches

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Abstract— Water quality classification is vital for protecting universal health, preserving ecosystems, and supporting agriculture and industry. It ensures safe recreational activities, prevents economic repercussions, and promotes long-term sustainability. This study extensively analyzes machine learning-based water quality classification, focusing on key parameters like aluminum, ammonia, arsenic, barium, cadmium, using a diverse dataset with safety labels. The research preprocesses data, selects relevant features, and trains models, including Logistic Regression, K-Nearest Neighbors, SVM, Decision Trees, and various boosting algorithms. his study compared water safety using 11 machine learning models on a 70:30 training/test set. XGBClassifier, with hyperparameter tuning, achieved 97.18% accuracy. LIME and SHAP improved dataset interpretation for water quality classification.

Keywords— Water safety, Hyperparameter Tuning, Ensemble model, Machine Learning, Explainable AI, SHAP, LIME.

Enhancing Medical Imaging: A Holistic Exploration of Precise PCOD Segmentation and Classification using Ensemble Deep Learning Approaches

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Abstract— In this comprehensive work on PCOD classification using Ensemble Models, we consider the ultrasound images of patients diagnosed with and without PCOD. Out of the total 5167 images comprising the dataset, 2567 represent PCOD and the rest 2600 represent non-PCOD patients, to prevent class imbalance. Following the creation of the dataset is the pre-processing using 2D filters, Gaussian Blur, and Mean and Median Filters which are used to enhance the images as seen in the results section. Following this step is the implementation of segmentation algorithms whose performance is measured using IoU, and mAP. The various algorithms used to perform segmentation are EfficientNet, Hybrid CNN, Transformers, and Attention Nets. The proposed Ensemble Model which comprises Transformers and Attention Nets outperforms the individual models by providing an accuracy of 91.07% with an F1 score of 88.89% for PCOS and an accuracy of 93.46% with an F1 score of 93.09% for non-PCOD conditions. The results of this study show that the proposed ensemble technique can efficiently aid in diagnosing PCOD using ultrasound images, which may develop into creating an effective computer-based PCOD diagnosis system.

Keywords— PCOD, Transformers, Attention Nets, Segmentation, Classification.

Design and Implementation of AI Machine Vision Inspection System with Multi-Optical Images for OLED Film Manufacturing

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Abstract— Machine vision technology is one of the main areas of rapid development in the modern world and is becoming increasingly important in various industries. This innovative technology uses the fusion of computer vision and artificial intelligence to process and analyze visual information, enabling the development of automated inspection systems and the automation of processes. In particular, machine vision technology is playing an increasingly important role in OLED film production and quality control. Currently, OLED film production is mainly based on visual inspection, but this method has various problems. It is labor-intensive and relies on humans, which limits the accuracy and consistency of the inspection. It is also difficult to identify defective elements with irregular shapes or sizes. To overcome these issues and revolutionize the field of OLED film production and quality control, we propose an OLED Film Inspection Architecture with Machine vision. This architecture utilizes advanced cameras and sensors to analyze the surface of OLED films in detail and automatically identify defective elements. In addition, by integrating multiple optical systems and AI deep learning algorithms, it can perform accurate inspections under various lighting conditions and detect defects in real time. By utilizing these advanced technologies, quality control and production efficiency can be greatly improved, which is expected to drive innovation in OLED film production. This research provides a high level of technical content and provides a bright outlook for the future of machine vision technology in the industrial field.

Keywords— Machine vision, Automated Inspection System,Multi-Optical System.

Novel Framework for Malicious URL Detector using Enhanced XGBoost

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Abstract— The goal of this work is to develop a model that can accurately detect malicious URLs. The model should be able to classify raw URLs into different types such as benign (which means safe URLs), or malicious URLs (which includes phishing URLs, malware URLs, or defacement URLs). The work addresses the limitations of traditional techniques such as URL blacklisting or signature blacklisting, which offer only "after-the-fact" solutions. The model can generalize to new URLs and improve the timeliness and abstraction of malicious URL detection methods. The work involves creating a feature set representation for identifying malicious URLs and measuring the model's ability to predict the maliciousness of URLs. The dataset used for the work consists of many URLs categorized as malicious or benign. The work involves constructing the efficient XGBoost algorithm with fine tuning of the Hyper Parameters and plotting average feature importance to understand which features are important in predicting malicious URLs.

Keywords— URL, XGBoost, Frame Work.

HealthLink: A Healthcare System Leveraging IoT, Blockchain and IPFS for Enhanced Data Security

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Abstract— In today's rapidly evolving healthcare landscape, the emergence of cutting-edge technologies like IoT and wearable devices has led to significant advancements, particularly in remote patient monitoring. However, the prevalent client/server architecture used in current implementations poses considerable challenges related to security and privacy, rendering healthcare systems vulnerable to various attacks. Consequently, stringent regulatory and security measures are imperative to safeguard health data. To address these challenges and align with regulatory requirements, transitioning to a distributed architecture becomes imperative. Blockchain, renowned for its distributed nature and security capabilities, emerges as a promising technology to mitigate security risks inherent in IoT-based systems. Motivated by these considerations, this study proposes HealthLink—a secure healthcare framework seamlessly integrating IoT and Blockchain technologies. This framework is specifically tailored to facilitate remote patient monitoring, particularly for chronic diseases necessitating continuous oversight. Key considerations encompass security, scalability, and processing efficiency. Security measures entail employing re-encryption proxies in conjunction with Blockchain for hash data storage, while access control is managed through smart contracts. To enhance Blockchain scalability, an off-chain IPFS-based database is utilized for data storage. Additionally, Ethereum Blockchain-based proof of authority is leveraged to expedite data storage processes. As a practical demonstration, we apply the HealthLink system to diabetes management, presenting execution results via system interfaces. Experimental findings underscore substantial enhancements in healthcare system security compared to conventional methodologies.

Keywords— Blockchain, Ganache, Healthcare, IPFS Security, Internet of things, Remote patient monitoring.

Brain Tumor Segmentation Using 3D Unet and 3D Autoencoder Contribution

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Abstract— The rapid advancement in medical imaging techniques has generated a wealth of data that can be exploited for diagnostic and treatment planning. Automatic segmentation of brain tumors from magnetic resonance imaging scans is a critical step for precise diagnosis and monitoring. This paper presents an end-to-end pipeline for brain tumor segmentation using 3D U-Net and feature extraction using a 3D AutoEncoder. The proposed model segments tumors into different classes, including necrotic and non-enhancing tumor core, peritumoral edema, and GD-enhancing tumor. Additionally, the model predicts patient age and survival days using the Support Vector Regression algorithm on latent features generated by the Auto- Encoder. Experimental results show promising performance in terms of segmentation accuracy and predictive validity.

Keywords— Brain Tumor, Segmentation, 3D Unet , 3D Autoencoder.

Exploring Synthetic Data Generation Methods

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Abstract— Generating synthetic data has become an important technique in data science that provides solutions to many challenges such as private data, rare data, and rich information. This research explores the diversity of computing techniques, from artificial intelligence techniques such as GANs, generalized instruction tuning and variable auto-encoders (VAEs) to legal rendering, live cloning and data protection technology. A summary of each method is provided and its content, advantages, limitations, and practical applications in various fields are discussed. Through comparative analysis, this article assesses the advantages and disadvantages of the various methods and offers perspectives on their suitability for different applications. It also discusses the challenges and future directions in the development of synthetic materials and provides recommendations to researchers and professionals.

Keywords— synthetic data, AI techniques, comparative analysis.

Safeguarding EVs: A Next-Generation BMS with Integrated Fire Protection

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Abstract— The Battery Management System (BMS) project aims to develop and implement a comprehensive solution for monitoring and managing lithium-ion battery packs. The system uses an Arduino as the primary controller, as well as a variety of sensors and gadgets, to measure and regulate various battery parameters. Its primary goal is to improve both the effectiveness and the security of battery-powered vehicles (EVs) with revolutionary Internet of Things (IoT) technology. Charge monitoring and fire prevention are among the key characteristics. Real-time data collection and analysis assure optimal charging conditions, extending battery life and increasing energy efficiency. Furthermore, sophisticated fire safety systems use sensors and clever algorithms to detect anomalies or overheating during charging, allowing for the rapid deployment of fire suppressants or power cutoffs to reduce dangers. This dual approach prioritizes both performance optimization and safety, fostering a secure environment for EV charging. Seamless connectivity among EVs, charging infrastructure, and a central monitoring system, facilitated by IoT, enables data analytics, remote monitoring, and prompt emergency responses. This project seeks to advance electric mobility by integrating charge monitoring and fire protection within a unified IoT framework, safeguarding against potential hazards and prolonging EV component longevity, thus encouraging broader adoption of sustainable transportation.

Keywords— Battery Management System, Lithium Ion Battery packs, Electric Vehicles , Internet of Things (IoT) technology, Charge monitoring, Fire protection

A QoS Aware RA Algorithm for OFDM Network

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Abstract— Orthogonal Frequency Division Multiplexing (OFDM) is one of the most promising modulation techniques being widely adapted for next generation wireless systems. The process of Resource allocation (RA) is achieved by performing allocation of power over multiple subcarriers & multiple users ensuring a raise in performance by improving spectral efficiency and throughput of the network. The Quality of Service (QoS), in a network is interlinked with resource utilization. The users of wireless communication system demand for a certain level of service satisfaction. This research paper, introduces a novice resource allocation algorithm which integrates scheduling, queuing with RA to elevate QoS level. The proposed RA algorithm works on Classified QoS traffic Flows to upgrade the network performance. The Simulation & performance evaluation indicates efficacy and improvised utility of presented RA algorithm. The improved rate of throughput is achieved whilst considering QoS constraints & maintaining fairness for a certain classes of wireless network users.

Keywords— Quality of Service (QoS), Resource Allocation (RA), Scheduling, OFDM, Resource Management Controller, Network Resource usage Configuration.

Advancing Video Surveillance Security: Real-Time Threat Detection with Deep Learning

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Abstract— In today's crime-stricken world, it has become a necessity for security and surveillance systems. The current surveillance systems are flawed as they require human operators who are susceptible to making errors. Even the smallest oversight can be extremely dangerous. A solution for this issue would be a smart surveillance system that can detect threats. Current solutions are limited due to the lack of large diverse datasets for training and due to the lack of generalizability of the solutions. This paper proposes a method that uses a ConvLSTM model along with incremental learning. The ConvLSTM model ensures that the spatial and temporal information is captured from the data. The use of incremental learning demonstrates how the issue of insufficiently sized datasets for threat surveillance can be overcome by continuously updating the model with new data points by passing new data into the model.

Keywords— ConvLSTM, Incremental learning, Spatial information, Temporal information.

PCOS Detection using Machine Learning

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Abstract— Polycystic Ovary Syndrome (PCOS) is a common hormonal disorder among women of reproductive age, affecting around 5 million women worldwide. To categorize PCOS based on its characteristics, diverse machine learning methods were utilized, such as the Naïve Bayes classifier, logistic regression, K-Nearest Neighbor (KNN), Classification and Regression Trees (CART), Random Forest Classifier, and Support Vector Machine (SVM). These methodologies were executed using the Spyder Python IDE. Identifying PCOS can pose difficulties because of the wide array of symptoms and potential overlap with other gynecological conditions. Popular diagnostic methods, which include clinical evaluations, hormone screenings, and ovarian ultrasound scans, may prove time- consuming and financially burdensome for patients. To tackle these obstacles, this work is implementing a framework for the timely detection and anticipation of PCOS utilizing minimal yet promising clinical and metabolic indicators. This framework endeavors to pinpoint crucial characteristics that could serve as preliminary indicators for PCOS, enabling a more streamlined and economically viable diagnostic process. The research gathered information from 541 women during medical consultations and clinical evaluations. Out of the original dataset, 23 attributes derived from clinical and metabolic tests were scrutinized using statistical software (SPSS V 22.0) to isolate 8 promising features based on their statistical significance. Before classification, the feature set underwent transformation via Principal Component Analysis (PCA) to enhance efficiency and mitigate computatio1nal complexity. Overall, this work highlights the potential of machine learning techniques in improving the early detection and prediction of PCOS, thereby reducing the burden on patients and healthcare providers associated with traditional diagnostic methods. Additionally, it underscores the importance of identifying and utilizing optimal clinical and metabolic parameters for more accurate diagnosis and management of PCOS.

Keywords: PCOS, Machine Learning, KNN, SVM, SPSS, PCA.

Utilizing Diverse Machine Learning Methodologies for Enhanced Stock Market Forecasting

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Abstract— In 21st Century investing in Stock market has become common among people. When talking about the finances stock market trading is predominant activity. Stock market forecasting utilizing a various of machine learning methodologies represents a pivotal area of research, providing investors with valuable tools to navigate the complexities effectively of financial markets. In this abstract we offer an outline of the use of diverse models of machine learning, including linear regression, random forest, and k-nearest neighbors. in forecasting stock prices. By analyzing previous market data and relevant indicators, these algorithms aim to discern patterns and trends, facilitating the prognostication of future price movements with a degree of accuracy. Furthermore, the abstract underscores the critical role of stock market prediction in financial investment, given the inherent volatility and multifaceted aspect of the stock market. Predictive models offer investors insights into potential market trends, identify lucrative investment opportunities, and mitigate risks effectively. Additionally, accurate stock market predictions empower investors to optimize portfolio allocation, maximize profitability, and achieve their financial objectives amidst dynamic market conditions. In this paper, implementing machine learning models for stock market forecasting is emphasized for enabling investors to navigate financial markets with confidence and precision, facilitating informed decision-making and driving sustainable investment outcomes.

Keywords— stock market, k-nearest neighbors, linear regression, random forest, machine learning.

Metaheuristic (Ant Colony Optimization) Algorithm-based optimization of a Hexagon shaped patch antenna for medical purposes

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Abstract— This paper presents the design, simulation, optimization of antenna parameters, reducing the antenna dimension to (5cmx5cm), fabrication and testing of a Hexagon shaped antenna for medical applications, Ant colony optimization (ACO) Algorithm was chosen for antenna optimization. The antenna considered here was fed by a 1.59mm diameter coaxial cable, the location of feeding and the side length of Hexagon shaped antenna was varied by Ant colony optimization Algorithm (ACO). Finding a set of settings that would enhance the antenna's performance was the optimization's goal. We have made use of MATLAB software to implement ACO Algorithm. The Ansys HFSS software was used to design antenna. Ansys HFSS software allows MATLAB to be interfaced with it for optimization purpose. The parameters considered were return loss (reflection coefficient S11) and the Voltage Standing Wave Ratio (VSWR). The ACO yielded a design with return loss (S11) of -22.21dB and VSWR of 1.30 at 2.38 GHz and reduced the dimension to (5cmx5cm). The fabricated antenna was tested in Anechoic chamber using network analyzer. There was strong good agreement between the measurements from the antenna's fabrication and simulation, for the operational frequency of 2.38 GHz and good performance in return loss, and VSWR parameters.

Keywords— VSWR, Return loss, ACO Algorith.

Development and Optimization of AI-Powered Travel Companion

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Abstract— In an era marked by perpetual evolution and an insatiable desire for exploration, a groundbreaking concept set to revolutionize global travel is an AI-powered Travel Companion. At the crossroads of cutting-edge technology and wanderlust, such an innovative endeavor stands poised to redefine the very essence of travel companionship. The AI-powered Travel Companion would not just be a conventional travel app; it would represent a sophisticated yet user-friendly platform. Through the fusion of artificial intelligence and a robust tech stack, it would transcend traditional limits, offering personalized recommendations, real-time information, safety assurance, and an array of features to transform each journey into an unforgettable experience.

Keywords— AI powered, generative AI, context-aware travel, recommendations, decision making, content-based filtering, collaborative filtering, RAD, JWT authentication, cognitive computing.

An Optimized Approach of Player Selection in Cricket using Performance Analytics

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Abstract— Selecting players' is one of the most crucial tasks for a team in sports like cricket. A Player's performance depends on several factors like playing conditions, venue of matches, climate, etc. The most difficult situation that comes during the match is to find the substitute when a player is injured or ill on the field. The important factor that needs to be considered in this situation is the previous performances of the player with an opposition team in all the matches. To identify the best substitute, we have used the K-Nearest Neighbor Classifier and Random Forest Classifier model. The study concludes that K-Nearest Neighbor Classifier model suits best for decision-making and performance analysis of the players with an accuracy of 94%.

Keywords— Cricket, Player Performance, Prediction, K Nearest Neighbors (KNN) algorithm, One Day Internationals.

Multivariant Facial Age Progression Using GANs Variated by Genetic Algorithm and Generative AI

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Abstract— There is a constant issue of identifying missing persons whose only identi- fication resource present is that of their old profile or photo or sketch with very vague features, posing a challenge in identifying the person. One profile or photo or sketch would be insufficient in efficiently identifying through age progression because facial features of a person has been proven to change over time in different environments. Facial Age Progres- sion is a challenging task in the field of image-based regression where multiple factors are put into consideration, such as genetics and lifestyle changes, to accurately predict future appearance.

The work done in this paper presents a workflow to accomplish Age Progression of faces along with variations to achieve possible permutations of faces that could occur depending on external conditions. To summarize the results, it would comprise of a three-dimensional outlook. One dimension would represent time, one dimension would represent variants and the final dimension would represent the Generational Variance brought by Genetic Algorithm. From a Blackbox perspective, the input would be a source image, source age, gender, race and target age/s and the output would be multivariant age progressed faces based on the input source image. The target area of application would be in forensics rather than its commonly used purpose, Entertainment and Fun.

Keywords— Generative Adversarial Networks, Genetic Algorithm, Generative AI, Artifi- cial Intelligence, MultiTask Cascaded Convolutional Neural Network, Principal Component Analysis, Stochastic Neighbour Embeddings, Facial Age Progression.

Prioritizing Test Cases Through Federated Learning Approach

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Abstract— Test case prioritization (TCP) is an important part of software testing for max- imizing efficiency of the resources and detecting faults as early as possible. The traditional TCP methods use historical data and predefined heuristics which are not flexible enough to adapt to dynamic software environment. In this paper we suggest a new architecture with federated learning (FL) technologies to improve TCP performance. On one hand, Federated learning allows for collaborative training of models across distributed data sources without a need for central- izing sensitive data, which in turn makes it suitable for TCP in CI software environmental setup. In this paper, we propose a comprehensive framework for integrating FL into TCP by considering factors like privacy of data and model aggregation strategy into account. Furthermore, we carry our extensive evalua- tion on datasets to demonstrate the efficiency of the proposed method with real data. This study proposes that federated learning for TCP can provide a con- siderable performance boost where 84.2 percentage of the failing test cases are identified and is expected to revolutionize software testing in the future.

Keywords— Testcases, TCP, FL, CI.

Blockchain-Driven Healthcare Management: A Secure and Efficient Prescription System with OCR and QR code

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Abstract— In the sphere of medical services management that is always changing, it's common for experts to incorporate blockchain technology and other advanced cryptographic measures in the bid for a more secure system to maintain and use patient records. Such an approach offers a novel way of improving the process of booking appointments and filling prescriptions within hospitals through different types of blockchains together with various encryption algorithms such as Blowfish, AES256 or Threefish etc. The suggested system provides for secure registration, login processes as well as data management by three main parties namely patients, doctors and administrators. Privacy is one of the key points that were considered when creating this system since it has features ranging from appointment scheduling to prescription management besides safe document transfer. The prescription process has also been modified to include digital forms together with QR code technology for faster service delivery and convenience on the part of both doctors and patients. Once the prescription is uploaded, the handwritten text is accurately extracted through OCR techniques which are used to display it on the patient's device. This is not only that but also doctors input prescription details into a digital form which when submitted generates unique QR code containing all necessary medication information. To ensure patients receive the best possible care, scan a QR code on their mobile device to receive information about recommended medications and dosages. The plan includes prescription medications to prevent errors caused by illegible handwriting. Also, it makes them easier to access thus improving overall patient care.

Keywords— Healthcare management, Blockchain technology, Cryptography solutions, Decentralization, Interoperability, Data integrity, Appointment scheduling, Prescription management, QR code technology.

Wearable Hand Orthotic Device for Stroke Monitoring and Rehabilitation

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Abstract— Stroke has been recognised as a significant health problem. After a stroke, it becomes difficult for an individual to do their daily activities because of the weakness in one hand. This orthotic glove is designed to rehabilitate and monitor patients who have had a stroke attack on their hands. The typical way of therapy is having it done in a hospital or at home by a therapist, which can be expensive for some people due to financial issues. Built within this device are several sensors such as EMG sensors for continuous tracking of muscle activity and B.P sensor along with heartbeat sensor and flex sensor for constant monitoring of blood pressure levels and heart rates, respectively, during continuous movement of hand muscles. Servo motors are used in rehabilitation therapy where necessary while offering different health monitoring parameters and real-time feedback given to therapists.

Keywords— Stroke, wearable hand orthotic device, therapists, rehabilitation, monitoring.

Remote Health Monitoring for Empowering Patients with Intelligent Wearables

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Abstract— The relationship between the need for high-quality treatment and the growing expense of healthcare is explored, with remote patient monitoring (RPM) as a workable option. The report highlights the potential of remote patient monitoring to reduce costs while maintaining quality care, with a particular emphasis on patients who require continuous vital sign monitoring, such as those managing chronic diseases. A novel model is presented that aims to provide a user-friendly platform for communication. With the use of eye movement analysis powered by MediaPipe framework, this system offers people with restricted motor skills or verbal difficulties a more effective way to communicate. This initiative, which has its roots in Internet of Things technology, offers flexible and inclusive solutions for health monitoring and communication by combining physiological sensors, computer vision algorithms and IOT infrastructure. For a variety of stakeholders, including healthcare professionals, legislators, and academics looking to capitalise on the benefits of remote patient monitoring (RPM), the findings presented in this study provide priceless insights.

Keywords— Smart Wearable, Remote Patient Monitoring, Healthcare, Chronic, Physiological Sensors, Computer Vision Techniques

The Fabric of Gaming: Weaving Insights into Popular Video Games through Social Network Analysis (1980-2023)

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Abstract— Over the last forty years, the gaming business has experienced a significant change, shifting from a specialized hobby to a cultural phenomenon those appeals to people of all ages and backgrounds. This study conducts a thorough investigation of famous video games from 1980 to 2023, using social network analysis (SNA) tools to understand the complex relationships and dynamics that have influenced the gaming industry. By employing diverse SNA methods and methodologies, we explore a comprehensive dataset comprising 1,511 video games. We examine numerous parameters like release dates, development teams, ratings, genres, and player interaction metrics. Our comprehensive strategy combines network building, centrality analysis, community identification, and visualization methods to determine popular games, famous developer teams, developing genre trends, and the wider social and cultural influence of gaming. The results of this study not only illuminate the development of popular video games but also offer significant perspectives for game developers, publishers, and industry experts. Our goal is to analyze the interconnections between games, genres, platforms, and player preferences in order to provide valuable insights for strategic decision-making and enhance our understanding of the factors that contribute to the success and lasting popularity of video games throughout different generations.

Keywords— Social Network Analysis, Genre Evolution, Network Centrality, Community Detection, Data Visualization.

Memspect: Tiny Static Analysis Framework for Real-World C Codebases

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Abstract— The C programming language, with its distinctive capability for low-level memory manipulation, makes it susceptible to a wide range of memory errors, especially memory leaks. Existing static analyzers and memory debuggers are often heavy and encounter scalability issues, encouraging the need for a platform-independent native C memory debugger framework for quick testing and debugging. We introduce Memspect, a general-purpose tiny static analysis framework that incorporates Data dependence analysis specifically for C programs. Memspect leverages recent advancements in points-to-analysis and builds upon existing SOTA data flow analysis methodologies to enhance the precision and performance of static analyzers. Memspect places a strong emphasis on the accurate identification of bugs in C codebases by generating Interprocedural Control Flow Graphs (ICFGs) and Interprocedural Data Flow Graphs (IDFGs). The framework is designed to be highly customizable allowing developers to add their preferred analysis and techniques. Memspect is built to be quick, easy, efficient, and most importantly developer-friendly allowing researchers and industry professionals alike to experiment with static analysis without sacrificing accuracy and performance.

Keywords—LLVM, static analysis, data dependence, scalability, memory errors, inter-procedural analysis, pointer analysis.

Design of Open L Slotted Monopole Antenna for Bluetooth Application

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Abstract— A novel printed rectangular monopole antenna with an open L slot in the radiating patch is presented in this paper. The proposed antenna consists of an open L slot embedded in a rectangular radiating patch. For the proposed monopole antenna, the measured and simulated input return loss findings correlate fairly well. The antenna is operating satisfactorily in the frequency band of 2.4 GHz for use in Bluetooth and IoT applications.

Keywords— : Monopole antenna, L slot, Bluetooth, Return Loss, IoT.

Optimizing Traffic for Emergency Vehicles – An Improved Data Driven Approach

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Abstract— This study proposes a new approach to improve how emergency vehicles handle traffic. It combines several advanced technologies, including vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, along with satellite navigation (global positioning system). Using real-time traffic data: Communication between vehicles (V2V) and roadside infrastructure (V2I) allows the system to constantly collect information on current traffic conditions. This data is then sent to a central server for processing. It also notifies the arrival of emergency vehicles. The attached global positioning system module continuously monitors the emergency vehicle's precise location, transmitting this data to the cloud back-end via the communication module. The cloud backend employs this real-time information to intelligently calculate the most efficient route, considering variables like traffic congestion and road closures. Additionally, the system integrates with traffic signal APIs, ensuring the swift and secure navigation of intersections. By revolutionizing emergency vehicle response times, this system holds the promise of significantly enhancing patient outcomes in critical situations, marking a transformative milestone in emergency medical services.

Keywords—Ambulance traffic control, Machine Learning, Optimization, Raspberry Pi, GPS, Emergency response times, Real-time traffic data, Route optimization, Pre-emption systems.

A Machine Learning Models for Brain Tumor Detection

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Abstract— The prevalence of brain tumors and the complexity of their treatment demand advancements in early detection techniques, where machine learning (ML) plays a pivotal role. This paper provides a comprehensive survey of various ML models that have been developed and employed for the detection and classification of brain tumors, focusing primarily on magnetic resonance imaging (MRI) data. A range of ML approaches, including Convolutional Neural Networks (CNNs), Support Vector Machines (SVMs), and more recent advancements such as hybrid models combining CNNs with Recurrent Neural Networks (RNNs), are discussed in depth. The effectiveness of these models is evaluated based on their accuracy, sensitivity, specificity, and computational efficiency, crucial metrics for clinical applications. This study also explores the challenges of implementing ML models in medical settings, such as data privacy, the need for extensive data sets for training, and the computational demands of model training and inference. The paper highlights the significant potential of ML to revolutionize the field of neuro-oncology by providing tools that can predict and classify brain tumors with high precision, thereby facilitating faster and more accurate diagnosis, tailored treatment plans, and ultimately, better patient outcomes. This survey aims to guide future research and practical applications of ML in brain tumor detection.

Keywords— Machine Learning, Brain Tumor Detection, Convolutional Neural Networks, Magnetic Resonance Imaging, Hybrid Models.

Determining Adverse Effects of COVID-19 Vaccination Using Machine Learning and Deep Learning Classification and Identification

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Abstract— This research delves into a comprehensive analysis of public sentiments and adverse drug reactions (ADRs) associated with COVID-19 vaccines and hydroxychloroquine, leveraging data collected from Twitter and Google Form responses. This research work uses Machine Learning (ML) and Deep Learning (DL) models for data collecting, preprocessing, feature extraction, and evaluation. For uniformity, user names, punctuation, links, and stop words are deleted and text is changed to lowercase during preparation. N-grams-based feature extraction algorithms are then used to extract relevant Twitter messages from preprocessed data. ML methods, specifically "Tri-grams with Q-SVM," are next tested for COVISHIELD ADR prediction. Deep learning models including LSTM, Bi-LSTM, CNN, and VAE-GANs analyze COVID-19 vaccine emotions. The analysis culminates by underscoring the accuracy of "Tri-grams with Q-SVM" for ADR prediction and highlighting the efficacy of the VAE-GANs model in sentiment analysis. The abstract concludes by discussing the implications of the findings for policymakers and healthcare professionals, emphasizing the importance of accurate sentiment analysis in gauging public opinions. Additionally, it suggests future directions for enhanced vaccination campaigns and public health interventions.

Keywords— COVID-19, LSTM, Bi-LSTM, CNN, and VAE-GANs.

Predictive Mechanism for fault-detection in Electric Vehicles: A Sustainable Transport

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Abstract— The role of transport in sustainable development has been recognized globally. The anchor points for sustainable transport, in the context of infrastructure, public transport systems, good delivery networks, affordability, efficiency, and convenience of transportation, as well as improving urban air quality and health, and greenhouse gas emissions have been discussed at the global platform – Sustainable Development Summit. This has led to the promotion of Electric Vehicles as a sustainable means of transportation these days. The Indian Government has set a target of 30 percent electrification of the country's vehicles by 2030. With advancement in the technology, it's becoming important to ensure the reliability of such systems. In point of view safety of Electrical Vehicles with an average of 16 EV and hybrid fires peryear, there is a 1 in 38000 chance of fire.The reliability and protection of EV systemsare of prime importance.The comprehensive study of fault prediction has been carried out in this paper. The Simulink model of EV system is developed for data generation under different defined faults, pattern analysis and prediction the faults using machine learning algorithms is carried out. Support Vector Machine (SVM), Random Forest, One-vs-Rest (OvR), and Stochastic Gradient Descent (SGD) have been used for the prediction of fault. The result demonstrates the successful application of predictive analysis in problem detection and diagnosis, highlighting its potential to enhance the safety and effectiveness.

Keywords— Sustainable development goals, electric vehicles, predictive analysis.

Automated CI/CD Pipeline: A DevOps Approach for Deploy Containerized Applications

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Abstract— The rapid pace of software development demands efficient and reliable deployment processes. In response, the adoption of DevOps practices and automation has become increasingly vital. This paper presents an in-depth exploration of an Automated CI/CD Pipeline Implementation utilizing Jenkins, Github, Docker and AWS EC2 with a focus on deploying containerized applications on AWS EC2. The project aims to streamline the software delivery lifecycle by automating the continuous integration and continuous deployment processes. Through the integration of cloud computing resources, containerization, and automation tools, this approach facilitates faster development cycles, reduced manual intervention, and improved collaboration among development teams. The paper outlines the methodology, implementation steps, and results of the CI/CD pipeline, demonstrating its effectiveness in enhancing deployment efficiency and reliability. Overall, this research offers insights into leveraging DevOps principles and modern technologies to achieve seamless application deployment in agile development environments. The adoption of CI/CD pipelines has surged in recent years, with a significant percentage of organizations leveraging these practices to drive their software delivery processes forward.

Keywords— Deployment, DevOps, Continous Integration, Continuous development.

Judicial Insight Navigator - A Document Management System for Indian Law Firms using Contextual search

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Abstract— Judicial Insight Navigator is a Machine Learning driven document management system designed for Indian Law Firms. It utilizes a query-based system to help lawyers to search for the judgment documents based on contextual requirements related to similar cases. Pattern Matching, Natural Language Processing (NLP) and Optical Character Recognition (OCR) technologies are used to extract text from clusters of legal personal documents of Lawyer(s). This research paper Contextually gives the File Locations which helps in searching related files for the case and it is used to enhance the capabilities in Legal Analytics.

Keywords— Natural Language Processing, Optical Character Recognition, Court judgments, Synonyms, Contextual Search, Machine Learning.

Implementation of Reinforcement Learning - Optimized Communication Protocols for Vanets: Challenges and Solutions

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Abstract— Implementing Reinforcement Learning (RL)-optimized conversation protocols for Vehicular hoc networks (VANETs) gives specific challenges and opportunities within intelligent transportation structures. This work explores the sensible components of deploying RL algorithms to enhance conversation protocols in VANETs that specialize in actual international implementation demanding situations and strategies for overcoming them. Specifically, the paper discuss about the selection of RL algorithms along with Q-Learning knowledge of Deep Q-Networks (DQN), the representation and motion areas, and the reward shape of VANET environments. Furthermore, the work explores strategies for addressing realistic demanding situations, restrained computational assets, electricity constraints, and the need for actual-time variation in highly dynamic vehicular environments. Through case research and practical examples, the work spotlights successful implementations of RL-optimized conversation protocols in VANETs, demonstrating their effectiveness in improving community performance, reliability, and performance. Overall, this work aims to offer precious insights into the implementation of RL-driven strategies for optimizing communication protocols in VANETs, closer to powerful deployment techniques and innovative solutions for sensible transportation structures.

Keywords— VANET, reinforcement Learning, Q-Learning, Deep Q-Networks, reliability, performance.

MAC Design and Performance Improvement using 64-Bit VMultiplier Based on UTS

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Abstract— The proposed model focuses on the design and performance enhancement of a 64-bit VMultiplier by utilizing the UTS, one of the 16 ancient sutras of VM. A modified architecture is proposed to achieve improved performance compared to a recent journal on 32-bit VMultiplier. Additionally, a 64-bit VMultiplier is designed according to the reference journal. The proposed 64-bit VMultiplier comprises three stages: the first stage consists of four 32-bit VMultipliers, the second stage incorporates a 96-bit CSA and a 95-bit modified CSKA, and internal stages include 8-bit and 16-bit Sklansky adders.

Keywords— Vedic Mathematics (VM), 64-bit Vedic multiplier (VMultiplier), Urdhva Tiryagbhyam sutra (UTS).

Enhanced Chlorophyll-a Assessment in River Water via Deep Learning Approaches with Remote Sensing Data

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Abstract— River water's concentration of chlorophyll-a is a crucial sign of the productivity and health of aquatic ecosystems. There are restrictions on the amount of space and time that can be covered by using labor-intensive field sampling and laboratory analysis in traditional methods of determining chlorophyll-a levels. In this work, we suggest a novel method to improve the evaluation of chlorophyll-a in river water by combining deep learning techniques with data from remote sensing. Our approach entails the collection of multispectral satellite imagery and the creation of artificial neural network (ANN) models that are informed by ground truth measurements of chlorophyll-a [1][3]. By conducting extensive experiments on datasets collected from different river systems, we show the effectiveness of our approach. According to the results, when compared to traditional methods, our deep learning models predict chlorophyll-a concentrations with superior accuracy. Moreover, spatially extensive and temporally frequent monitoring are made possible by the use of remote sensing data, which makes it easier to identify changes in chlorophyll-a levels quickly [1][2]. Our research demonstrates how deep learning and remote sensing technologies have the potential to completely transform aquatic ecosystem monitoring and management, opening the door to more successful conservation tactics and sustainable resource use.

Keywords— Chlorophyll-a, Artificial Neural Network (ANN).

Low Light Image Enhancement using MIRNet for Gesture Recognition

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Abstract— In today's digital era, the importance of human-computer interaction (HCI) is growing for various applications such as entertainment and medicine. Natural and more comprehensible interfaces such as voice commands, gestures, and touchscreens, which are more easier to understand, have fully replaced traditional methods of input such as keyboards and mouse. This paper outlines a thorough method for detecting gestures in low-light conditions using advanced image processing and deep learning models. The proposed approach includes deep learning algorithms to enhance image quality, segment the hand gestures, extract features, and accurately classify hand gestures in challenging low-light conditions. Input images are enhanced with the MIRNet model, which effectively retrieves information and increases visibility in low-light conditions. BASNet is used for segmentation of the image. Using MobileNet algorithm gesture classification is made possible by extracting feature from segmented images. These components operate together in a cohesive structure to provide strong performance in all kinds of situations. An experimental tests have shown that the suggested method could effectively identify hand gestures during a low-light environment. The functionality of the system in dynamic circumstances is illustrated via the inclusion of media player control using a JavaScript user defined functions and Flask micro web framework in Python, demonstrating its real-world application. The overall goal of this project is to provide a complete solution for low-light gesture identification by using cutting-edge approaches.

Keywords— Gesture recognition, Human-computer interaction (HCI), Low-light conditions, Image processing, Deep learning, Computer vision, Hand gesture segmentation, Feature extraction, Image enhancement.

An Application for Translating Media- Bridging the Gap with Sign Language

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Abstract— The app is designed to provide users with sign language to communicate in a similar way by integrating deep learning models learned from large databases of hand gestures and faces. This application uses digital technology to translate spoken, written and visual content into different formats. Versatility in formats from live broadcasts to recorded videos to text content such as articles and headlines. Instant translation allows bilingual users to access content at the same time as hearing users, eliminating latency and increasing engagement in a variety of environments, including educational environments, the office, and meetings. and easy access with customizable settings to suit different descriptions and preferences. The application aims to facilitate communication between hearing and deaf people, explaining communication and cultural issues, promoting understanding, understanding and international cooperation. Deep learning models, real-time translation, container, learning environment, sign language, deaf people, web applications, voice to sign language, ISL. The application uses advanced technology and deep learning models to translate spoken, written and visual content into native language, supporting social media-to-social media text formats. It provides rapid translation for bilinguals, eliminating delays and increasing engagement in education, the workplace, and social media. Customizable environments foster individuality, facilitate communication between hearing and deaf people, and promote understanding and cooperation worldwide.

Keywords— sign language, deaf people, web applications, voice to sign language, ISL.

Comparative Study of Supervised Machine Learning Techniques for Kannada Text to Braille Conversion

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Abstract— In today's digital world, information predominantly exists in digital or virtual formats, offering benefits to diverse users. However, individuals with visual impairments encounter challenges accessing digital data from technological devices due to their limitations. This study proposes machine learning algorithms including SVM, KNN and Logistic Regression (LR), to facilitate the conversion of Kannada text to Braille, thereby enhancing accessibility for the visually impaired community. The proposed methodology entails a systematic approach involving tokenization, stemming, feature extraction, model training and testing, culminating in empirical assessments and comparative analyses. Through this research, a comprehensive evaluation of various algorithms is conducted to gauge their effectiveness in improving Braille accessibility for individuals with visual impairments.

Keywords— Machine Learning, K-Nearest Neighbour(KNN), Support Vector Machine (SVM), Logistic Regression (LR), Braille Script.

Realization of Carry Look Ahead Adder using Reversible Gates

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Abstract— This Verilog design implements reversible adders, essential for reversible computing paradigms like quantum computing. The design comprises two main modules: RevAdder and RevAdd16. RevAdder is a 4-bit reversible adder utilizing Peres and Fredkin gates to compute the sum and carry-out. RevAdd16 extends this functionality to 16-bit addition by instantiating four RevAdder modules and managing carry signals between them. The design emphasizes reversibility, enabling computations to be undone perfectly, and demonstrates the use of generative techniques for efficient modular design. Overall, these modules provide foundational components for reversible computing architectures, offering potential benefits in energy efficiency and computation reversibility, by implementing the method as discussed in this paper it showed a significant improvement of 63.8% of quantum cost, 40% of garbage output and 62.3% delay over existing method.

Keywords— Carry look ahead adder, Reversible gates.

Design and Implementation of Application Specific UTMI with SIE

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Abstract— Wired communication has been widely used for decades and remains prevalent in various applications due to its reliability, security and consistent performance. The USB protocol is a commonly utilized standard for wired communication. It facilitates the connection of a va- riety of peripheral devices to computers and other similar devices. The focus of this work is to develop a USB 2.0 Transceiver module that comprises two main components - the USB 2.0 Transceiver Macrocell Interface (UTMI) and the Serial Interface Engine (SIE), which will en- able communication between two devices to do isochronous transfer. The UTMI block is a crucial component responsible for performing low-level protocol functions such as serialization of parallel data and viceversa, bit stuffing, bit unstuffing, NRZI encoding and decoding. The transmit and receive state machines in UTMI control the transmission and re- ception operations, respectively. The SIE block generates control signals and packets, which are essential for successful communication between the two devices. The protocol operates in High Speed (HS) mode with a data rate of 480 Mbps. This high-speed mode enables the isochronous transmission of data such as speech and images between devices. The implementation uses the Basys 3 FPGA board from Xilinx.

Keywords— Universal serial bus (USB), serial interface engine (SIE), USB 2.0 Transceiver Macrocell Interface (UTMI), field-programmable gate array (FPGA).

Python Source Code Analysis for Bug Detection using Transformers

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Abstract— Effective bug detection is vital in software development, as the identification and localization of defects are crucial for creating robust applications. In Python-based programs, the traditional bug detection process depends on a Python interpreter, leading to workflow interruptions because of sequential error detection. As Python's popularity increases, so does the demand for more efficient bug detection tools.
The proposed method focuses on error detection within Python code. Leveraging advanced transformer models, we aim to enhance the accuracy and efficiency of identifying errors, such as syntax errors, logical errors, and runtime errors, within Python programs. By employing transformer-based techniques, we seek to overcome the limitations of conventional error detection methods and provide developers with a robust tool for ensuring the reliability and stability of their Python applications.

Keywords— Python, Bug detection, Transformers.

Reduced set of HOG Features through Feature Selection Methodfor Efficient Offline Signature Verification

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Abstract— Offline signature verification (SigVer) is regarded as one of the most challenging tasks in all biometrics. In the case of signature biometrics, the skilled forgeries are created with a high level of precision and expertise. Hence, extracting intricate features from signature images plays a significant role in discriminating between genuine and forgery images. This study aims to explore the possibility of bringing out the importance of feature reduction and feature selection mechanisms for efficient offline SigVer. The Histogram of Oriented Gradients (HOG) and Mutual Information (MI) feature selection criteria are considered for the experimentation purpose. Firstly, HOG features are obtained from the signature images, and reduction in dimensionality is accomplished through the use of MI, an effective filter-based feature selection technique. Finally, the authenticity of the test signature is decided using the SVM classifier. The proposed model is simple but effective in terms of reducing computation complexity. Extensive experimentation was conducted on the CEDAR dataset and achieved an accuracy of 97%, which outperforms the state-of-the-art result. The results obtained indicate the effectiveness and efficacy of the proposed model.

Keywords— Signature Verification, HOG, MI, SVM, CEDAR.

Multiple Regression to Calculate Indian Premier League Player Auction Price using Player Performance Attributes

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Abstract— In the Indian Premier League (IPL), a player auction process determines a player's auction price. Before the start of each IPL season, teams bid on the players they want to buy. Past performance, current form, experience, and reputation can all have an impact on bidding for certain players. To find auction price of player different systems like performance analysis, scouting, auction strategy, etc. are used. These techniques have few detriments like limited information, subjectivity, time-consuming. Due to this, the auction price can result in overvaluing or undervaluing certain players. To overcome these limitations, we have proposed model that uses multiple regression, as it allows for the analysis of many elements that may have an impact on performance and worth of players.

In this task, we are using different cricketing attributes like rank, run above average (RAA), Wins, Eigen-factor score (EFscore) and Value in the proposed model to approximate the auction price of players. We design two models: the Value-Rank-Wins (VRW) and the Value-Rank-RAA-Wins-EFScore (VRRWE) model. These models are aligned to calculate the player's auction price based on their past performances in the IPL and check whether the auction price assigned to the player is more or less. The data-set used for training and testing of model contains information of 659 players who played in at least one season of the IPL from 2008 to 2022.

Keywords— Indian Premier League (IPL), T20, Auction price, Multiple Regression, Player Attributes, Model.

Chatbots in Telecommunications: Enhancing Customer Engagement with Deep Learning Models

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Abstract— This project focuses on the development of a Natural Language Processing (NLP) and Deep Learning-based chatbot tailored for telecom customer care, aiming to address the escalating demand for efficient customer service solutions within the telecommunications industry. Traditional customer care systems often struggle to address the diverse array of queries and issues encountered by telecom customers in a timely and personalized manner. To overcome these challenges, our chatbot employs advanced NLP techniques and Deep Learning models to comprehend and respond to natural language queries from customers. The project encompasses various pivotal phases, including dataset acquisition, text data preprocessing, vectorization, model training with hyperparameter optimization, and integration into a frontend-backend architecture utilizing HTML, CSS, and Flask. The significance of this endeavor lies in its potential to revolutionize the telecom customer care landscape by offering an automated, scalable, and responsive solution. Through the deployment of our chatbot, telecom companies can streamline their customer service operations, mitigate costs, and enhance overall customer satisfaction. The abstract encapsulates the essence of our initiative to bridge the gap between customer expectations and service provider capabilities in the telecommunications sector.

Keywords— Deep Learning, Natural Language Processing (NLP), Long-Short Term Memory (LSTM), Recurrent Neural Network (RNN), Convolutional Neural Network (CNN), Text-to-Speech (TTS).

Recognition of Sign Language using E-CNN

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Abstract— Although speech is still the most widely used mode of communication, some persons have difficulties with hearing or speaking. For the kinds of limitations, communication poses a serious challenge. Using deep learning techniques can aid in breaking down obstacles to communication. Here deep learning-based approach that can identify words from gestures is proposed. CNN, LSTM and GRU (feedback-based learning models) Three distinct types of deep learning concepts are utilised to identify signs in Indian Sign Language (ISL) separating video frames. With own dataset, IISL2020, we tested four various hybrids of CNN, GRU and LSTM. With one LSTM layer and then GRU, CNN which stands the suggested approach achieves around 97% accuracy.

Keywords— Indian sign language, deep learning, CNN, LSTM, GRU.

QSAR Model for Aquatic Toxicity Estimates using Machine Learning

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Abstract— Determining the aquatic toxicity of organic compounds is still a crucial requirement for environmental management and regulatory compliance. QSAR models are a suitable alternative for use in predictive toxicology since they can assist address the problem of high prices and time spent on experimental assays, which will ultimately lead to a reduction in the cost of resources. This work's primary objective is to assess and forecast acute aquatic toxicity using QSAR modeling methodologies. This gives decision-makers in chemical management and risk assessment a starting point. The accuracy of forecasting is astounding thanks to a thorough data fusion and model optimization, and it can be a useful tool for determining the levels of toxicity on the abundance of organic compounds. Because computational methods are based on the fundamental principles governing the intermolecular interactions of chemical structures with aquatic species, they not only expedite the assessment process but also enhance our understanding of the fundamentals of structure-toxicity relationships.

Keywords— QSAR modeling, Acute aquatic toxicity, Predictive toxicology, Environmental risk assessment and Computational methods.

Secure File Transfer Management: Leveraging Special Group ID for User-to-User Communication in Linux

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Abstract— This paper presents the design, implementation, and evaluation of a secure file transfer management system built on the Linux platform. The system utilizes special group IDs to facilitate seamless communication between users while ensuring robust security measures. File manager is an API developed in Python, enabling efficient and reliable transfer of files from one user to another. The paper discusses the system's architecture, highlighting the integration of special group IDs for user authentication and access control. Key aspects of the development process include emphasizing the challenges and solutions encountered in leveraging Linux-specific features. Security considerations, including access control mechanisms, are thoroughly examined to ensure the confidentiality and integrity of transferred files. Overall, this paper provides valuable insights into implementing a secure and efficient file transfer management system on Linux, offering practical guidance for developers and administrators seeking to enhance user-to-user communication in their environments using GUI.

Keywords— Red Hat Linux, Ubuntu, Python, PyQt5, GUI, Secure File Transfer.

To Classify Normal and Abnormal events using Siamese Network and to track the abnormal events using e-TLD Algorithm

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Abstract— VRecent advancements in object detection and tracking systems have revolutionized industries like surveillance and autonomous vehicles. These systems are vital for real time object identification and monitoring, aiding tasks from security to inventory management. However, current systems face challenges in accurately handling dynamic environments due to issues like noise reduction and adaptability to changing scenarios, affecting their performance and efficiency. To address these challenges, proposed methodology integrates techniques such Adaptive Guided Multilayer Side Window Box Filter (AGMSWBF) for noise reduction and enhancing visual quality, along with segmentation methods like Hesitant Fuzzy Threshold Linguistic Bi-Objective Clustering (HFTL-BiOC). Furthermore, proposed approach incorporates a Siamese Network based Incremental Spatio-Temporal Learner (SN-ISTL) with coronavirus mask protection optimization for improved object classification. Additionally, utilized the enhanced tracking learning detection for fine tuning neural network performance. The proposed framework demonstrates exceptional performance with high accuracy, precision, and low false acceptance and rejection rates of 99.26%, 96.59%, 0.0912%, and 0.0987%, respectively. By integrating these methods, proposed approach aims to enhance OD and tracking accuracy, adaptability to changing environments, and efficiency in processing spatio-temporal data streams, thereby overcoming the limitations of existing methodologies.

Keywords— Side window filter, Bi-objective clustering, Siamese network, coronavirus mask protection optimization, tracking learning detection.

Comparative Analysis of Deep Learning based Approaches for Event Detection in Videos

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Abstract— — Detecting events automatically in videos is gaining popularity in the field of surveillance health care, security. In surveillance, intelligent systems are used to detect suspicious activities or individuals to track people in large crowds or public spaces. In healthcare, it is used for early detection of disease and monitoring elderly people's tendency to fall. Human action recognition (HAR) is a rapidly growing area that focuses on recognizing and interpreting human actions from video data. However it is challenging to detect complex events due to intra class and interclass variations. The use of deep learning for HAR has resulted in significant improvements in accuracy and efficiency. The paper presents a short summary of the various works reported using deep learning techniques in action recognition and to investigate the performance of cross entropy loss function using CONVLSTM for HAR analysis with increasing class categories.UCF101 data set is considered for experimental investigation.

Keywords— Event Detection, Intelligent Systems Surveillance, Health Care, Human action recognition, Computer Vision, Deep Learning, CONVLSTM.

Enhanced Phishing URL Classification Based on Machine Learning with Keyword Specific Web Crawler

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Abstract— In recent years websites are collecting information from users for many purposes. But users are not ensuring that the collected information is used only for the anticipated purpose. Securing the information from unauthorized users and minimizing the risk of misusing the sensitive information is one way to ensure the security of data. Phishing is the common way to deceive the sensitive information like bank credentials or personal information from users and utilize the deceived information for malicious activities. This causes many hazardous effects on individuals as well as organizations. Securing the information from the phishers requires technological efforts and valuable for global cause. The proposed work mainly focuses on collecting the website URL through web crawler and validates the authenticity of the URL by calculating similarity score. Also, the proposed work employs on chi-square feature selection method for minimizing the number of features for classification purpose, which results in better response time with 0.12 seconds. Different classifiers are tested for evaluating proposed method. As per simulation and performance analysis, random forest classifier outperforms other conventional methods by achieving accuracy of 95.36% without similarity score index and enhanced accuracy of 96.07% after including similarity score index. Additionally, detection time is computed to analyze the time complexity.

Keywords— URL Phishing, Web crawler, Phishing classification, Machine learning, chi-square method.

Machine Learning for Gender Inclusivity: Empowering Women in India's IT Landscape

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Abstract— In India's rapidly growing IT sector, gender inclusivity continues to remain a critical hurdle, despite significant technological advancements and economic growth. In alignment with the Sustainable Development Goals (SDGs), particularly SDG 5, which emphasizes on gender equality and women's empowerment, this study focuses on exploring the status of women in India's IT industry. With only 27% of the workforce comprising women and a notable absence in leadership roles, gender diversity poses a barrier to achieving sustainable development and innovation. This paper identifies the determinants contributing to gender disparities within the IT sector, examining challenges faced by women professionals, and identifying opportunities for their career prospects. Leveraging machine learning (ML) techniques, the study empirically assesses hidden biases in hiring, promotion, and compensation practices, shedding light on systemic disparities that perpetuate gender gaps. By identifying these biases, the study aims to pave the way for evidence-based interventions that promote equitable opportunities and foster a supportive environment for women empowerment. Key findings underscore the motivations driving women towards IT careers, including enhanced job prospects, competitive salaries, and exposure to cutting-edge technologies. However, persistent challenges such as workplace biases, inadequate career development opportunities, and societal pressures hinder their professional growth and job satisfaction. The study employs logistic regression and support vector machines to analyze data, achieving a predictive accuracy of approximately 77%. Insights from ML models inform policy recommendations aimed at fostering gender inclusivity. Recommendations include implementing unbiased recruitment practices, enhancing workplace diversity through supportive policies (e.g., flexible work arrangements, on-site childcare), and fostering a culture of inclusivity and respect. By addressing these challenges and implementing evidence-based policies, India's IT sector can unlock the full potential of its female workforce, driving innovation and sustainable growth. The findings contribute to a broader understanding of gender inclusivity in technology-driven industries, highlighting the transformative role of ML in promoting equitable opportunities and economic empowerment for women in India.

Keywords— Gender Inclusivity, Machine Learning Models, Sustainable Development Goals, IT Sector, Women Empowerment.

Wireless Technology-Based Charging System for Electric Vehicles

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Abstract— To combat ongoing pollution, Electric Vehicles offer a superior solution. Thus, it is crucial to refine the battery charging process for enhanced dependability. Electric vehicle batteries can be recharged using either plug-in stations or wireless power transfer. Two types of wireless transmission of power are static and dynamic charging configurations. Transformer coils carry electricity from a source to the rechargeable batteries in inductive power transmission. Dynamic charging stations can be strategically positioned along planned routes to facilitate battery charging. This strategic deployment not only encourages greater electric vehicle usage but also enhances their efficiency and reliability for longer journeys. Using wireless power transfer (WPT) devices can solve all of the charging issues that electric vehicles face. But the performance of the WPT systems installed in electric cars today is hampered by serious air gap problems between the transmitter and receiver coils.

Keywords— Electric Vehicle, Dynamic Charging, WPT, Inductive Power.

Digital Patient Records Management System using Blockchain

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Abstract— - This paper presents a hybrid on-off chain blockchain architecture tailored for enhancing the security and efficiency of Electronic Health Records (EHR). By combining on-chain immutability with off-chain scalability, the proposed approach ensures data integrity and confidentiality while optimizing performance. Key components include a permissioned blockchain network, and smart contracts for access control. Challenges such as interoperability and regulatory compliance are addressed, alongside a security analysis. This hybrid blockchain solution offers a promising pathway for secure EHR management in healthcare systems.

Keywords— Blockchain, Digital Patient records, EMRs, Data Security, Decentralization, Smart Contracts, Real-time Monitoring, off-chaining.

An Evaluation framework for Voice commands to Control the Micro Air Vehicle

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Abstract— As micro air vehicles (MAVs) become increasingly integrated into various applications, the need for intuitive control mechanisms becomes paramount. Voice commands present a promising interface, offering hands-free and natural interaction with MAVs. However, ensuring the accuracy and reliability of voice command systems is critical for safe and effective operations. The paper presents an evaluation framework designed to assess the performance of voice command systems in controlling MAVs. The framework incorporates advanced techniques, including Automatic Speech Recognition (ASR) and Natural Language Processing (NLP), to interpret spoken commands and provide contextual understanding. Additionally, a command validity assessment framework is developed to enhance safety by evaluating the reliability of recognized commands. The integration of confidence scores from ASR and semantic analysis along with contextual clue from NLP further improves the robustness of the system. The effectiveness of the proposed framework is demonstrated through experimental evaluation, highlighting improvements in accuracy, reliability, and adaptability. The paper contributes to the development of more effective and reliable voice command systems for controlling MAVs, paving the way for their seamless integration into various applications.

Keywords— Assessment Scheme, Micro Air Vehicle (MAV), Mission Planner, Natural Language Processing, Voice Command Recognition, Vosk.

Touchless Tech Assistant A Gesture Controlled Virtual Mouse and Voice Assistant

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Abstract— Interacting with a computer can be made easy through voice commands and hand gestures with the Gesture Controlled Virtual Mouse. Direct physical interaction with the computer is not really necessary. Combining vocal instructions with hand movements that are both static and dynamic could enable digital management of all input and output procedures. Modern Machine Learning (ML) and Computer Vision (CV) techniques are used in this study to identify spoken commands and hand gestures without the requirement for further hardware. It utilizes MediaPipe, which is predicated on pybind11, to employ CNN-like models. It consists of two modules: one uses MediaPipe Hand detection to operate directly on hands, and the other person wears gloves of any colour.

Keywords— Computer Vision, Human Computer Interaction, Voice Recognition, Gesture Recognition.

Lecture Notes in Electrical Engineering

L. M. Patnaik · G. T. Raju · G. K. Ravikumar · N. H. Prasad *Editors*

Emerging Research in Computing, Information, Communication and Applications

Abstract Book of ERCICA 2024

This book presents the proceedings of the International Conference on Emerging Research in Computing, Information, Communication and Applications (ERCICA) 2024. The conference provides an interdisciplinary forum for researchers, professional engineers and scientists, educators and technologists to discuss, debate and promote research and technology in the upcoming areas of computing, information, communication and their applications. Some of the topics include the Internet of Things (IoT), wireless communications, image and video processing, parallel and distributed computing, and smart grid applications, among others. The book discusses these emerging research areas, providing a valuable resource for researchers and practicing engineers alike.

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