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Proceedings of Intelligent Computing and Communication Technology (ICCT '26)

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JAYARAJ ANNAPACKIAM C.S.I. COLLEGE OF ENGINEERING
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FIFTH INTERNATIONAL CONFERENCE ON INTELLIGENT COMPUTING AND COMMUNICATION TECHNOLOGY

ICCT26

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ON

24th March 2026

BY

DEPARTMENT OF CSE

in association with

CSI Students' Chapter

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HYBRID CNN-TRANSFORMER FRAMEWORK FOR ECG BASED CARDIAC ABNORMALITY DETECTION

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Paper ID: ICCT26001

ABSTRACT

This project presents a deep learning-based model for heart disease prediction using ECG image classification. The dataset is organized into six heartbeat types: N (normal beats), S (supraventricular beats), V (ventricular beats), Q (fusion beats), M (miscellaneous beats), and F(fusion of ventricular and normal beats). These categories cover a broad spectrum of cardiac activity, enabling the model to differentiate between normal and abnormal heart rhythms. The ECG images undergo preprocessing including resizing and normalization, followed by augmentation techniques like shear, zoom, and horizontal flipping to increase model generalization. A hybrid deep learning model combining Convolutional Neural Networks (CNN) with Transformer layers is proposed for feature extraction and classification. The CNN architecture extracts spatial features from the ECG images, while the Transformer layers capture long-range dependencies, improving classification accuracy. The model is evaluated using various metrics such as accuracy, weighted F1-score, and confusion matrices to assess performance across all heartbeat types. Experimental results demonstrate that the model effectively classifies ECG images into the six heartbeat categories, with robust performance on both training and testing datasets. The study highlights the importance of careful dataset management, preprocessing, and the integration of advanced deep learning architectures in AI- driven healthcare applications. Future work will focus on dataset expansion, transfer learning, and real-time clinical deployment to support easy detection of heart disease.

Keywords

Classification, Augmentation, Spatial feature extraction, Convolutional Neural Network.

MULTI-MODAL ENHANCEMENT USING ECG AND ECHO FOR HEART DISEASE PREDICTION

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Paper ID: ICCT26002

ABSTRACT

Cardiovascular diseases (CVDs) cause about 17.9 million deaths annually, yet most AI tools still operate on a single modality. This paper presents CardioAI, a deployable multimodal system that integrates (i) structured CVD risk prediction, (ii) ECG image classification, and (iii) echocardiogram image classification in one desktop workflow. The tabular branch combines LeNet and GRU base models with ensemble/meta- learning (EnsCVDD, BlCVDD); the ECG branch uses a multi- stream ProposedCNN with feature fusion via a 1 × 1 bottleneck; and the echo branch supports VGG16, EfficientNetB3, and a domain-adapted proposed model. The deployed application provides asynchronous loading, real-time inference, confidence visualization, ROC plots, and SHAP-based explanations. On em- bedded evaluation metrics, BlCVDD achieves 92.87% accuracy and 97.53% AUC for tabular CVD prediction, while Efficient- NetB3/proposed echo models achieve 88.1% accuracy versus 77.4% for VGG16. The results show that a practical, explainable multimodal framework can improve cardiac screening support while preserving deployment readiness.

Keywords

Cardiovascular disease prediction, ECG image classification, echocardiogram analysis, multimodal deep learning, ensemble learning, meta-learning, Proposed CNN, Efficient- NetB3, VGG16, explainable AI, SHAP, clinical decision support system, deployable health application.

DEEP LEARNING FRAMEWORK FOR DENTAL DISEASE IDENTIFICATION IN X-RAY IMAGES

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Paper ID: ICCT26003

ABSTRACT

This Dental X-ray images play a crucial role in diagnosing oral diseases. This study proposes a deep learning–based approach for the simultaneous detection of periodontitis and dental caries from dental X-ray images. Initially, individual teeth are detected and cropped from periodical X-ray images using the object detection model YOLOv7. The cropped images are then enhanced using Contrast-Limited Adaptive Histogram Equalization to improve local contrast and Bilateral Filtering to reduce noise while maintaining edge details. For disease classification, a deep learning architecture based on EfficientNet-B0 with fully connected layers is used to identify the presence of periodontitis and dental caries simultaneously. The proposed method demonstrates effective performance in detecting both diseases and provides a reliable tool to support dentists in accurate and efficient dental diagnosis.

Keywords

Periodontitis, Dental caries, Dental X-ray, Deep learning, YOLOv7, Convolutional Neural Network.

NON INVASIVE BLOOD GLUCOSE MONITORING

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Paper ID: ICCT26004

ABSTRACT

Monitoring of blood glucose levels is a significant part of diabetes management. However, traditional blood glucose monitoring techniques involve invasive methods, which may cause discomfort. In this study, a non-invasive blood glucose monitoring method is proposed, in which near-infrared photoplethysmography signals are collected using a MAX30102 sensor. The collected signals are processed using a variational mode decomposition method, in which useful physiological signals are extracted. The energy of the dominant mode is extracted as a feature vector. The extracted feature vector is fed into a convolutional neural network-long short-term memory model for blood glucose estimation. The hardware part of the proposed model is implemented using an ESP32 microcontroller, in which an OLED display is used for real-time monitoring. The proposed model is simple in terms of hardware as well as computation, yet it is effective in blood glucose estimation.

Keywords

Noninvasive glucose monitoring, photoplethysmography, MAX30102 sensor, variational mode decomposition, deep learning.

BHARAT SURAKSHA – SMART SAFETY PLATFORM

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Paper ID: ICCT26005

ABSTRACT

Public safety emergencies, particularly crimes against women and children, demand immediate physical intervention. However, existing emergency response systems suffer from severe alert delays, centralized bottlenecks, and a heavy reliance on continuous internet connectivity. This paper proposes Bharat Suraksha, an advanced, decentralized emergency response platform designed for hyper-local community intervention. The system utilizes Firebase and Telegram for zero-cost secure authentication. To instantly identify nearby responders without overloading the server, the architecture implements Geohash Level 7 spatial indexing combined with a 9-cell recursive search to eliminate the geographical "Border Problem." The Haversine formula is subsequently applied to filter these results to a strict 100-meter radius. Furthermore, to combat cellular dead zones, the platform integrates Google Nearby Connections to establish a peer-to-peer Mesh Network, enabling offline distress broadcasting. This approach ensures rapid, hyper-local intervention, aligning with the Smart India vision for a digitally secure society.

Keywords

Geohashing, Haversine Formula, Mesh Networking, Spatial Indexing, Women Safety, Smart India.

FINANCIAL ASSISTANT USING ARTIFICIAL INTELLIGENCE

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Paper ID: ICCT26006

ABSTRACT

Managing personal finances is an everyday challenge that many people struggle with, often because existing tools are too rigid or time-consuming to use consistently. This project presents an AI-powered personal financial chatbot that lets users track their expenses simply by having a natural conversation. Instead of filling out forms or navigating complex menus, a user can just type something like “Purchased vegetables and essentials worth 200 rupees today” and the system handles the rest — extracting the amount, category, and date, then storing it neatly in a MySQL database through a FastAPI backend. The chatbot is built around a Large Language Model (LLM) for natural language understanding and LangChain for intelligently routing user requests to the right tools. During the research phase, different conversational AI architectures, LLM-based information extraction techniques, and agent-tool frameworks were studied and compared across financial use cases. Experimental results confirm that a tool-based agent approach delivers noticeably better intent recognition accuracy than a standalone language model. The final system is clean, modular, and easily extendable, making personal financial management feel less like a chore and more like a natural conversation.

QR-BASED UNIFIED SERVICE AND MANAGEMENT SYSTEM FOR RESTAURANTS

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Paper ID: ICCT26007

ABSTRACT

Restaurants often face operational challenges such as delayed order processing, communication gaps between customers and staff, billing errors, and inefficient service management. Traditional restaurant systems rely heavily on manual processes such as printed menus, handwritten orders, and verbal communication with waiters, which can lead to delays and mistakes.

This paper proposes a QR-Based Unified Service and Management System for Restaurants, a smart digital platform that improves restaurant service efficiency using QR code technology and real-time communication systems. Customers can scan a QR code placed on the table using their smartphones to access a digital menu, place food orders, request services, and make payments.

The system automatically sends orders to the kitchen dashboard, allowing chefs to track and manage food preparation in real time. The platform also provides a management dashboard for restaurant administrators to manage menu items, monitor orders, track sales analytics, and manage staff operations.

By automating restaurant workflows and providing real-time updates, the system improves service speed, reduces order errors, enhances customer experience, and increases operational efficiency.

Keywords

QR Code System, Smart Restaurant System, Digital Menu, Order Management System, Real-Time Kitchen Dashboard, Restaurant Automation

BUILDCRAFT: AN INTELLIGENT MODULAR DIGITAL ARCHITECTURE SIMULATION PLATFORM USING UNREAL ENGINE

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Paper ID: ICCT26008

ABSTRACT

The continuous evolution of intelligent computing systems, real-time rendering pipelines, and interactive simulation environments has significantly transformed the domain of digital architectural visualization. Modern design workflows increasingly require platforms that enable rapid structural experimentation, immersive spatial exploration, and efficient modification of architectural layouts. Traditional architectural modeling tools, although powerful in geometric precision and documentation capabilities, often involve complex manual operations and limited real-time feedback mechanisms that may reduce design productivity and restrict iterative exploration.

This paper presents BuildCraft, an intelligent modular digital architecture simulation platform developed using Unreal Engine 5.6. The system enables users to construct architectural layouts interactively through a structured modular building framework that incorporates intelligent snapping assistance, collision-aware placement validation, dynamic material and variant customization, and persistent layout storage functionality. The proposed framework leverages Blueprint-driven runtime logic to coordinate modular buildable instantiation, interaction state transitions, and visualization updates within a real-time simulation environment.

The architecture of BuildCraft is centered around a centralized construction controller referred to as the Building System , which orchestrates placement resolution, snapping computation, and communication between modular components. By combining responsive interaction workflows with advanced rendering capabilities, the platform enhances spatial understanding, reduces structural placement errors, and improves digital construction efficiency. Experimental observations indicate that the modular framework significantly accelerates layout creation processes while maintaining structural consistency. The proposed system provides a scalable foundation for future research in intelligent architectural computing, immersive digital construction environments, and interactive design education platforms.

NOVEL DATA HIDING ALGORITHM FOR HIGH DYNAMIC RANGE IMAGES

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Paper ID: ICCT26009

ABSTRACT

This paper presents a novel approach for hiding messages in digital High Dynamic Range (HDR) images in the spatial domain. The proposed method embeds two bits of a message into a pixel by manipulating the second and fourth bit planes, while ensuring only one alteration occurs per embedding process. By utilizing the 10-bit mantissa field of the 48-bit Open EXR format, the algorithm achieves high embedding capacity with minimal distortion. Experimental results demonstrate that the method is resistant to common steganalysis attacks such as RS and SPAM while maintaining superior image quality compared to traditional Least Significant Bit (LSB) matching.

A GENERATIVE AI FRAMEWORK FOR DRUG DISCOVERY USING DIFFUSION MODELS AND ALPHAFOLD-GUIDED MOLECULAR DESIGN

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Paper ID: ICCT26010

ABSTRACT

Drug discovery is a complex and resource-intensive process that requires exploring vast chemical spaces to identify potential therapeutic compounds. Recent advances in Generative Artificial Intelligence (GenAI) have enabled automated molecular design and accelerated drug candidate identification. This paper proposes a generative AI-based framework that integrates diffusion models, AlphaFold-guided protein structure information, and reinforcement learning optimization for molecular generation. The framework generates chemically valid molecules and optimizes them based on drug-likeness, binding affinity, toxicity prediction, and synthetic feasibility. Experimental evaluation indicates improved molecular validity, novelty, and diversity compared with traditional generative models such as Variational Autoencoders and Generative Adversarial Networks. The proposed approach demonstrates the potential of generative AI to significantly improve the efficiency of early-stage drug discovery by enabling faster identification of promising drug candidates.

Keywords

Generative Artificial Intelligence, Drug Discovery, Diffusion Models, AlphaFold, Molecular Generation.

SMART TRAFFIC SIGN DETECTION USING YOLOV8-NANO INTEGRATED WITH ULSAM ATTENTION MECHANISM

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Paper ID: ICCT26012

ABSTRACT

Traffic sign detection is an essential component of Intelligent Transportation Systems (ITS) and Advanced Driver Assistance Systems (ADAS), helping drivers understand road regulations and hazards. However, detecting traffic signs in real- world environments is challenging due to factors such as varying lighting conditions, weather changes, occlusions, and complex backgrounds. Traditional methods relying on manual feature extraction often perform poorly in such conditions. Although deep learning approaches have improved detection accuracy, many models require high computational resources, limiting their use in real-time systems. This study proposes a lightweight traffic sign detection framework based on the YOLOv8-Nano model integrated with the Ultra-Lightweight Subspace Attention Module (ULSAM). The model is trained on a merged dataset combining images from the German Traffic Sign Detection Benchmark (GTSDB) and selected classes from the LISA Traf- fic Sign Dataset to improve dataset diversity and robustness. The ULSAM attention mechanism enhances feature extraction by emphasizing important spatial regions while maintaining a lightweight architecture. Experimental results show that the pro- posed model achieves 94.07% precision, 95.54% recall, 98.30% mAP@50, and 95.23% mAP@50–95, demonstrating its effec- tiveness and suitability for real-time traffic sign detection in intelligent transportation applications.

Keywords

Traffic Sign Detection, Deep Learning, YOLOv8-Nano, Ultra-Lightweight Subspace Attention Module (ULSAM), Intelligent Transportation Systems (ITS), Advanced Driver Assistance Systems (ADAS), Real-Time Object Detection, Traffic Sign Recognition, Computer Vision.

BLOCKCHAIN IN HEALTHCARE

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Paper ID: ICCT26013

ABSTRACT

Blockchain technology is emerging as a transformative solution for addressing many challenges in the healthcare industry, particularly in areas such as data security, interoperability, and patient privacy. Traditional healthcare systems often rely on centralized databases that are vulnerable todata breaches, limited data sharing, and inefficiencies in record management. Blockchain, a decentralized and distributed ledger technology, provides a secure and transparent framework for storing and sharing medical information across multiple stakeholders.

By enabling immutable and tamper-proof records, blockchain can improve the integrity and reliability of electronic health records (EHRs). It allows patients to have greater control over their personal health data, granting or revoking access to healthcare providers as needed. Additionally, blockchain can streamline processes such as medical billing, insurance claims, drug supply chain tracking, and clinical trials management, reducing fraud and administrative costs.

Furthermore, smart contracts—self-executing agreements stored on the blockchain—can automate various healthcare operations, improving efficiency and reducing human error. Despite its promising benefits, the adoption of blockchain in healthcare faces challenges including regulatory concerns, scalability issues, high implementation costs, and the need for standardized frameworks.

Overall, blockchain technology has the potential to revolutionize healthcare systems by enhancing data security, improving transparency, and fostering better collaboration among healthcare stakeholders, ultimately leading to more efficient and patient-centred healthcare services.

Keywords

Blockchain, Healthcare, Electronic Health Records (EHR), Data Security, Patient Privacy, Smart Contracts, Drug Supply Chain, Data Sharing.

HYBRID RESNET–VISION TRANSFORMER WITH CNN ATTENTION FOR AUTOMATED MULTI-LEAD ECG ARRHYTHMIA DETECTION

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Paper ID: ICCT26014

ABSTRACT

Electrocardiogram (ECG) signals are widely used for detecting cardiac abnormalities and diagnosing heart diseases. However, accurate arrhythmia detection from multi-lead ECG signals is challenging due to noise, signal variations, and complex temporal patterns. This work proposes a Hybrid ResNet–Vision Transformer with CNN Attention (HRVT-CA) framework for automated ECG arrhythmia classification. Initially, ECG signals are preprocessed using a bandpass filter to remove noise and improve signal quality. Then, Recursive Feature Elimination (RFE) is applied to select the most relevant features and reduce redundancy. The selected features are processed using a hybrid deep learning architecture that combines ResNet for feature extraction, Vision Transformer for capturing global dependencies, and CNN attention for emphasizing important signal patterns. The model performance is evaluated using accuracy, precision, recall, and F1-score. Experimental results demonstrate that the proposed model improves arrhythmia detection performance and provides an effective solution for automated ECG-based cardiac diagnosis.

Keywords

ECG Signal Processing, Arrhythmia Detection, ResNet, Vision Transformer, CNN Attention, Feature Selection.

DEEPFAKE DETECTOR FOR DIGITAL EVIDENCE IN COURT

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Paper ID: ICCT26015

ABSTRACT

Deepfake technology has rapidly evolved with the advancement of artificial intelligence and deep learning, making it increasingly difficult to distinguish between real and manipulated media. Deepfake videos and images can be used for misinformation, identity theft, and other malicious purposes. This project proposes a Deepfake Detection System that automatically identifies whether an image or video is real or fake using deep learning techniques.The system uses EfficientNet-B0 Convolutional Neural Network (CNN) for feature extraction and classification. The uploaded image or video is preprocessed by resizing, normalization, and noise simulation before being analyzed by the deep learning model. The trained model then predicts whether the content is real or fake along with a confidence score.

The proposed system helps in preventing misinformation, improving digital security, and assisting media verification processes. It can be applied in social media platforms, journalism, and digital forensics to detect manipulated media effectively.

Keywords

Deepfake Detection, Artificial Intelligence, Deep Learning, Convolutional Neural Network, EfficientNet-B0, Image Processing, Video Analysis, Digital Forensics.

A SWIN TRANSFORMER-BASED FRAMEWORK FOR AUTOMATED LIVER FIBROSIS DETECTION FROM ULTRASOUND IMAGES

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ABSTRACT

Liver fibrosis is a condition in which scar tissue gradually forms in the liver due to long-term damage or inflammation. This scarring affects the normal structure and function of the liver and reduces its ability to work properly. Early detection and proper treatment are important to prevent the condition from becoming more severe. The proposed system for liver fibrosis detection follows several sequential image processing steps. First, the image dataset containing liver ultrasound images is collected and used as the input for the system. These images are then enhanced using Contrast Limited Adaptive Histogram Equalization (CLAHE) to improve image contrast and highlight important details. After preprocessing, the images are processed using Watershed Segmentation to separate the important liver region from the background. This segmentation step helps focus only on the region of interest for better analysis. Next, important features are extracted from the segmented images using Histogram of Oriented Gradients (HOG), which captures texture and edge information. These extracted features represent the structural patterns present in the liver tissue. The feature data is then provided to the Swin Transformer for classification. The model analyzes the features and learns patterns related to liver fibrosis. Finally, the system produces a prediction output that indicates the classification result of the liver condition. This process helps in accurate and efficient detection of liver fibrosis from medical images. This project is implemented using Python.

Keywords

Liver Fibrosis, Ultrasound Imaging, Deep Learning, Swin Transformer, Medical Image Analysis

A BILINGUAL PRIVACY-PRESERVING SERVICE MARKETPLACE WITH URGENCY-BASED REQUEST MANAGEMENT FOR TAMIL NADU

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Paper ID: ICCT26017

ABSTRACT

Digital service platforms have revolutionized the way people receive local services, yet there are still large gaps in meeting the requirements of rural and semi-urban populations, especially in linguistically varied areas like Tamil Nadu. Current systems mostly serve urban consumers, don't have sufficient privacy controls, don't support many regional languages, and don't adequately handle urgent service needs. This paper introduces QuickServe, a new multilingual (Tamil and English) service marketplace platform created especially for users in Tamil Nadu's 38 districts. It uses a role-based, privacy-first architecture to link service seekers with vetted local providers. Three significant breakthroughs set QuickServe apart from competing products. First, a phased privacy architecture that gradually divulges user data in three different stages: at first, only the service type and district are visible; following provider acceptance, phone numbers are exchanged; and after seeker confirmation, exact addresses are shared. This preserves complete service operation while guaranteeing the highest level of user protection. Second, an urgency-based request management system with timer settings of one hour, two hours, or one day that allows for automatic expiry handling and real-time status monitoring for urgent service requirements. Third, a multi-step provider verification architecture that ensures platform legitimacy and fosters user trust by combining document submission via Cloudinary, OTP authentication with EmailJS, and administration approval. Three separate role-based dashboards are implemented by the platform: the Admin Dashboard for provider verification, platform monitoring, and complaint resolution; the Provider Dashboard for managing incoming requests, accepting jobs, and updating service completion; and the Seeker Dashboard for browsing providers, creating requests, and tracking status. For customers with different degrees of digital literacy, each dashboard has an easy-to-use single-page interface. QuickServe is an example of how modern tools can be used to create inclusive digital solutions. It was built using Next.js 14 for the frontend, Firebase Authentication and Cloud Firestore for backend

services, Cloudinary for document storage, and EmailJS for OTP delivery. 100% provider verification compliance, 92% faster response times for urgent requests, and 97.8% customer satisfaction were the results of an experimental deployment with 1,000 users spread across three districts. By providing technology in Tamil, QuickServe is a major step toward closing the digital divide between urban and rural areas, empowering local service providers economically and enhancing rural people' access to vital services. Researchers and practitioners creating region-specific digital service solutions can learn a lot from the platform's architecture, workflow, and implementation details.

Keywords

Service Marketplace, Privacy-Preserving Architecture, Role-Based Access Control, Real-Time Request Management, Provider Verification System, Bilingual Platform, Tamil Nadu, Firebase, Next.js

DEEP LEARNING-BASED LUNG CANCER DETECTION USING HYBRID VGG16 AND RESNET50 ENCODER–DECODER

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Paper ID: ICCT26018

ABSTRACT

Lung cancer remains one of the leading causes of cancer-related deaths worldwide, making early and accurate diagnosis critical for improving patient survival and treatment outcomes. Traditional manual analysis of Computed Tomography (CT) scan images is time-consuming, prone to human error, and highly dependent on the expertise of radiologists. To address these challenges, this study proposes a hybrid deep learning framework that combines the strengths of the VGG16 and ResNet50 models for automated lung cancer detection. The proposed model analyzes CT scan images and classifies them into three categories: benign, malignant, and normal. In this hybrid architecture, VGG16 is utilized to capture fine-grained spatial features, while ResNet50 learns deeper abstract representations, improving the overall classification performance and reliability. Additionally, the model integrates the interpretability technique Grad-CAM to highlight important lung regions that influence the prediction results. This visualization capability enhances transparency and allows medical professionals to better understand and trust the model's decisions. The proposed approach aims to support radiologists by providing an efficient and reliable automated system for early lung cancer detection

Keywords

Deep Learning, Lung Cancer Detection, CT Scan Image Analysis, VGG16, ResNet50, Grad-CAM, Medical Image Classification

CROP YIELD PREDICTION USING VISION TRANSFORMER WITH BAT OPTIMIZATION ALGORITHM

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ABSTRACT

Crop prediction is an important task in smart agriculture. This paper proposes a crop prediction system based on data preprocessing, visualization, normalization, and a Vision Transformer model optimized using Bat Optimization. The system analyzes agricultural datasets and predicts suitable crops with high accuracy. This diagram shows the complete workflow for a crop prediction system. First, the input dataset is collected, which typically includes soil nutrients (N, P, K), temperature, humidity, rainfall, and pH values. In the preprocessing stage, Exploratory Data Analysis (EDA) is performed to understand patterns, handle missing values, and check non-numeric (object) data. Next, data visualization helps identify relationships between features and crop yield. The data is then normalized to scale all features uniformly, improving model performance. After that, the dataset is split into training and testing sets to evaluate accuracy fairly. A Vision Transformer model with Bat Optimization is applied for intelligent feature learning and parameter tuning. During model selection, the best-performing configuration is chosen. Finally, the trained model generates predictions, recommending the most suitable crop for the given environmental conditions, helping farmers improve productivity and decision-making.

Keywords

Crop Prediction, Vision Transformer, Bat Optimization, Agriculture AI

AI-POWERED MOUNTAIN SNOW STABILITY AND PERSONALIZED AVALANCHE ALERT SYSTEM

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Paper ID: ICCT26020

ABSTRACT

Avalanches pose severe risks to mountaineers, skiers, and backcountry enthusiasts, claiming hundreds of lives annually despite conventional monitoring systems that rely on coarse, area-wide alerts from aggregate snow metrics. We propose an AI-powered mountain snow stability and personalized avalanche alert system that fuses multi-source data—including live environmental sensors for temperature, snow depth, slope angle, humidity, wind speed, and ground vibration—alongside historical avalanche records and satellite/drone imagery-derived snowpack metrics. This comprehensive feature set feeds a Transformer-based neural network with 12 layers and multi-head self-attention, which processes sequential inputs through positional encodings and layered representations, then outputs a snow stability index and 24-hour avalanche probability via sigmoid-activated regression heads from mean-pooled encoder features. The stability index detects weak layers by integrating modeled interlayer shear strength, while predicted probabilities drive geo-fenced alerts that trigger dashboard notifications above 0.92 risk thresholds and mobile/SMS warnings above 0.95 for users within 500m of high-risk slopes, computed via risk polygon intersections with GPS positions. Furthermore, incremental online learning refines model parameters through gradient descent on streaming data with binary cross-entropy loss, adapting predictions without full retraining. Our system thus advances beyond scalar threshold-based monitoring by delivering precise, location-specific risk assessments and visualizations of evolving snow depth, stability, and probability trends. Initial simulations on historical datasets demonstrate superior accuracy over baselines, promising substantial reductions in avalanche fatalities through timely, personalized interventions.

MULTIMODAL MRI BRAIN TUMOR SEGMENTATION USING ATTENTION-ENHANCED INCEPTION U-NET

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Paper ID: ICCT26021

ABSTRACT

Brain tumor segmentation using multimodal magnetic resonance imaging is an essential task in medical image analysis because precise identification of tumor regions helps clinicians during diagnosis, treatment planning, and patient follow-up. However, obtaining accurate segmentation remains difficult due to significant variations in tumor structure, boundary appearance, and signal intensity across different MRI modalities. To overcome these challenges, this work introduces an Attention-Enhanced Inception U-Net model designed for automated segmentation of brain tumors from multimodal MRI scans such as T1, T1c, T2, and FLAIR.

The proposed architecture combines inception-based feature extraction with an attention mechanism inside an encoder–decoder framework. Inception blocks enable the network to capture tumor characteristics at multiple spatial scales, while attention modules improve focus on relevant abnormal regions and reduce background interference. Before training, MRI volumes are processed through resizing and normalization to maintain input consistency. Soft Dice Loss together with Focal Loss is applied during optimization to improve segmentation quality in regions where class imbalance is significant.

Performance analysis on the BraTS dataset indicates that the proposed network achieves improved segmentation compared with conventional U-Net approaches. The predicted segmentation masks show stronger boundary localization and improved detection of irregular tumor structures. This framework can serve as an effective support tool for radiologists by providing more dependable tumor region identification for future clinical applications.

Keywords

Medical Image Processing, Brain Tumor Segmentation, Multimodal MRI, Attention-Enhanced Inception U-Net, BraTS, Deep Learning.

AUTHCORE: SMART ATTENDANCE MANAGEMENT SYSTEM

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Paper ID: ICCT26022

ABSTRACT

The traditional attendance management pro-cess in educational institutions and organizations is often manual, time-consuming, and prone to errors such as proxy attendance and incorrect data entry. To address these challenges, this paper presents AuthCore, a Smart Attendance Management System that leverages face recognition and QR code technologies to automate and secure attendance tracking. The system is developed using Python Flask as the backend framework, with HTML, CSS, JavaScript and Bootstrap for the frontend interface, and SQLite for database management.

AuthCore includes modules such as staff registration, face en-rollment, QR/face-based attendance marking, dashboard analytics, AI assistant integration, and report generation. The system ensures real-time attendance tracking, improves accuracy, and reduces administrative workload. Experimental results show that the system significantly enhances efficiency and reliability compared to traditional methods.

Keywords

Smart Attendance System, Face Recognition, QR Code, Flask, AI Assistant, Automation.

AN EXPLAINABLE DEEP LEARNING FRAMEWORK FOR FETAL ULTRASOUND IMAGE PLANE CLASSIFICATION

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Paper ID: ICCT26023

ABSTRACT

Fetal ultrasound image plane classification plays a crucial role in prenatal diagnosis, enabling clinicians to assess fetal growth and detect abnormalities. However, ultrasound images often suffer from low contrast, noise, and high similarity between different anatomical planes, making manual classification challenging and time-consuming. To address these issues, this study proposes an explainable deep learning framework for automatic fetal ultrasound image plane classification using advanced convolutional neural networks. The proposed model leverages a deep learning architecture to accurately classify key fetal planes such as brain, abdomen, femur, thorax, and maternal cervix. To enhance model transparency and clinical trust, the framework integrates Local Interpretable Model-Agnostic Explanations (LIME) as an explainability technique. LIME provides visual interpretations by highlighting important regions in the ultrasound images that influence the model's predictions. Experimental results demonstrate that the proposed approach achieves improved classification accuracy compared to traditional methods, while also offering meaningful visual explanations. These explanations help clinicians understand the decision-making process of the model, thereby increasing reliability and usability in real-world clinical settings. Overall, this framework combines high-performance deep learning with interpretability, making it a valuable tool for computer-aided diagnosis in prenatal healthcare.

Keywords

Fetal Ultrasound Imaging, Image Plane Classification, Deep Learning, Convolutional Neural Networks (CNN), Explainable AI (XAI), LIME (Local Interpretable Model-Agnostic Explanations), Medical Image Analysis.

SATS

SMART ALLOCATION AND TIMETABLE SCHEDULER

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Paper ID: ICCT26024

ABSTRACT

The Smart Allocation & Timetable Scheduler (SATS) is an intelligent system designed to automate and optimize the process of timetable creation and resource allocation in educational institutions. Traditional timetable scheduling is time-consuming, manually intensive, and prone to conflicts such as overlapping classes, improper room allocation, and uneven faculty workload. SATS addresses these challenges by using rule-based logic and automated scheduling algorithms to generate error-free, efficient, and fully optimized timetables. The system inputs essential data such as courses, faculties, departments, classrooms, and time slots. It then processes this information to automatically allocate rooms, assign faculties to subjects, and generate a conflict-free timetable. SATS ensures optimal distribution of classes, maximum utilization of available resources, and adherence to institutional constraints such as faculty availability, room capacity, and departmental requirements. Additionally, SATS features a smart allocation module that dynamically adjusts schedules in case of changes, such as faculty leave or room unavailability, ensuring seamless continuity. The solution provides an easy-to-use interface for administrators to view, edit, and export timetables in PDF format. Overall, SATS significantly reduces manual workload, improves accuracy, and enhances operational efficiency in academic scheduling, making it a smart and reliable tool for modern educational institutions.

Keywords

Smart Allocation, Timetable Automation, Resource Optimization, Conflict-Free Scheduling, Academic Management.

AUTOMATED RECOMMENDATION SYSTEM FOR STUDENTS USING AI

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Paper ID: ICCT26025

ABSTRACT

In recent years, educational institutions generate a large volume of student academic data. Analyzing this data effectively helps students make better academic and career decisions. This project proposes an intelligent Student Recommendation System using a Decision Tree Classifier. The system performs data preprocessing, feature selection, and classification to recommend suitable academic domains for students. Experimental results show high accuracy, precision, recall, and F1-score, proving the effectiveness of the proposed model.

Keywords

Student Recommendation System, Decision Tree, Machine Learning, Classification, Academic Prediction.

BOOK EXCHANGE PLATFORM WITH INTEGRATED CHAT SYSTEM

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Paper ID: ICCT26026

ABSTRACT

This project presents a Book Exchange Platform with Integrated Chat System that enables users to post, browse, and exchange books efficiently. The system allows users to register, log in, and upload details of books they wish to exchange, including title, category, and location. Users can explore available books and initiate communication with other users through a real-time chat module.

The backend is developed using Django REST Framework, ensuring secure data handling and authentication, while the frontend is built using Ionic Angular to provide a responsive user interface. The chat functionality enhances user interaction by enabling direct communication between users regarding book exchange.

This system aims to simplify the process of book sharing, reduce costs, and promote reuse of educational resources through a user-friendly and interactive platform.

A ROBUST DEEP LEARNING FRAMEWORK FOR AUTOMATED LIVER TUMOR SEGMENTATION IN CT IMAGES

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Paper ID: ICCT26027

ABSTRACT

Liver cancer is one of the most common and life-threatening diseases worldwide, and early detection plays an important role in improving patient survival. Accurate segmentation of liver tumors from medical images such as Computed Tomography (CT) scans is a challenging task due to the complex structure of the liver and the variation in tumor size, shape, and intensity. In recent years, deep learning techniques have shown significant success in medical image analysis. This paper presents a deep learning-based approach for automatic liver tumor segmentation using convolutional neural networks (CNN). The proposed system preprocesses CT scan images to remove noise and enhance image quality before feeding them into the deep learning model. A segmentation network, such as U-Net, is used to accurately identify and extract tumor regions from the liver images. The performance of the proposed model is evaluated using standard metrics such as accuracy, Dice similarity coefficient, and precision. Experimental results show that the deep learning model provides efficient and reliable tumor segmentation compared to traditional image processing methods. This approach can assist radiologists in faster diagnosis and treatment planning for liver cancer patients.

Keywords

Liver Tumor, Deep Learning, Medical Image Segmentation, Convolutional Neural Network, CT Scan, U-Net.

CLOUD STORAGE FORENSICS

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Paper ID: ICCT26028

ABSTRACT

Cloud storage forensics is a critical area of digital forensics that deals with the identification, acquisition, preservation, and analysis of data stored in cloud environments. As cloud computing becomes widely adopted, digital evidence is increasingly distributed across virtualized and remote infrastructures, making traditional forensic methods less effective. Cloud storage forensics addresses these challenges by utilizing advanced techniques such as remote data acquisition, log analysis, and collaboration with cloud service providers. It also ensures the integrity and admissibility of evidence despite issues like multi-tenancy, data volatility, and jurisdictional constraints. This field plays a vital role in investigating cybercrimes and supporting legal proceedings in modern cloud-based systems.

AN INTERPRETABLE ATTENTION-BASED INCEPTION-TRANSFORMER FRAMEWORK FOR CERVICAL CANCER CELL CLASSIFICATION USING HERLEV DATASET

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ABSTRACT

Cervical cancer detection requires accurate automated systems. This work proposes a deep learning framework for cervical cell classification using the Herlev dataset containing 9,650 images across five classes. Images are preprocessed through resizing and normalization, along with data augmentation techniques such as rotation, zoom, and flipping. The model employs InceptionV3 for feature extraction with partial fine-tuning, followed by a Multi-Head Self-Attention module to enhance feature representation. Global Average Pooling and a multilayer perceptron with dropout are used for classification. A 5-fold cross-validation strategy is applied with an 80:20 train-test split. The model is trained using the Adam optimizer with a learning rate of 0.0001 and categorical cross-entropy loss, along with Early Stopping and learning rate scheduling. The proposed model achieves an average accuracy of 98.69% with a standard deviation of 0.35%. Performance metrics show high precision, recall, and F1-score, while Grad-CAM improves interpretability by highlighting important regions.

Keywords

Cervical Cancer Classification, Herlev Dataset, InceptionV3, Attention Mechanism, Deep Learning, Medical Image Analysis, Grad-CAM, Computer-Aided Diagnosis

GESTURE AND FACIAL EXPRESSION BASED ASSISTIVE COMMUNICATION SYSTEM

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Paper ID: ICCT26030

ABSTRACT

Speech- and hearing-impaired individuals frequently encounter significant barriers to real-time interpersonal communication, primarily attributable to the limited availability of affordable and accessible interpretation support. The proposed vision-based assistive communication system that integrates hand gesture recognition with facial expression analysis to facilitate natural, non-verbal human interaction. Acquires input via a standard webcam, extracts hand landmarks and facial feature vectors using the MediaPipe framework, and classifies 26 distinct hand gestures through a keypoint-based deep neural network, achieving a test accuracy of 93.7%. Concurrently, seven discrete facial emotion states are recognized employing a transfer-learned MobileNetV2 architecture, yielding a validation accuracy of 88.2%. A rule-based semantic fusion module synthesizes gesture and emotion predictions to generate contextually coherent natural language phrases, which are subsequently rendered as on-screen text and converted to synthesized speech in real time with support for eight languages. The system attains a mean end-to-end processing latency of 187ms on commodity hardware, requiring no specialized peripheral equipment. Experimental results demonstrate the practical viability of the proposed approach as an inclusive, low-cost solution for assistive communication in accessibility-constrained environments.

Keywords

Gesture recognition, facial expression recognition, assistive technology, MediaPipe, deep learning, MobileNetV2, multimodal fusion, text-to-speech.

SMART CROP YIELD PREDICTION AND OPTIMIZATION

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Paper ID: ICCT26031

ABSTRACT

Agriculture plays a crucial role in food production and economic development. Predicting crop yield accurately is essential for farmers to improve productivity and manage resources effectively. This paper proposes a smart crop yield prediction and optimization system using machine learning techniques. The system analyzes agricultural data such as soil type, rainfall, temperature, humidity, and fertilizer usage to predict crop yield. Based on the prediction results, the system also provides recommendations for optimizing crop production. The proposed system helps farmers make better decisions related to crop selection, irrigation, and fertilizer usage. The implementation of such smart agricultural systems can improve productivity, reduce risks, and promote sustainable farming practices.

Keywords

Crop Yield Prediction, Smart Agriculture, Machine Learning, Data Analytics, Agricultural Optimization.

STUDYMATE – AN AI POWERED LEARNING WEBSITE FOR ACADAMIC DEVELOPMENT FOR COLLEGE STUDENTS

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Paper ID: ICCT26032

ABSTRACT

StudyMate is a smart learning platform designed to help students easily access and manage academic study materials in one place. Many students face difficulty finding organized notes, question papers, and learning resources because they are scattered across different platforms. StudyMate solves this problem by providing a centralized system where materials are organized based on year, semester, and subject, making it easier for students to search and access relevant resources. The platform includes separate modules for administrators and students. Administrators can upload and manage study materials, while students can browse, search, and download notes and other learning resources. In addition, the system allows students to provide feedback, improving communication and resource management. To further enhance learning, StudyMate integrates AI-based features that assist students by summarizing notes and generating important questions for exam preparation. These intelligent capabilities help students understand concepts faster and improve their study efficiency, making StudyMate a modern and effective academic support platform.

Keywords

StudyMate, E-Learning Platform, AI Learning Assistance, Study Material Management, Educational Resource Sharing, Intelligent Study Support, Student Learning Platform.

SMART CAMPUS CASHLESS PAYMENT SYSTEM USING RFID AND IOT

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Paper ID: ICCT26033

ABSTRACT

In many educational institutions, payment systems in canteens and campus stores are still cash-based, leading to delays during peak hours, difficulty in transaction tracking, and risks associated with cash handling. These issues reduce operational efficiency and create inconvenience for students and staff.

To address these challenges, this paper proposes a Smart Campus Cashless Payment System using RFID and IoT technologies. The system enables users to perform quick and secure transactions using RFID cards linked to a digital wallet. The RFID reader reads the card UID, and the ESP32 microcontroller processes the data and communicates with a backend server via Wi-Fi.

The backend system verifies user details, checks account balance, processes transactions, and stores records in a centralized database. A web-based admin dashboard allows monitoring of users, transactions, and balances in real time. The system improves transaction speed, enhances security, and provides centralized control over campus payments.

Keywords

RFID, IoT, ESP32, Cashless Payment System, Smart Campus, Web Application, Digital Wallet.

AUTISM DISEASE PREDICTION

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Paper ID: ICCT26034

ABSTRACT

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by challenges in social interaction, communication, and repetitive behaviours. Early detection and intervention are crucial for improving outcomes and quality of life for individuals with ASD. In recent years, deep learning techniques have shown promising results in various medical applications, including disease prediction. Here we have proposed a deep learning approach using ResNet50 architecture for effective detection of ASD from MRI images.

The model is trained using MRI datasets collected from Kaggle. Image preprocessing, segmentation, and feature extraction techniques are used to improve model performance.

The proposed ResNet50-based system achieves improved accuracy, sensitivity, and specificity, making it a reliable tool for early ASD detection.

SMART BUSINESS INTELLIGENCE CHATBOT

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ABSTRACT

This project, Smart Business Intelligence Chatbot, is an advanced AI-powered system designed to provide intelligent business insights through natural language interaction. The system enables users to ask questions in simple language, and the chatbot responds with both textual explanations and visual representations such as charts and summaries, making data analysis more accessible and user-friendly.

The chatbot is integrated with an MCP (Model Context Protocol) server, which connects to multiple data sources including databases, PDFs, CSV files, and Excel documents. It dynamically converts user queries into SQL queries, retrieves relevant data, performs analysis, and generates real-time insights. This allows organizations to replace traditional business intelligence tools and reduce dependency on manual reporting and data analysts.

The system is developed using Python for backend processing and AI integration, and Streamlit for the frontend interface, providing an interactive and responsive user experience. It also supports multi-database connectivity such as MySQL and PostgreSQL, enabling flexible data integration.

A key feature of this project is its secure multi-company architecture, where any organization can connect their own database to the chatbot. Each company's data is strictly isolated using authentication and access control mechanisms, ensuring that no company can access another company's confidential information. This enhances data privacy and security while allowing scalable deployment across multiple organizations.

Overall, the Smart Business Intelligence Chatbot acts as a smart enterprise assistant that combines artificial intelligence, data analytics, and secure architecture to deliver fast, accurate, and visually enriched business insights in real time.

Keywords

Artificial Intelligence, Business Intelligence, Chatbot, Data Analytics, SQL Automation, MCP Server.

MACHINE LEARNNG BASED INVENTORY MANAGEMENT SYSTEM WITH SALES PREDICTION

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Paper ID: ICCT26037

ABSTRACT

Inventory management plays a crucial role in ensuring smooth business operations in retail stores and warehouses. Improper stock management leads to overstocking, understocking, and financial losses. This paper proposes a Machine Learning Based Inventory Management System with Sales Prediction to improve stock control and decision-making. The system maintains product details, tracks inventory levels, and predicts future sales using machine learning techniques. Historical sales data is used to train models that identify demand patterns and forecast future requirements. Based on predicted results, the system provides stock recommendations to avoid shortages and excess storage. The proposed system reduces manual effort, improves accuracy, and enhances business efficiency. It is especially useful for small and medium-scale businesses to optimize inventory planning and increase profitability.

Keywords

Inventory Management, Sales Prediction, Machine Learning, Demand Forecasting, Stock Analysis, Inventory Optimization, Predictive Analytics

BLOCKCHAIN-POWERED CROP INDEX INSURANCE FOR IMPROVED TRANSPARENCY AND TRUST FOR INDIAN FARMERS

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Paper ID: ICCT26038

ABSTRACT

Agriculture plays a vital role in India's economy, but farmers frequently face challenges such as unpredictable weather, pest attacks, and irregular rainfall that impact crop yields. Crop insurance serves as a safeguard, helping mitigate financial losses due to these natural calamities. However, traditional crop insurance models are often plagued by complex procedures, high costs, and a lack of trust, discouraging many farmers from adopting such protective measures. To address these issues, this project introduces an innovative blockchain-based crop insurance solution that leverages the advantages of blockchain technology to ensure transparency and security. By utilizing blockchain, every transaction and data exchange within the system is recorded on an immutable ledger, creating a transparent and trustworthy environment for all stakeholders. Smart contracts, embedded within a private blockchain, allow only authorized participants—including farmers, insurers, and weather data providers—to interact with the system. This reduces the risk of fraud and automates claim processing, ensuring faster settlements and increasing overall trust in the system. The core objective of this project is to develop an affordable, low-cost crop insurance model that guarantees timely insurance payouts for farmers who experience valid losses. The decentralized, distributed architecture of the system eliminates intermediaries, reducing costs and protecting smallholder farmers from exploitation. Through the integration of blockchain technology, the proposed solution aims to transform the crop insurance landscape by improving efficiency, accessibility, and trust for farmers.

Keywords

National Agricultural Insurance Scheme (NAIS), Block Chain, Pradhan Mantri Fasal Bima Yojana (PMFBY), Internet of Things (IOT), Convolution Neural Network (CNN), Machine Learning (ML).

AI-POWERED REAL ESTATE MARKETPLACE: INTELLIGENT PRICE PREDICTION AND SMART BUYER–SELLER COMMUNICATION SYSTEM

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Paper ID: ICCT26039

ABSTRACT

The real estate sector represents a significant contributor to national economic stability, with property valuation acting as a key determinant in financial and investment decisions. Traditional valuation approaches often depend upon human judgment, which can be subjective and inconsistent. This study introduces a data-driven framework for predicting property prices through the application of supervised machine-learning techniques. The methodology involves rigorous data preparation, including cleaning, feature engineering, encoding of categorical variables, and normalization, to ensure robust model performance. Several regression algorithms—Linear Regression, Decision Tree Regressor, Random Forest Regressor, and XGBoost—are examined and compared using evaluation metrics such as Mean Absolute Error (MAE), Mean Squared Error (MSE), and the Coefficient of Determination (R2). The most accurate model is deployed for final prediction. Experimental outcomes reveal that machine-learning approaches can successfully model the intricate relationships between property attributes and market prices, producing predictions that are more consistent and precise than traditional valuation techniques. The proposed solution demonstrates potential for integration within digital property platforms to support evidence-based decision-making and enhance transparency and efficiency in the housing market.

Keywords

Artificial Intelligence, Machine Learning, Real Estate, Price Prediction, Deep Learning, Chatbot, Marketplace, Data Analytics.

GREEN AI FOR SMART AGRICULTURE: ENERGY-EFFICIENT PREDICTIVE MODELS FOR CROP YIELD AND RESOURCE MANAGEMENT

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Paper ID: ICCT26040

ABSTRACT

Artificial Intelligence (AI) and Machine Learning (ML) have become critical technologies in farming, enabling accurate crop prediction, efficient irrigation, and more effective resource use. However, increasing computational demands of AI systems escalate energy consumption and carbon emissions. This paper presents a Green AI framework for intelligent agriculture, synthesizing six energy-efficient predictive model types—lightweight architectures, model compression, federated learning, edge/fog computing, transfer learning, and green algorithmic innovations—within a layered methodological framework integrating the TOE model, AI-driven precision agriculture, Earth Observation (EO) data integration, AI-IoT-Blockchain systems, human-centered design, and Multi-Criteria Decision-Making. The framework demonstrates that these combined strategies substantially reduce computational energy consumption while maintaining high performance in crop yield forecasting, water management, energy optimization, and nutrient management. Case studies from six global deployments validate practical feasibility. Future directions include integration with IoT, digital twins, explainable AI, and policy-aligned sustainability standards.

Keywords

Crop yield forecasting; energy-efficient predictive models; Green AI; smart agriculture; sustainable resource management.

AI-DRIVEN PASSWORD STRENGTH CHECKER: A MACHINE LEARNING FRAMEWORK FOR INTELLIGENT CREDENTIAL SECURITY ASSESSMENT

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Paper ID: ICCT26041

ABSTRACT

Password security remains one of the most critical vulnerabilities in digital systems, with weak or predictable credentials being a primary vector for unauthorized access and data breaches. Traditional rule-based password strength estimators rely on static heuristics that fail to capture the nuanced complexity of modern attack methodologies including dictionary attacks, pattern-based guessing, and neural network-driven credential cracking. This paper presents an AI-driven Password Strength Checker (AI-PSC) framework that employs machine learning and deep learning techniques—including Random Forest, Gradient Boosting, Long Short-Term Memory (LSTM) networks, and transformer-based models—to intelligently assess credential security. The proposed framework extracts 42 engineered features spanning entropy metrics, character-class distributions, n-gram patterns, and semantic similarity against compromised password corpora. Evaluated on a dataset of 15 million passwords from public breach repositories, the AI-PSC achieves 94.7% classification accuracy and 0.96 AUC-ROC, significantly outperforming conventional zxcvbn and NIST-based heuristics. Real-time inference is achieved at sub-5ms latency via model compression and edge deployment. The framework further provides explainable feedback, guiding users toward stronger credentials through actionable, context-sensitive recommendations.

Keywords

Password strength estimation; machine learning security; credential assessment; deep learning; cybersecurity; natural language processing; explainable AI.

A HYBRID DEEP LEARNING FRAMEWORK FOR AUTOMATED LUNG DISEASE DETECTION USING IMAGE PROCESSING AND DENSENET-121

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ABSTRACT

Lung diseases are medical conditions that affect the lungs and interfere with normal breathing. They can be caused by infections, smoking, pollution, or genetic factors and may reduce the lungs' ability to supply oxygen to the body. lung disease detection from medical images. First, the input dataset consists of lung images, usually collected datasets. These images contain important visual information about the lungs and possible abnormalities. Next, the preprocessing stage is applied to improve image quality. In this step, Histogram Equalization is used to enhance contrast and make important structures in the lung image more visible. After preprocessing, the segmentation stage is performed using Canny Edge Detection. This technique identifies the edges and boundaries of important regions in the lung image. Segmentation helps separate the lung area from the background and highlights potential disease regions. Once the important regions are identified, the process moves to feature extraction. In this step, the Local Binary Pattern (LBP) method extracts texture features from the lung image. These features represent patterns that help distinguish between normal and abnormal lung tissues. After extracting the features, the classification stage is performed using the deep learning model DenseNet-121. This model analyzes the extracted features and learns patterns related to different lung diseases. Finally, the system generates the prediction output, which indicates whether the lung image is normal or shows signs of disease. This pipeline improves the accuracy and efficiency of automated lung disease detection. The Project implemented by Python.

Keywords

Lung Disease Detection, Medical Image Processing, Histogram Equalization, Image Segmentation, Canny Edge Detection, Feature Extraction, Local Binary Pattern (LBP), Deep Learning, DenseNet-121, Image Classification, Computer-Aided Diagnosis, Ultrasound/Medical Imaging, Python Implementation.

MULTI-AGENT AI-DRIVEN CYBERSECURITY INTRUSION DETECTION AND PREVENTION SYSTEM

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ABSTRACT

The study proposes a Multi-Agent Artificial Intelligence based Intrusion Detection and Prevention System for Distributed & Cloud Computing environments to address the increase in Cyber Security threats. The proposed system deploys Intelligent Endpoint Agents which monitor activities of the host device, including but not limited to, processes, network traffic, file system behavior, and internet usage, and transmits this information to a Centralized Server via WebSockets for real-time analysis. A Random Forest machine learning algorithm based on a hybrid dataset derived from CICIDS2017 and NSL-KDD is used to detect anomalies and attempts at intrusion. In addition to detecting such attacks, a Risk Aggregation Engine collects data from multiple monitoring modules and executes risk aggregation to generate a dynamic risk score for each endpoint. If the score exceeds specified risk thresholds, the system will automatically execute mitigation actions including but not limited to, blocking an IP address, terminating a process, or shutting down a system. The proposed system will enable enhanced detection accuracy and quick autonomous responses; thus, making the solution viable for current and future enterprise Cyber Security requirements.

DIGITAL HEALTH RECORD MANAGEMENT SYSTEM

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Paper ID: ICCT26044

ABSTRACT

The Digital Health Record Management System is designed to store and manage patient medical data electronically. It replaces traditional paper records, making data access faster, more accurate, and secure. The system allows doctors to update and retrieve patient information easily, improving healthcare efficiency and decision-making. It also ensures patient data privacy through secure access. The Digital Health Record Management System is designed to store, manage, and access patient medical records in a secure and efficient manner. Traditional paper-based record systems are time-consuming, prone to errors, and difficult to maintain. This system provides a digital solution to overcome these challenges by allowing authorized users to store and retrieve patient information easily. The system includes features such as patient details management, disease diagnosis records, prescriptions, vaccination tracking, and doctor notes. It ensures data accuracy, reduces redundancy, and improves accessibility of medical records. Role-based access control is implemented to maintain data privacy and security. This application uses modern technologies like database integration and cloud storage (such as Firebase) to ensure real-time data availability. It helps healthcare providers make faster and more accurate decisions, improving the overall quality of patient.

Keywords

Digital Health Records, Electronic Healthcare Management System, Patient Data Management, Cloud Storage, Firebase, Medical Record System.

DEEP LEARNING MODELS DETECTING HIDDEN ANOMALIES IN POLLUTION DATA

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Paper ID: ICCT26045

ABSTRACT

Environmental pollution has become a major global concern due to rapid industrialization and urban growth, leading to harmful increases in pollutants such as CO, NOx, NO_2, O_3, and PM2.5. Monitoring pollution levels and identifying abnormal variations is essential for ensuring public health and guiding environmental policies. However, traditional statistical and rule-based methods often fail to detect hidden, nonlinear, or sudden anomalies present in real-world pollution data.

This system presents a deep learning–based framework for detecting hidden anomalies in environmental pollution datasets. The approach integrates three neural architectures—Autoencoder, Long Short-Term Memory (LSTM), and Bidirectional LSTM (Bi-LSTM)—to learn normal pollutant behavior and identify deviations using reconstruction and prediction errors. The dataset undergoes preprocessing, normalization, and feature scaling before being analyzed by the models.

Experimental results show that deep learning models significantly outperform conventional methods in identifying subtle anomalies. Among the models compared, the Bi-LSTM achieves the highest accuracy due to its ability to learn temporal dependencies in both forward and backward directions. The outcomes demonstrate the potential of deep learning for reliable air-quality monitoring and provide a foundation for future smart environmental management systems.

BLOOD GROUP DETECTION USING FINGERPRINT

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Paper ID: ICCT26046

ABSTRACT

Blood group identification is an essential process in medical diagnostics, transfusion medicine, and emergency healthcare. Traditional methods for blood group detection rely on invasive blood sampling and laboratory analysis, which can be time-consuming, prone to human error, and inconvenient in critical situations. This project aims to develop a non-invasive and automated framework for blood group detection using fingerprint images, leveraging deep learning and image processing techniques. The proposed system classifies fingerprint images into eight blood group categories — A+, A−, B+, B−, AB+, AB−, O+, and O− — using advanced Convolutional Neural Network (CNN) architectures such as DenseNet, ResNet, LeNet, AlexNet, and VGGNet. The fingerprint images undergo preprocessing, including ridge enhancement, noise reduction, feature extraction, and data augmentation, to improve model robustness. Model performance is evaluated using accuracy, precision, recall, F-measure, and area under the ROC curve (AUC). Experimental results indicate that DenseNet and ResNet achieve superior performance, with an F-measure exceeding 90% and AUC above 98%, ensuring reliable classification accuracy. The proposed system demonstrates a novel, efficient, and contact-based biometric solution for rapid and accurate blood group detection, minimizing manual effort and enhancing accessibility in healthcare and forensic applications.

Keywords

Blood Group Detection, Fingerprint Recognition, Deep Learning, Convolutional Neural Networks (CNN), DenseNet, ResNet, LeNet, AlexNet, VGGNet.

UZHAVANOS: A LOCALIZED VOICE-ENABLED INTELLIGENT DECISION SUPPORT SYSTEM FOR SMALL AND MARGINAL FARMERS

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Paper ID: ICCT26049

ABSTRACT

Agriculture plays a crucial role in developing economies, yet small and marginal farmers often face challenges due to fragmented information sources and lack of real-time decision support. This paper presents UzhavanOS, a localized intelligent decision support system designed to assist farmers in irrigation planning, disease monitoring, market decision-making, and access to government schemes. The system integrates environmental data, crop-specific parameters, and rule-based logic to generate actionable recommendations. Additionally, a Tamil voice-enabled interface enhances accessibility for rural users. Experimental evaluation using simulated scenarios demonstrates improved decision efficiency and usability. The proposed system bridges the gap between traditional farming practices and modern technology.

Keywords

Smart Agriculture, Decision Support System, Precision Farming, AI in Agriculture, Voice Interface.

CHATBOT FOR COLLEGE ENQUIRY SYSTEM USING RETRIEVAL-AUGMENTED GENERATION

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Paper ID: ICCT26050

ABSTRACT

The Chatbot for College Enquiry System using Retrieval-Augmented Generation (RAG) is designed to provide accurate and instant responses to student queries related to admissions, courses, fees structure, departments, exam schedules, and campus facilities. Traditional chatbots rely only on pre-defined responses or pre-trained data, which may not always provide updated or specific information.

This project integrates a retrieval mechanism with a generative language model to build a RAG-based chatbot. The system retrieves relevant information from the college database or documents and uses it to generate context-aware and precise answers. By grounding responses in verified institutional data, the chatbot improves accuracy, reduces misinformation, and ensures reliable communication.

The proposed system enhances user experience by offering 24/7 automated support, reducing manual workload for administrative staff, and providing quick access to authentic information. It can be deployed on college websites or mobile applications to streamline the enquiry process.

Keywords

Retrieval-Augmented Generation (RAG), College Enquiry Chatbot, Natural Language Processing (NLP), Information Retrieval, Knowledge Base, Automated Support System.

SMART AGRICULTURAL CARGO OPTIMIZATION USING KNAPSACK ALGORITHM WITH ROUTE OPTIMIZATION AND 3D PACKING LOGIC (AGROROUTEX)

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Paper ID: ICCT26051

ABSTRACT

Implements a smart agricultural cargo optimization system using computational algorithms. Utilizes the 0/1 Knapsack Problem with Dynamic Programming to select the most profitable combination of items .Operates under a fixed truck capacity constraint to maximize efficiency and profit. Applies Dijkstra's Algorithm for optimal route selection, reducing transportation time and cost . Incorporates a 3D packing strategy to efficiently arrange goods inside the truck. Categorizes items into heavy, medium, and fragile to ensure safe handling and placement. Minimizes product damage and wastage during transportation. Developed as a web-based application using HTML and JavaScript. Provides an interactive user interface for easy input and Visualization. Enhances overall logistics efficiency in agricultural supply chains. Aims to increase profit margins while ensuring safe and optimized delivery of goods.

CAREERVECTOR: AN AI-DRIVEN SKILL READINESS PLATFORM FOR BRIDGING THE EMPLOYABILITY GAP AMONG ENGINEERING GRADUATES IN INDIA

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Paper ID: ICCT26052

ABSTRACT

India produces over 1.5 million engineering graduates annually, yet only 51% are considered employable. A structured mechanism is missing that helps students measure how their current skills align with specific job requirements before entering the workforce. This paper presents CareerVector, an AI-driven web platform that bridges this gap. Students upload a resume or enter skills manually; the system extracts competencies, computes a job-readiness compatibility score using cosine similarity, identifies skill gaps, and generates a personalized learning roadmap with curated free resources. The platform targets pre-placement readiness — guiding students 6 to 18 months before graduation — unlike existing job portals for active job seekers. Evaluation with final-year CSE students demonstrates improved career clarity and focused skill development.

Keywords

Skill Gap Analysis, Career Readiness, EdTech, Resume Parsing, Employability, Machine Learning, Job Matching.

SMART ALCOHOL MONITORING SYSTEM USING FINGERPRINT AUTHENTICATION

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Paper ID: ICCT26053

ABSTRACT

Alcohol misuse and unauthorized purchasing are significant concerns in many regions, especially where regulatory monitoring is limited. This paper proposes a Smart Alcohol Monitoring System using Fingerprint Authentication to ensure controlled and responsible alcohol distribution. The system integrates biometric fingerprint verification with a centralized database to identify individuals before permitting alcohol purchases. When a customer attempts to buy alcohol, their fingerprint is scanned and matched with stored records to verify identity and age eligibility. The system also tracks the quantity of alcohol purchased by each individual per day and restricts purchases once the predefined limit is reached. Additionally, the centralized database enables real-time monitoring across multiple outlets within a district, preventing individuals from bypassing restrictions by purchasing alcohol from different locations. The proposed system enhances transparency, enforces legal age requirements, and supports government authorities in regulating alcohol sales effectively. By combining biometric technology with smart monitoring, the system reduces misuse, improves accountability, and promotes responsible consumption. This approach demonstrates how digital identity verification can be applied to public health and regulatory enforcement in alcohol distribution systems.

KIDNEY DISEASE PREDICTION SYSTEM: AN INTELLIGENT PLATFORM FOR AUTOMATED CKD DETECTION, STAGING, AND CLINICAL RECOMMENDATION

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ABSTRACT

The Kidney Disease Prediction System is an intelligent healthcare platform designed to automate the early detection and staging of Chronic Kidney Disease (CKD). By leveraging machine learning, optical character recognition (OCR), and a clinical knowledge base, the system provides users — both patients and healthcare practitioners — with rapid, accurate, and actionable renal health diagnostics. The core of the system utilises a high-precision XGBoost classification model trained on diverse clinical datasets, analysing 24 unique biomarkers such as Creatinine, Albumin, and Haemoglobin to predict the presence of CKD with quantified probability. To minimise manual input errors, the system integrates Tesseract OCR and pdfplumber, enabling direct extraction of clinical data from scanned medical reports and digital PDF files. Beyond binary prediction, the system calculates the estimated Glomerular Filtration Rate (eGFR) using the MDRD equation, enabling accurate staging of kidney disease across Stages 1 through 5. A structured clinical knowledge base correlates diagnostic results with categorised medical advice, delivering tailored treatment protocols, dietary recommendations, and safety precautions. The system is architected as a full-stack web application using Flask (Python) for the backend API and HTML5/Bootstrap for a responsive user interface. This system addresses the critical need for automated renal screening tools; by streamlining report analysis and providing clear CKD staging, it empowers early medical intervention, potentially reducing the global burden of late-stage kidney failure.

Keywords

Chronic Kidney Disease; Machine Learning; XGBoost Classification; eGFR Staging; OCR Biomarker Extraction; Clinical Decision Support; CKD Prediction; MDRD Equation; Renal Health Diagnostics; Flask Web Application.

DIABETIC RETINOPATHY SCREENING SYSTEM

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Paper ID: ICCT26055

ABSTRACT

Diabetic Retinopathy (DR) is a leading cause of preventable blindness, requiring timely detection and continuous monitoring to avoid severe vision impairment. This project presents an automated Diabetic Retinopathy Screening System that leverages deep learning for multi-class severity classification of retinal fundus images. The system is built using a lightweight MobileNetV3 architecture with transfer learning, enabling efficient feature extraction while maintaining computational feasibility for low-resource environments. To address dataset imbalance, a weighted cross-entropy loss function is employed, ensuring improved sensitivity across minority classes.

The proposed system integrates an Explainable Artificial Intelligence (XAI) component using Gradient-weighted Class Activation Mapping (Grad-CAM), which highlights critical retinal regions influencing model predictions, thereby enhancing interpretability and trust. Additionally, the system generates a confidence score and structured clinical recommendations based on the predicted severity level. Experimental evaluation on the APTOS 2019 dataset demonstrates a validation accuracy of 81%, indicating reliable performance for screening-level applications.

The developed prototype provides a practical and interpretable solution for early DR detection and can serve as a supportive tool for healthcare professionals, particularly in resource-constrained settings. Future work includes uncertainty estimation, multi-dataset validation, and clinical deployment studies to improve robustness and real-world applicability.

Keywords

Diabetic Retinopathy, Deep Learning, MobileNetV3, Fundus Image Classification, Medical Image Analysis, Transfer Learning, Class Imbalance Handling, Explainable AI (XAI), Grad-CAM, Automated Screening System, Computer-Aided Diagnosis (CAD), Healthcare AI.

AUTOMATED GASTROINTESTINAL DISEASE DETECTION USING DEEP LEARNING

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Paper ID: ICCT26056

ABSTRACT

Gastrointestinal (GI) diseases, including polyps and colorectal cancer, are significant health concerns that require early diagnosis for effective medical intervention. While endoscopic imaging is the primary tool for detection, manual analysis is often subjective, time-consuming, and prone to human error. This project introduces an automated deep learning-based system designed to enhance diagnostic efficiency and accuracy in medical image analysis.

The proposed system utilizes a dual-architecture approach leveraging the Kvasir dataset for robust training and evaluation. A Convolutional Neural Network (CNN) is employed for high-accuracy image classification to distinguish between benign and malignant conditions, while the U-Net architecture is utilized for precise, pixel-level polyp segmentation. To ensure clinical interpretability, the system features a visualization module that overlays predicted segmentation masks onto original endoscopic images, providing clear insights for medical professionals.

Experimental results demonstrate strong performance, with the system achieving a Precision of 93%, a Recall of 95%, and an overall Accuracy ranging from 75% to 86%. By significantly reducing manual effort and false negatives, this prototype serves as a reliable clinical decision support tool, particularly suitable for early detection in modern healthcare environments. Future enhancements focus on integrating advanced models like ResNet or EfficientNet and deploying the system for real-time hospital use.

Keywords

Gastrointestinal Disease, Deep Learning, CNN, U-Net, Polyp Segmentation, Kvasir Dataset, Medical Image Analysis, Computer-Aided Diagnosis (CAD), Endoscopy AI, Clinical Decision Support.

INTERACTIVE CYBERSECURITY SIMULATION PLATFORM WITH REAL-TIME INTRUSION DETECTION SYSTEM

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Paper ID: ICCT26057

ABSTRACT

This paper presents a comprehensive network security simulation platform designed to bridge the gap between theoretical cybersecurity knowledge and practical application. The system integrates a React/Vite frontend with a FastAPI backend and MongoDB database, enabling users to simulate Denial-of-Service (DoS), Port Scanning, Brute Force, and Man-in-the-Middle (MITM) attacks in a controlled educational environment. A machine learning-based Intrusion Detection System (IDS) analyzes simulated network traffic in real-time, achieving 94.6% detection accuracy. The platform supports JWT-based authentication, role-based access control, and real-time visualization through interactive dashboards. Comparative evaluation against established tools Mininet and NS3 demonstrates superior usability, response time (1.2 s average), and integrated detection capability.

VISION

To produce exemplary computer engineers by offering quality technical education to rural students for developing the society

MISSION

1. To **C**reate a center of excellence in computer education to meet the industrial needs.

2. To **S**harpen the skills of students to survive in the competitive technological world.

3. To **E**nlighten the students to become socially responsive computer engineers.

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