

Universal Engineering College

Department of computer science and engineering

GIGA CHRONICLES 22-23



Vision ●

Empower universally equipped computational technocrats having innovative entrepreneurial skills with holistic values.



Mission ●

- With well experienced faculty members and excellent infrastructure, provide way to equip universally acclaimed computational technocrats.
- With institute industry interaction, develop apt skill in entrepreneurship innovativeness.
- Provide value based education to meet the technical and computational needs of the society



Program Specific Outcomes ●

PSO1: Ability to provide refined solutions based on expert knowledge in evolutionary change in computing environment and entrepreneur practises to the various needs of the society.

PSO2: Impart skills to solve problems in the area of computer programming and appraise environmental and social issues with ethical sustainable solutions .

PSO3: Disseminate wider knowledge of various latest domains to analyse and determine research gaps and hence provide solutions by new ideas and innovations.



Program Educational Objectives ●

- PE01: Inculcate ability to analyse the computer science and engineering problems by assimilating technical knowledge .
- PE02: To groom the students to be adaptable to the ever changing technological challenges and career opportunities.
- PE03: To make students proficient in fundamental knowledge and engross them in pursuing higher education and research oriented activities.

MEET OUR TEAM



Najla Nazer
Asst.pro CSE



Nighila Ashok
Asst.pro CSE



Mohamed Rasnal
S8 CSE



Shabana K S
S4 CSE



Devika Madhu
S6 CSE



Akshaya
Unnikrishnan
S2 CSE

We would like to express gratitude to all those who have contributed to the production of this year's magazine. Without your support, this would not have been possible. We would like to thank our editorial team for their hard work and dedication in bringing together this wonderful publication. We also extend our appreciation to Our, Principal Dr. Jose K. Jacob, Dr. Sreeraj R, H.O.D (CSE), magazine incharges Ms. Najla Nazer and Ms.Nighila Ashok, who have contributed their valuable insights and expertise. We are grateful to our staffs and students, who have submitted their articles, artwork, and photographs, which have added color and vibrancy to this magazine. "GIGA CHRONICLES" (2022-23).

MESSAGE FROM HEAD OF THE DEPARTMENT



Dear Students, Faculty, and Readers,

As we welcome the academic year 2022-2023, I am excited to address our dynamic Computer Science and Engineering community at Universal Engineering College. This year promises to be a period of growth, innovation, and continued excellence.

Our faculty's unwavering commitment to education and mentorship has been instrumental in our success. They have adapted to new teaching methods and provided unparalleled support, ensuring that our students remain engaged, motivated, and well-prepared for the challenges of the technological world.

To our students, your passion for learning and perseverance in the face of challenges are truly inspiring. As you embark on this new academic journey, I encourage you to embrace every opportunity for growth and innovation. Your efforts will not only shape your future but also contribute to the advancement of technology on a global scale.

This magazine is a celebration of our collective achievements and a testament to the talent and creativity within our department. It showcases the collaborative spirit and innovative mindset that are the hallmarks of Universal Engineering College.

I extend my heartfelt thanks to everyone who has contributed to this publication and to those who have supported our department's endeavors. Your dedication and hard work are deeply appreciated.

Let us continue to inspire, innovate, and excel as we move forward into an exciting and promising academic year.

CONTENTS

- 1 STARE : AUGMENTED REALITY DATA VISUALIZATION FOR EXPLAINABLE DECISION SUPPORT IN SMART ENVIRONMENT
- 2 DRONE-YOLO : AN EFFICIENT NEURAL NETWORK METHOD FOR TARGET DETECTION IN DRONE IMAGES
- 3 A HYBRID SPEECH ENHANCEMENT ALGORITHM FOR VOICE ASSISTANCE APPLICATION
- 4 AN EDGE TRAFFIC FLOW DETECTION SCHEME BASED ON DEEP LEARNING IN AN INTELLIGENT TRANSPORTATION SYSTEM
- 5 FIGHTING DEEPFAKE BY EXPOSING THE CONVOLUTIONAL TRACES ON IMAGES
- 6 HANDWRITING BASED TEXT LINE SEGMENTATION FROM MALAYALAM DOCUMENTS
- 7 SMART TRAFFIC MONITORING THROUGH PYRAMID POOLING VEHICLE DETECTION AND FILTER-BASED TRACKING ON AERIAL IMAGES
- 8 TRAINING A DISASTER VICTIM DETECTION NETWORK FOR UAV SEARCH AND RESCUE USING HARMONIOUS COMPOSITE IMAGES
- 9 DETECTION OF DIABETIC RETINOPATHY IN RETINAL FUNDUS IMAGES USING CNN CLASSIFICATION MODELS
- 10 DEEP LEARNING-BASED SIGN LANGUAGE RECOGNITION SYSTEM FOR STATIC SIGNS
- 11 CORRELATING PSYCHOPHYSIOLOGICAL RESPONSES OF EXERGAMING BOXING FOR PREDICTIVE HEART RATE REGRESSION MODELS IN YOUNG ADULTS
- 12 AI-BASED LEARNING STYLE PREDICTION IN ONLINE LEARNING FOR PRIMARY EDUCATION
- 13 TRAJECTORY-BASED AIR-WRITING RECOGNITION USING DEEP LEARNING NEURAL NETWORK AND DEPTH SENSOR
- 14 REAL-TIME SURVEILLANCE USING DEEP LEARNING

STARE : AUGMENTED REALITY DATA VISUALIZATION FOR EXPLAINABLE DECISIONSUPPORT IN SMART ENVIRONMENT



STARE deals with the intersection of the Internet of Things (IoT) and Augmented Reality (AR) in making real-time decision-making within smart environments. It emphasizes the opportunities arising from the diverse data generated by IoT, underscoring the imminent mainstream adoption of AR as a tool for ubiquitous data visualization. The integration of AR is depicted as a means to not only visualize but also cognitively and visually bind information to the corresponding physical objects. Recognizing the challenges of efficiently managing and prioritizing this wealth of data for immediate decision-making, the paper introduces the AR decision support framework, STARE. This framework aims to enhance decision-making by associating semantically relevant IoT data and suggestions with the user's focal objects.

**ADHIN KOOTALA S6
CSE**

DRONE-YOLO : AN EF-FICIENT NEURAL NETWORK METHOD FOR TARGET DETECTION IN DRONE IMAGES



Drone-YOLO, a set of object detection algorithms specifically designed for unmanned aerial vehicle (UAV) imagery. UAV imagery presents unique challenges, such as large image sizes, small object sizes, dense distribution of objects, overlapping instances, and insufficient lighting. To address these challenges, the paper propose enhancements to the YOLOv8 model. The improvements include modifications to the neck component of YOLOv8, where a three-layer PAFPN structure is employed. This structure, along with a tailored detection head for small-sized objects using large-scale feature maps, significantly improves the algorithm's ability to detect small targets. The proposed Drone-YOLO methods are evaluated through ablation experiments and compared with other state-of-the-art approaches on the VisDrone2019 dataset.

MOHAMMED RASNAL

S8 CSE

A HYBRID SPEECH EN-HANCEMENT ALGORITHM FOR VOICE ASSISTANCE APPLICATION



Non-linear spectral subtraction, a well-known speech enhancement algorithm, is optimized with the Hidden Markov Model and tested with 6660 medical speech transcription audio files and 1440 Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS) audio files. The performance of the proposed model is compared with those of various typical speech enhancement algorithms, such as iterative signal enhancement algorithm, subspace-based speech enhancement, and non-linear spectral subtraction. The cascading of the speech enhancement and speech-to-text conversion architectures results in higher accuracy for enhanced speech recognition. The evaluation results confirm the incorporation of the proposed method with real-time automatic speech recognition medical applications where the complexity of terms involved is high.

ANJANA K DAS
S6 CSE

AN EDGE TRAFFIC FLOW DETECTION SCHEME BASED ON DEEP LEARNING IN AN INTELLIGENT TRANSPORTATION SYSTEM



An Intelligent Transportation System (ITS) is a crucial part of handling public transportation and ensuring safety. A key component of this system involves understanding how traffic moves. This understanding allows the system to provide helpful guidance to reduce traffic congestion and environmental harm. Typically, in an ITS, traffic flow information comes from cameras on roads, and this data travels to a central computer system in the cloud. But as more cameras are used, dealing with all this data becomes challenging for the usual cloud-based systems. To solve this challenge, a new approach suggests using smarter, smaller devices at the edge of the network. Here's the breakdown: First, there's a clever model called YOLOv3, trained with a ton of traffic data. This model figures out where vehicles are in the video footage. Then, there's another intelligent system called DeepSORT.

NANDANA NARAYANAN

S8 CSE

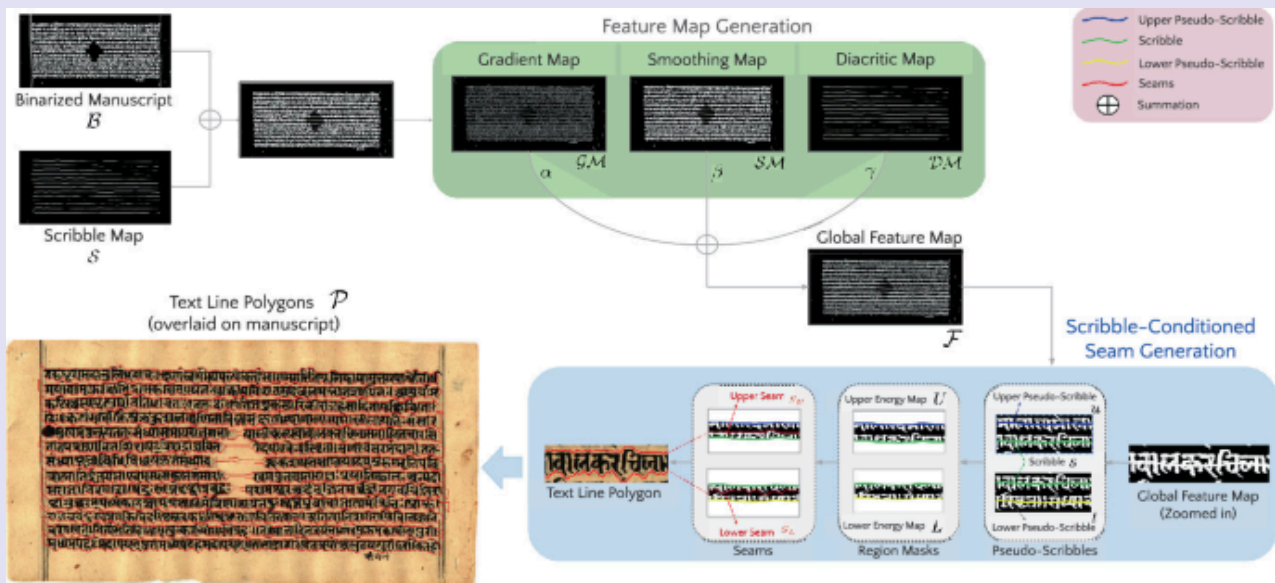
FIGHTING DEEPPFAKE BY EXPOSING THE CONVOLUTIONAL TRACES ON IMAGES



Advancements in Artificial Intelligence (AI) and Image Processing are transform-ing the way people interact with digital images. Mobile applications like FACEAPP using Generative Adversarial Networks (GANs) to create extreme transformations in human facial photos, such as gender swapping and aging. These transforma-tions, known as Deepfakes, present a significant challenge in multimedia , making the detection of manipulated media crucial.However, existing methods, primarily using Convolutional Neural Networks (CNNs), struggle with the intricate task of distinguishing Deepfakes from real images. They exhibit limitations in robustness,context specificity, and reliance on image semantics.This paper proposes a novel approach based on the Expectation-Maximization algorithm to extract unique Con- volutional Traces (CTs) left by GANs during image generation.

MANOJ M
S6 CSE

HANDWRITING BASED TEXT LINE SEGMENTATION FROM MALAYALAM DOCUMENTS



Optical Character Recognition systems for Malayalam handwritten documents have emerged as a significant research area, but a notable challenge has been the scarcity of comprehensive databases. Addressing this gap, this paper introduces a novel database comprising 402 Malayalam handwritten document images, accompanied by ground truth images encompassing 7535 text lines. The development of this database is crucial for evaluating and implementing the proposed technique. Innovative method for extracting text lines from handwritten Malayalam documents, focusing on the distinctive characteristics of the script. The technique relies on factors such as horizontal and vertical projection values, handwritten character size, text line height, and the curved nature of Malayalam alphabets.

POOJA KD
S4 CSE

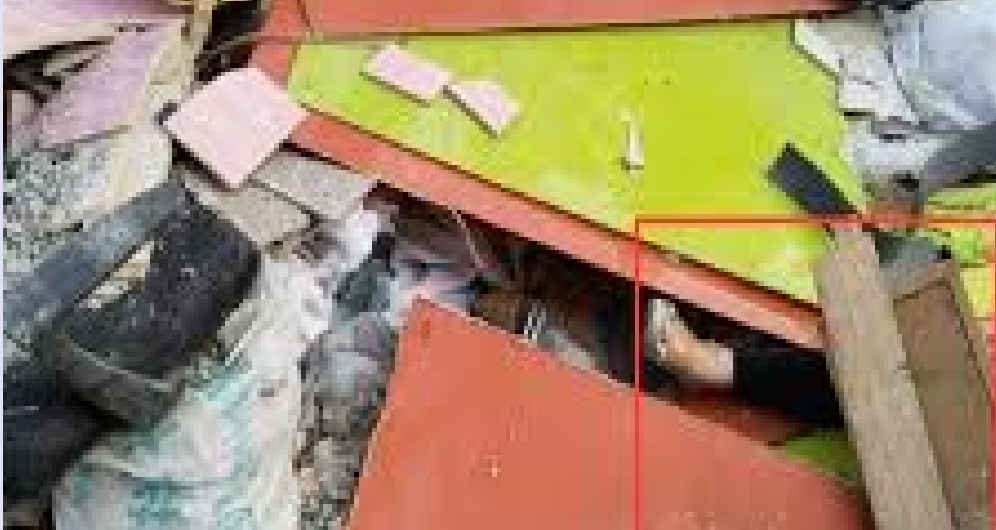
SMART TRAFFIC MONI-TORING THROUGH PYRAMID POOLING VEHICLE DETECTION AND FILTER-BASED TRACKING ON AERIAL IMAGES



The methodology harnesses a Convolutional Neural Network (CNN) to segment aerial imagery. These segmented images undergo advanced analysis, integrating a unique customized pyramid pooling technique to accurately detect vehicles. Once identified, the system categorizes these vehicles into distinct subcategories. To effectively manage heavy traffic volumes with minimal human intervention, the system implements Kalman filtering (KF) and kernelized filter-based tracking techniques. During extensive experimental evaluations, the proposed system showcased an impressive vehicle detection rate and accuracy over the German Aerospace Center (DLR) DLR3K datasets. The applications of this proposed system are diverse and impactful. They encompass vehicle identification within traffic, assessment of road congestion, determination of traffic density at intersections, diverse vehicle type detection, and facilitation of pedestrian pathways.

ARSHA K B
S2CSE

TRAINING A DISASTER VICTIM DETECTION NETWORK FOR UAV SEARCH AND RESCUE USING HARMONIOUS COMPOSITE IMAGES

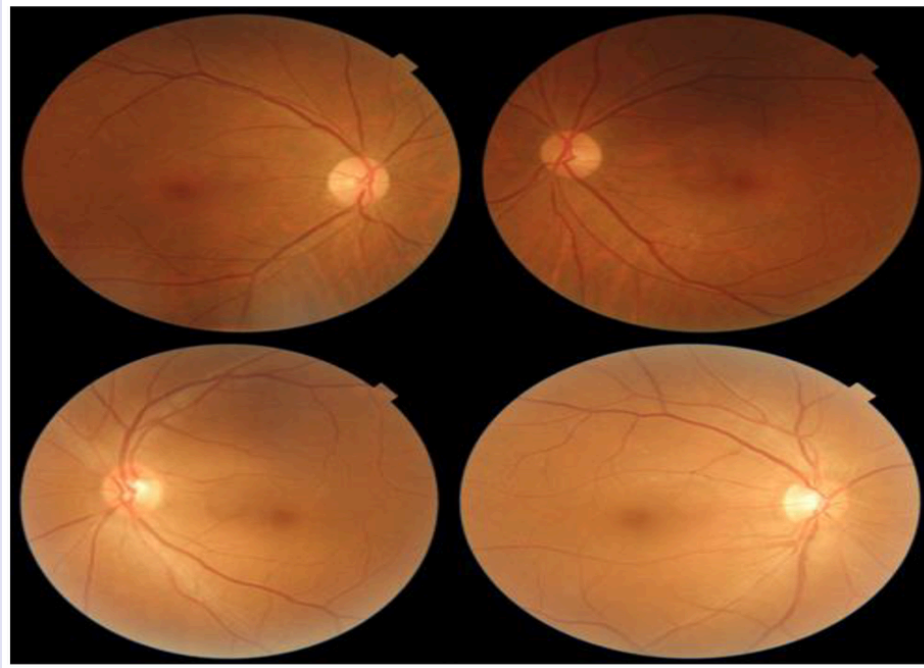


In recent years, using deep learning for finding people in images has been popular and successful. Training computers to spot people is crucial for rescuers searching for trapped individuals in debris after disasters. This study specifically looks at using deep learning to find these trapped victims and discovers that current top models struggle with this task. The researchers have been using computers to find people in pictures, which can be helpful for rescuers after a disaster. But when they tried to use this to find trapped people in the mess after a disaster, it didn't work well.

The problem was that the computers were trained on photos of everyday life, not on pictures from disasters. In real disasters, it's hard to see the people stuck in debris because they're partly hidden and covered in dust. Their clothes or body parts look like the debris around them, making it tough for computers to find them.

MEGHA K P
S2 CSE

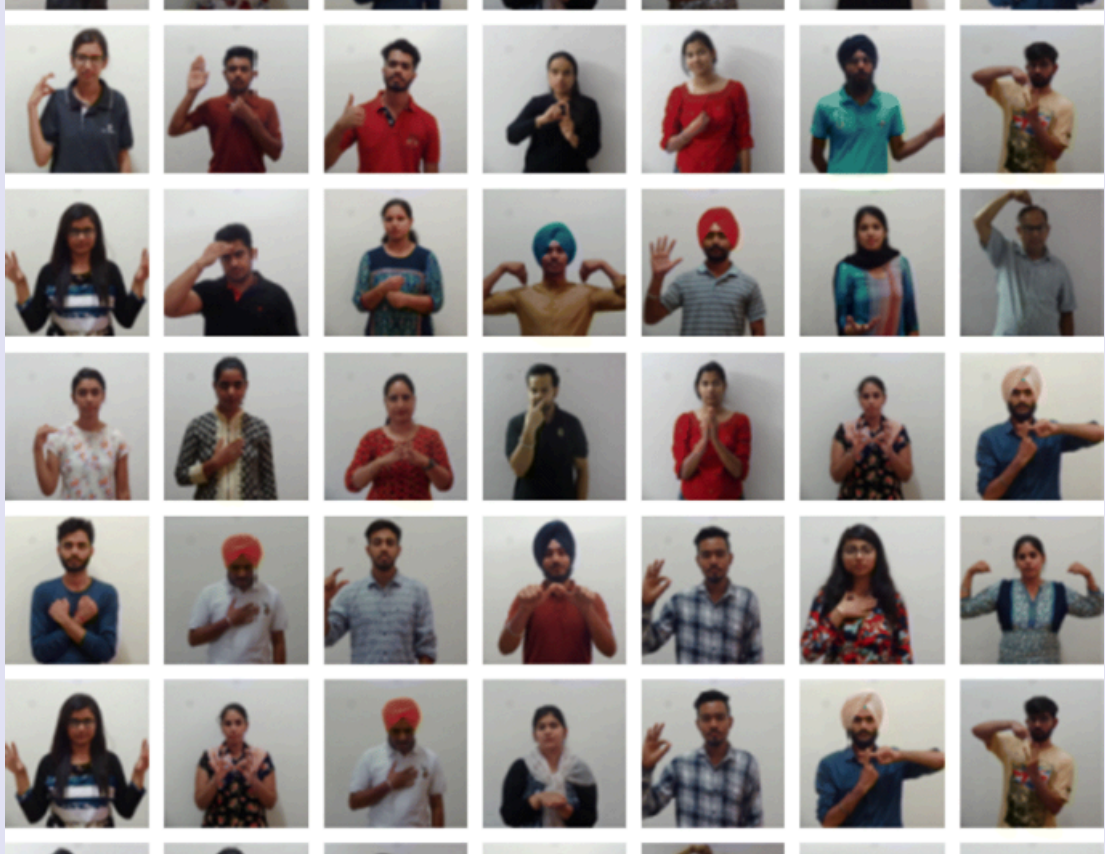
DETECTION OF DIABETIC RETINOPATHY IN RETINAL FUNDUS IMAGES USING CNN CLASSIFICATION MODELS



Diabetes is a prevalent disease that can lead to diabetic retinopathy, macular edema, and other microvascular complications in the retina. Recognizing the challenges posed by the diversity and complexity of DR, the research employs a deep learning approach, specifically a convolutional neural network (CNN), on fundus photography to discern different stages of DR. The dataset utilized, obtained from Xiangya No.2 Hospital Ophthalmology in Changsha, China, presents challenges such as size, imbalance in labels, and limited data. To overcome these hurdles, the study introduces a comprehensive methodology involving preprocessing, regularization, and augmentation, aimed at enhancing and preparing the XHO image dataset for effective training and improved model performance.

AKSHAYA K S
S4 CSE

DEEP LEARNING-BASED SIGN LANGUAGE RECOGNITION SYSTEM FOR STATIC SIGNS

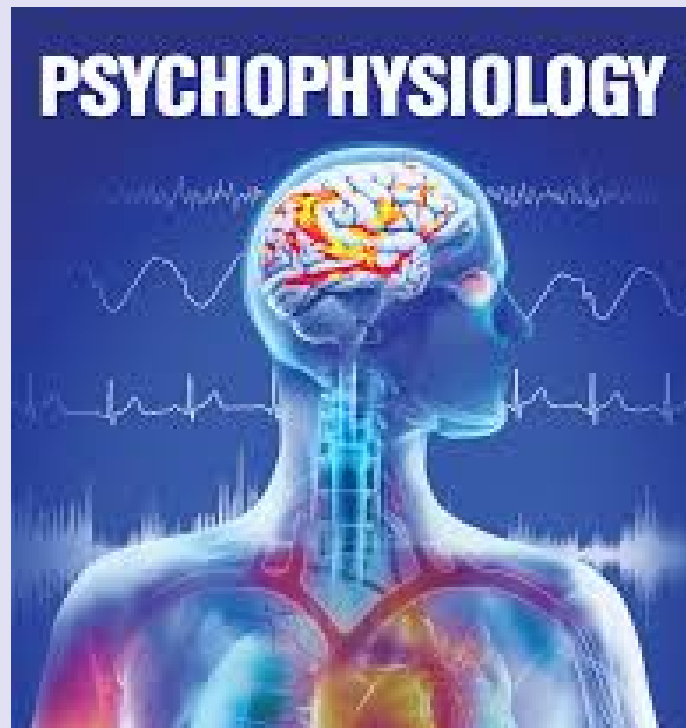


The earliest work in Indian Sign Language (ISL) recognition considers the recognition of significant differentiable hand signs and therefore often selecting a few signs from the ISL for recognition. Sign language for communication is efficacious for humans, and vital research is in progress in computer vision systems. This paper deals with robust modeling of static signs in the context of sign language recognition using deep learning-based convolutional neural networks (CNN). In this research, total 35,000 sign images of 100 static signs are collected from different users. The efficiency of the proposed system is evaluated on approximately 50 CNN models.

RUBEENA ABDUL JABBAR

S6 CSE

CORRELATING PSYCHOPHYSIOLOGICAL RESPONSES OF EXERGAMING BOXING FOR PREDICTIVE HEART RATE REGRESSION MODELS IN YOUNG ADULTS



The study aimed to validate correlations between heart rate (HR) and rating of perceived exertion (RPE) during seated and standing exergaming boxing. Thirty healthy adults (mean age: 25.10 ± 2.95 years) engaged in 10 minutes of exergaming boxing in both positions. HR measurements were taken at rest and during gameplay, while RPE was assessed using Borg's modified (1–10) and original (6–20) scales. A predictive regression model for HR estimation from reported RPE was derived based on the significant Pearson's correlations.

BADARUNNISA T S

s8 cse

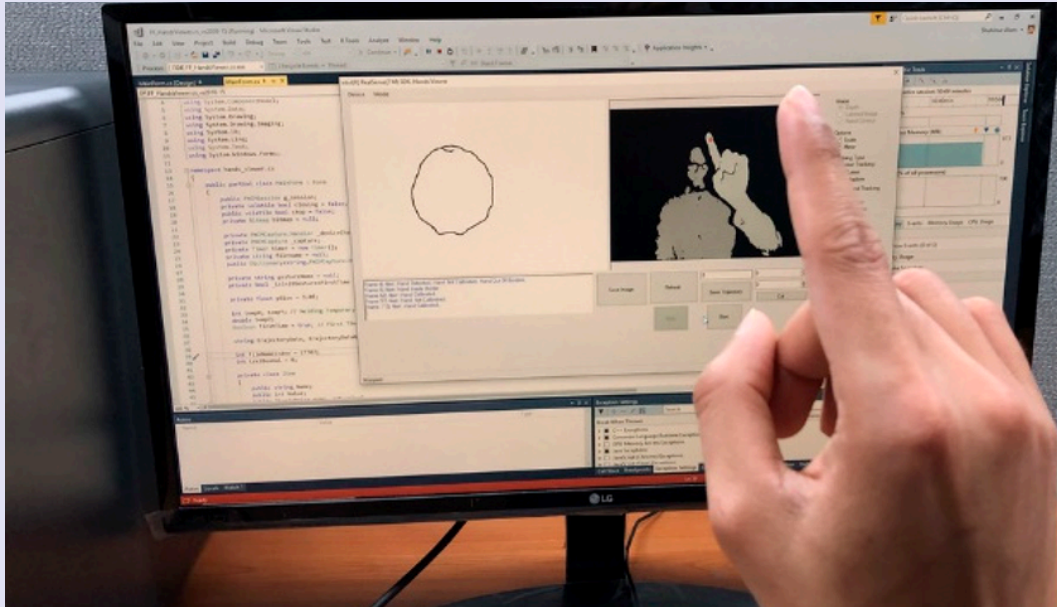
AI-BASED LEARNING STYLE PREDICTION IN ONLINE LEARNING FOR PRIMARY EDUCATION



AI model embedded in the online learning portal was engineered to recommend learning materials that are tailored to each student's unique learning style . A novel AI approach was formulated, allowing collaborative filtering-based AI models to be guided by learning style predictions . Through this AI algorithm, the online learning portal can offer material suggestions specifically aligned with the learning style of each student . The performance evaluation of the AI model yielded satisfactory results, with an average Root Mean Squared Error (RMSE) of 0.9035 on a rating scale of 1 to 5 . Additionally, an analysis of the t-test results on 269 subjects revealed an improvement in students' learning performance when comparing pre-test and post-test scores.

NAYANA M
s4 cse

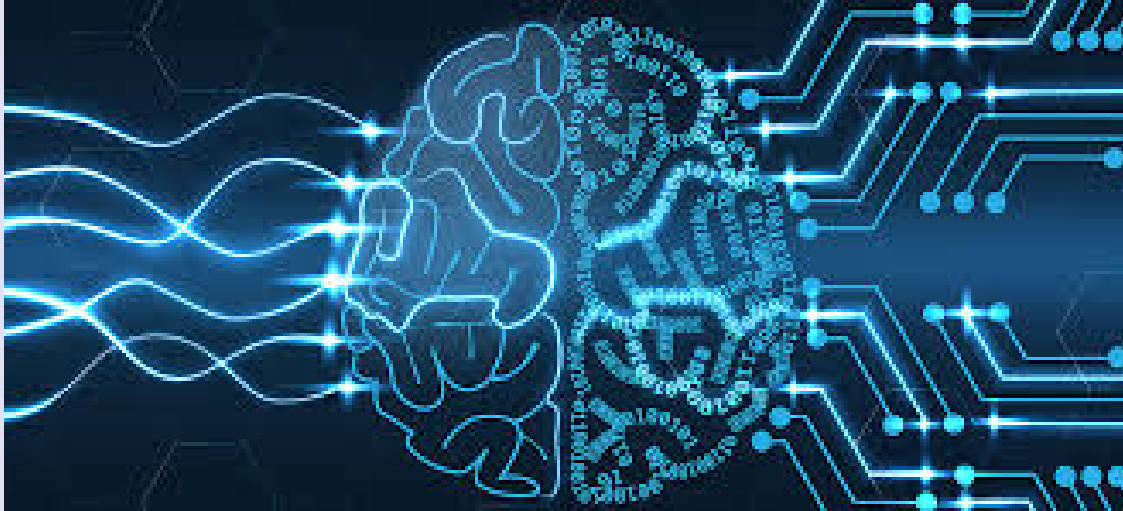
TRAJECTORY-BASED AIR-WRITING RECOGNITION USING DEEP LEARNING NEURAL NETWORK AND DEPTH SENSOR



A trajectory based writing system involves creating words or characters in open space by moving a finger, marker, or handheld device. This method is useful insituations where traditional pen up and pen down writing systems are inconvenient.Unlike more complex gesture based systems, trajectory based writing is simpler but presents challenges due to variations in characters and writing styles.In our research, we developed a system that recognizes air writing using three dimensional trajectories captured by a depth camera tracking the fingertip. To enhance feature selection,we employed nearest neighbor and root point translation techniques to normalize the trajectory.

ANJALI N B
s2 cse

REAL-TIME SURVEILLANCE USING DEEP LEARNING



Ensuring the safety and security of individuals and assets through effective surveillance is paramount. Addressing the challenges posed by current surveillance systems, which are often costly and intricate, calls for the development of a more accessible solution that remains both cost-effective and efficient. The proposal introduces an aerial surveillance system utilizing quadcopters equipped with cutting-edge image processing technology. This technology captures detailed images of the monitored area, enabling the identification of any unusual activities such as individuals carrying weapons or facial recognition for enhanced surveillance. Upon detecting such anomalies, the system generates alerts for security personnel. The approach centers around quadcopter surveillance and video streaming, employing deep learning models for anomaly detection in the received video streams.

NISMA NAVAS

s6 cse



