Project

PRISM

B. Tech. (2024-25)

Reflections of

Artificial Intelligence & Data Science Excellence

Prepared by :

Department of AI & DS, DJSCE

PREFACE

It gives us immense pleasure to present **Project Prism: Reflections of Artificial Intelligence & Data Science Excellence**, a thoughtfully curated abstract booklet showcasing the innovative project work and research contributions of our final-year B.Tech. Students from the Department of Artificial Intelligence (AI) and Data Science.

Project Prism reflects the multifaceted brilliance of our students — like light dispersed through a prism, each project shines uniquely while emerging from a common foundation of knowledge, curiosity, and rigorous training. These abstracts illustrate the students' ability to apply advanced AI and data science techniques to address complex, real-world challenges with creativity, responsibility, and technical precision.

Spanning a wide range of themes including intelligent healthcare, predictive analytics, smart systems, cognitive computing, and ethical AI, these projects mirror the spirit of innovation and excellence that our program aims to instill. The diversity and depth of topics underscore the transformative potential of AI & DS in solving today's pressing problems and shaping tomorrow's technological landscape.

This booklet not only serves as a record of academic accomplishments but also as a source of inspiration for students, educators, researchers, and industry practitioners alike. We commend the dedication of our students and deeply appreciate the mentorship and support provided by our faculty members in guiding them through their research journey.

We hope that Project Prism will continue to be a beacon of the academic spirit, collaborative inquiry, and excellence that defines our department.

Department of Artificial Intelligence (AI) & Data Science
Dwarkadas J. Sanghvi College of Engineering
May, 2025.

AI BASED SYSTEM FOR PATHOGEN IDENTIFICATION IN HEARING LOSS GENETIC DISORDER

Submitted by ,

Vansh Chheda
Lavanya Subramanian
Miloni Panchal
Antara Kadam

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Dr. Narendra Shekokar

Abstract

Hearing loss due to genetic factors is among the most inherited disorders, occurring in one out of every thousand newborns all over the world. This project presents a fully automated, AI-driven system developed to detect pathogenic genetic variants associated with hearing loss. The workflow involves six key stages—beginning with parsing of Variant Call Format (VCF) files and annotation using established databases such as dbNSFP and Ensembl VEP, followed by meticulous data cleaning, imputation of missing values, and transformation into a structured format. To reduce noise and improve model accuracy, advanced feature selection methods were applied, including Random Forest (RF), Recursive Feature Elimination (RFE), BorutaPy, XGBoost, CatBoost, and a hybrid RF-CatBoost ensemble. From a dataset of over 25,000 curated hearing-loss-related variants, the top 10 predictive features were selected and used to train a custom deep learning model featuring embedding layers, residual blocks, and attention mechanisms. This model reached 97.2% accuracy, 96.8% precision, and a 0.981 area under the ROC curve (AUC) on the validation set. It kept prediction speed under 5 seconds for 10,000 samples. Adding tools like SHAP and Grad-CAM makes the model's predictions clear. These tools help doctors grasp the reasons behind each outcome. The platform also features a user-friendly web interface that supports real-time uploads, progress tracking, multi-session processing, and downloadable visual outputs—making it accessible even to those with limited technical background. Built with scalability and adaptability in mind, the system can easily integrate with existing clinical workflows and supports variant input from diverse population datasets. By automating the most time-consuming steps of genomic interpretation and ensuring each prediction is both fast and traceable, this tool represents a meaningful step forward in the diagnosis of genetic hearing loss. It not only improves diagnostic accuracy and reduces turnaround time but also lays the foundation for broader applications in other rare genetic conditions and personalized medicine.

Zero-knowledge Enhanced Adaptation Learning (ZEAL): A Framework for Verifiable Model Adaptation

Submitted by ,
Dhrumil Panchal
Hrushik Mehta
Pragati Shetty

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Dr. Pratik Kanani

Abstract

A novel zero-knowledge proof (ZKP) paradigm enables verifiable language model adaptation without exposing proprietary parameters or datasets. Traditional verification requires full disclosure, creating privacy risks in sensitive domains like healthcare and finance. Our approach integrates polynomial commitments with an optimized proof scheme using Kate-Zaverucha-Goldberg (KZG) commitments to ensure adaptation integrity while preserving confidentiality. Implementation with a GPT-2 model fine-tuned on medical data achieved 46.2% loss reduction while generating cryptographic proofs in 84.44 seconds, with 36MB proof size and 0.303 compression ratio. The system produced 124,503 commitments with average polynomial degree of 10.0. Total runtime was 142.57 seconds (adaptation: 58.13s; proof generation: 84.44s), with 3.36GB memory usage. The workflow includes capability evaluation, fine-tuning, re-evaluation, polynomial conversion, commitment generation, and proof storage. While challenges remain in proof generation costs and scalability, this framework advances privacy-preserving AI verification for sensitive applications.

Multi-Label Object Detection using Multi-model R-CNN

Submitted by ,

Armaan Attar
Fayed Hakim

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Dr. Pratik Kanani

Abstract

Modern deep learning models require large amounts of labeled data and high computational power, especially for tasks like object detection that involve complex scenes and many object classes. These challenges become even more difficult in multi-label settings, where the model needs to detect multiple overlapping objects from different categories. Previous research has explored using graph structures to represent relationships between classes, and Mixture of Experts (MoE) to divide work across specialized sub-models. In this paper, we combine both ideas by introducing a Graph-based Mixture of Experts (GMoE) architecture for multi-label object detection. Our method groups related object classes into smaller subsets and assigns each to a dedicated expert model. A graph built using class co-occurrence data helps decide which experts should be used for each image, reducing unnecessary computation. We test our approach on a custom version of the COCO 2017 dataset, using RetinaNet with a ResNet-50 FPN backbone. The model shows strong performance on large and complex scenes, achieving a mean Average Precision (mAP) of 0.7431 on the "Outdoor" class, while smaller objects like "Kitchen" items remain challenging at 0.1484 mAP. Although focused on object detection, this architecture can be applied to other tasks where speed, accuracy, and modular design are important.

ZAPDOS : Zero-shot AI-Powered and Dynamic Optimized Summarization (for question generation)

Submitted by ,

S. Upadhyay
A. George
A. Kattukaran
B. Vaidya

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Dr. Pratik Kanani

Abstract

The latest developments in Large Language Models have revolutionized automated educational content generation thus creating improved educational experiences. The quality of generated questions depends on how clear the original input is. To enhance the procurement of questions this study develops more effective input data processing. This approach utilizes key concept extraction to initiate a context-aware summarization procedure supported by TextRank, LexRank, LSA, along with LUHN-based summarization methods. The method minimizes token usage which promotes both faster operation and economical benefits. When input quality increases it produces questions which make information easier to understand for students. ZAPDOS cuts input tokens down by 45% which helps reduce computational expenses by 19% when using GPT-4 Turbo. The FairytaleQA benchmark reveals that ZAPDOS generates questions with high quality that achieves geometric matches to human references through ROUGE scores of 0.93, 0.90 and 0.93. Reliable question generation capabilities have been achieved simultaneously with reduced operational spending.

EDUMAP: MULTI-DOCUMENT SUMMARIZER AND MIND-MAP GENERATOR

Submitted by,

Riya Surya
Aryan Kapoor
Tanmay Modi
Vritti Shah

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Shruti Dodani

Abstract

Historically, mind map creation is done manually by drawing objects and their interconnections, a process that can be time-consuming. This study seeks to streamline this process through the automation of summarization and mind map generation from several PDF documents. The software uses current Natural Language Processing (NLP) technologies to summarize the contents of several PDFs and determine key concepts and relationships. The system is composed of three primary modules: a PDF summarizer, a semantic relation extractor, and a mind map generator. The PDF summarizer deals with several documents, whereas the semantic relation extractor determines the associations among major concepts. These associations are then displayed in the mind map through the combination of radial and hierarchical layout algorithms. The system was tested using two experiments: testing the accuracy of PDF summarization and testing the mind map visualization effectiveness using user feedback.

DECEPTECH AI: ADVANCING LIE DETECTION THROUGH MULTIMODAL NONVERBAL BEHAVIOR ANALYSIS

Submitted by,

Priyansh Bindroo
Rahi Bhuva

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Shruti Dodani

Abstract

Deceptech AI is a real-time, AI-operated lie detection system that is designed to analyze non-conhibited behavioral signs using advanced machine learning and computer vision techniques. Traditional methods such as polygraph tests and voice-stress analyzers often face borders such as invasion, dependence on physical signals, and sensitivity to human bias. Deceptech ai depends on these challenges completely visible, non-oblivious signs such as facial subtle-views, gaze direction, blink rate, lip compression, hand-by-facial gestures and emotional manifestations. The system uses the Miami University Deception Detection Detection Database (MU3D), which includes 320 anotate video clips labeled in the form of truth or deception. Each video is processed using Medapipe facemesh and hands, which remove wide face and hand sites. Facilities are then calculated from these sites, such as blink frequencies, lips tightness, gaze direction vector, and proximity to the hands on the face. These features are stored in the structured CSV format and cleaned through normalization and copy techniques. For classification, several machine learning models were tested, including logistic region, feedforward neural network (FNN), and long short -term memory (LSTM). LSTM model, due to its ability to catch temporary behavior pattern, improved others and gained 81.52% accuracy, with an accuracy of 0.78 deception-class, remembering 0.83 and AUC-Roc of 0.86. The system was deployed using OpenCV to process real -time webcam input and obtained stable performance in 30 frames per second. Live feedback includes a visual overlay with a probability score of a deception on the user's face and hands, making it useable in interviews, online proctoring and testing scenarios. Feature Importance Analysis confirmed that gaze direction (34%), lip compression (25%), and blink rate (14%) are the most important signs in identifying misleading behavior, which align with psychological principles of behavior leakage. Despite the promising results, challenges remain in low-light conditions or worn frames, which sometimes affect landmark detection accuracy. Future reforms include integrating audio features such as pitch and speech hesitation, involving physiological sensors for stress-based signals and more cultural and demographically expand the dataset with diverse subjects.

There is also a scope for converting desptec AI into a cloud-based tool or mobile application, which enables scalable sins in corporate, educational and legal domains. In addition, explain AI (XAI) methods can be added to provide transparency in predictions, highlighting the characteristics contributing to the output of the model, thus the system is more interpreted for forensic or legal DecepTech AI AI_DS Department, DJSCE ii use. Finally, Deceptech AI represents a significant progress in the field of behavioral analysis and deception, offering a scalable, fair and practical option for traditional methods with strong real -time abilities and high predicted performance.

Stacked Ensemble-Based Framework for Predicting Market and Tactical Fit in Football Transfers

Submitted by ,

Vedant Bhawnani
Shubh Harde

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Shruti Dodani

Abstract

The transfer markets in football are a dynamic and pivotal period which entails a state of volatility where teams and clubs strategize and aim to strengthen their teams. This is more often than not preceded by in-depth analysis of data related to hundreds of promising and prospective players to find the perfect replacement for the outgoing player. This analysis currently includes labour-intensive tasks of manual video reviews and scouts going to games to watch a prospect play. This research introduces the Football Player Replacement Finder, a novel approach to reduce the complexity and time required for scouting and acquiring impactful talents by using advanced machine learning models and automated data scraping pipelines. Our system employs supervised models for gauging the performance and price of football players along with clustering techniques for player profiling, enabling stat-by-stat comparison of players. By integrating advanced metrics along with appealing visualisations, our system empowers decision-makers to streamline their scouting process and uncover valuable talents effectively

ECHO: A Mental Wellness Support System

Submitted by ,

Pranay Maniar
Ishani Bhadlikar
Hamza Bubere

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Deepali Patil

Abstract

The issues surrounding the mental health of students offers educational institutions and health care providers unique challenges. Recently surveys indicate that roughly 35% of students who suffer from mental health problems seek the help they need. The large discrepancy between the amount of therapeutic and psychological aid givers and users calls for new solutions for mental health assistance. There are always traditional counseling services available, but they have too many people to cater to making them useless to many in need. Moreover many students have stated that they face stigma and time shortages as barriers to seeking proper professional aid. The need for suitable help has led to exploring the further realms of technology which help overcome these boundaries but do not cross appropriate clinical limits. Our goal is to construct an intelligent assistant system that overcomes all barriers using advancements AI has presented. We selected the integration of both language models and emotional intelligence features to build a platform that will serve as a student's first point of contact for mental health issues. This method focuses on reducing barriers and protecting privacy. The system captures the user's emotional state and intent using sophisticated natural language processing and tailors the response to the user's needs while still keeping with clinical best practices. The project details our attempts at building and deploying this specialized AI-driven mental health support system. We show how integrating emotional intelligence into the system is done. The engineering complementing therapeutic engagement is explained and the initial evaluation results of the system prototype are analyzed. Our AI-enabled support systems suggest a solution by being available around the clock, lowering barriers to access and providing ongoing emotional support with user privacy maintained. These systems are able to provide initial points of contact and help users figure out the type of professional care they need. The system uses a combination of focused intent recognition training and emotional state classification training. We have built a platform that can properly understand users' needs. The implementation continues existing gaps in the literature of AI assistance in mental health to develop and end-to-end support system. By combining emotional intelligence and

clinical insight the system provides appropriate user assistance while adhering to professional limits. The model is designed to meet major gaps in the need for engagement, accessibility and cost efficiency

Attention based Anomaly Detection using hybrid models in Multivariate Time Series Data

Submitted by ,

Yashvi Shah
Achintya Shah
Dhruvi Doshi
Drashti Shah

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Deepali Patil

Abstract

The detection of anomalies in time series data is vital for identifying deviations from normal behavior, allowing proactive measures in domains such as finance, healthcare, and the Internet of Things. Conventional techniques struggle with handling temporal dependencies and complex, multivariate data, resulting in sub-optimal accuracy in detecting rare or faint anomalies. Introduction of a combination model of deep learning based on CNN, LSTM networks, Temporal Convolutional Networks (TCN), and an attention mechanism aims to mitigate these constraints. The CNN detects local anomalies at certain timestamps. LSTM remembers the long-term temporal patterns, and TCNs further improves the sequence modeling with the help of causal convolutions to detect complex temporal patterns. The attention mechanism further improves the process by taking account of only the most important data points for further improvement in accuracy of anomaly detection. The proposed model is verified on univariate and multivariate time series datasets with significantly less validation loss compared to existing methods. With the integration of multiple models, the given framework offers a robust and scalable method for anomaly detection across multiple real-world scenarios with complex time series data. By combining emotional intelligence and clinical insight the system provides appropriate user assistance while adhering to professional limits. The model is designed to meet major gaps in the need for engagement, accessibility and cost efficiency

AETHERREC: SPECIALIZATION-AWARE CONSTRAINT-BASED RECOMMENDATIONS FOR OPTIMAL BUSINESS COLLABORATIONS

Submitted by ,

Nikhil Harisinghani, Shubham Godbole, Jainam Shah, Janvi Gandhi

Course: B. Tech. Project

Date of Submission

May 15, 2025

Guide

Prof. Deepali Patil

Abstract

The task of identifying relevant business customers and service providers is a challenging but increasingly onerous one in today's competitive and information-intensive business environment. Traditional web directories and search engines are typically not adequate in fully meeting the intricacies involved in distinguishing the true intent behind user queries. Such sites have a tendency to respond based on keyword matching rather than full semantic comprehension of the input, leading to incorrect results, irrelevant listings, and the need for extensive manual filtering. Such limitations lead to inefficiencies for users seeking highly specialized or niche businesses meeting very specific criteria. To avert such limitations, the present study proposes an intelligent business recommendation system that utilizes advanced vector search techniques with high-level language models to improve the relevance and ease of access of the search results. At the heart of the system is the Facebook AI Similarity Search (FAISS), which facilitates efficient similarity-based retrieval with dense vector representations. Instead of depending solely on pure text matching, the system makes use of semantic embeddings to understand the contextual intent of user queries. These embeddings are calculated over the input text and matched against precalculated business embeddings to produce the most contextually relevant results. To further improve the quality and presentation of the recommendations, the system makes use of the LLaMA-3.2-3B-Instruct model. The large language model is used to refine and summarize the search results in a more user-centric manner that is also more comprehensible. It personalizes the response to ensure that the results are not only accurate but also easily comprehensible and actionable to the users. The model plays a vital role in interpreting user input nuances and hence improving the clarity and relevance of the final result. The recommendation model is essentially obtained based on the identification and recommendation of businesses dealing with niche domains, dynamically calculated based on user queries. This method allows the system to deal with a wide variety of questions with different levels of specificity, thus making it extremely useful in business-to - business (B2B) contexts, where accuracy and precision in correspondences are crucial. The

assessment of the accuracy of the proposed approach was accomplished using benchmark metrics appropriate for recommendation methods. We assessed how relevant the top three recommendations returned by the proposed method were using Precision@3. Most of the top recommendations would assume the user intention (or preference) as we have an accuracy of 84.47%. Mean Reciprocal Rank (MRR) was calculated to estimate the performance of prioritizing the most relevant results in rankings. The model achieved a high MRR rating of 98.25%, which suggests that the system is extremely effective in ranking the most relevant matches. The model also achieved a coverage rating of 63%, which indicates that it is capable of generating meaningful recommendations for more than half of the businesses in the provided dataset. This work suggests a novel method that effectively bridges the gap between user expectations and search engine capabilities, providing an exhaustive solution for business discovery through smart, intent-based recommendation

DermaScan AI: Integrating Visual and Clinical Cues for Melanoma Detection

Submitted by ,

Saurin Savla
Bhavyan Daiya
Varun Kargathara

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Sudhir Dhekane

Abstract

Early diagnosis and timely treatment are the most effective prevention methods for skin cancer and the potentially most fatal subtype- Melanoma. Traditional diagnostic methods, rely solely on dermoscopic images and often suffer from limitations in accuracy in a generalized manner for various skin types. In this study, we propose a multimodal deep learning framework that integrates two modalities - dermoscopic images and patient metadata to enhance melanoma detection. Our model employs two pathways for processing the input data. For the dermoscopic images, we employ a CNN backed by Efficient-Net B0 which is trained using transfer learning. The metadata is processed using a fully connected feed-forward neural network using the Attention mechanism. The metadata includes 7 features- age and gender of the patient, length and breadth of the lesion, race and ethnicity of the patient and the Fitzpatrick scale value for the skin type. The extracted features from both pathways are fused, improving the classification performance. The model is trained and evaluated on the MRA-MIDAS dataset, comprising of 3328 dermoscopic images along with corresponding patient metadata. Our model achieves a classification accuracy of 97.60%, outperforming traditional, image-only models. It also achieves a high area under the ROC curve (ROC-AUC) of 99.87%, indicating strong discrimination between melanoma and non-melanoma cases. These findings highlight the effectiveness of multimodal learning in improving skin cancer diagnosis and emphasize the potential of AI-driven approaches in clinical dermatology.

SynthGen: Enabling AI with No-Code Synthetic Data Tools

Submitted by ,

Dhruvkumar Panchal
Manan Bilala
Ronak Adep

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Sudhir Dhekane

Abstract

The widespread adoption of artificial intelligence (AI) and machine learning (ML) across various sectors has led to a growing demand for large volumes of high-quality, diverse, and representative datasets. However, acquiring such data is often hindered by challenges including data scarcity, high acquisition costs, and stringent privacy regulations such as GDPR and HIPAA. These limitations make it difficult to access real-world datasets, especially in domains such as healthcare, finance, and security. In this context,synthetic data generation has emerged as a promising solution to address these issues by creating artificial data that statistically mirrors real-world data while preserving privacy and reducing dependency on sensitive or proprietary datasets. This study explores a novel no-code framework for synthetic data generation that simplifies the traditionally complex processes associated with generative modeling. The approach combines Deep Convolutional Generative Adversarial Networks (DCGANs) for image data and the Generative Pre-trained Transformer 2 (GPT-2) for text data. Unlike conventional methods that require in-depth programming skills and expertise in model training, the proposed no-code framework is designed to be user-friendly, enabling individuals with minimal technical background to generate synthetic data efficiently. A comprehensive literature review was conducted as part of this study to understand the landscape of synthetic data generation, privacy-preserving data techniques, and their practical applications. It explores the evolution of traditional data augmentation methods, the advent of GAN-based frameworks for image synthesis, and transformer-based models for text generation. Additionally, the review delves into various privacy-enhancing technologies including differential privacy, k-anonymity, and federated learning, all of which underscore the importance of maintaining confidentiality when handling sensitive data. This foundational review helps to identify existing gaps and informs the design of the proposed system. The framework is designed to allow users to upload real datasets through an interactive graphical interface, select relevant parameters for generation, and visualize the output without needing to write or modify code. The backend automates the entire pipeline, from data preprocessing and model configuration to

training and synthetic data output. The discussion emphasizes the scalability and adaptability of the proposed framework to a wide range of datasets and use cases. The no-code design enhances accessibility, while the integration of DCGAN and GPT-2 models ensures that the synthetic data generated is both high in quality and contextually relevant. The platform has the potential to support AI model development in data restricted environments, enabling innovation while adhering to data governance standards

Advanced HR Interview Simulation Platform

Submitted by ,

Parita Mendapara
Vineet Mota
Pravin Nag
Mansi Sharma

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Sudhir Dhekane

Abstract

The shift toward digital recruitment and remote hiring has exposed key limitations in traditional HR interview evaluations—particularly their manual nature, subjectivity, and lack of objectivity in candidate assessment. As organizations increasingly adopt AI-based assessment tools, there is a growing need for platforms that ensure fairness, accuracy, and scalability while maintaining the evaluative rigor of human-led interviews. These challenges are more pronounced in virtual settings, where factors like candidate authenticity and communication clarity are harder to verify. This study addresses the need to develop a more insightful evaluation process that focuses on the quality and relevance of candidate responses. This work presents the Advanced HR Interview Simulation Platform, an AI-driven, voice-based assessment system that combines speech transcription and automated scoring using large language models (LLMs). The platform allows HRs to configure questions, define ideal answers, and evaluate responses based on parameters such as correctness, relevance, grammar, clarity, and completeness. Among these, correctness is given the highest weight to ensure factual accuracy while allowing flexibility in phrasing. Using LLMs like Gemini Flash 1.5, the system analyzes responses not just by keyword match but by overall semantic alignment. This enables deeper, more meaningful evaluation of each answer. To determine the most effective LLM for scoring, we tested identical responses—including answer text and keywords—across multiple models: Gemini Flash 1.5, Mistral, Falcon, and LLaMA. Out of all, Gemini consistently returned the most aligned and interpretable results, scoring 9 out of 10 for most answers. Based on this performance, Gemini was selected as the evaluation backbone of the platform. The system outputs a score for each response and flags any potential malpractice through face detection. Explainable AI tools like LIME are integrated to justify score distribution across criteria, helping HRs interpret results clearly and make fair hiring decisions.

INTELLIGENT TRAFFIC SURVEILLANCE: A VISION BASED SYSTEM FOR DETECTING VIOLATIONS OF TRAFFIC RULES

Rishabh Shah
Shreevardhan Bhosale
Harsh Samant
Kush Doshi

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Dashrath kale

Abstract

With rising traffic congestion in cities and violations of traffic rules, there is an urgent need for smart, automated solutions to comply with road safety. This project suggests "Intelligent Traffic Surveillance: A Vision-Based System for Detecting Violations of Traffic Rules", a fully automated system utilizing computer vision and deep learning to identify and report frequent traffic violations such as helmet rule violations, over-speeding, and red-light jumping. The system takes real-time video feed, crops the relevant frames, and uses sophisticated detection modules from the YOLO (You Only Look Once) framework. Red light faults are detected by a combination of YOLO-based object detection and HSV color segmentation. After detection of the fault, the frame goes through an OCR pipeline, where the number plate of the vehicle is detected using YOLO and read using the LLaMA 4 Scout 17b 16e Instruct model. The license plate number extracted is then utilized to retrieve data from official government APIs for PUC and insurance checks. On verification, an e-challan is automatically generated, wrapping the violation information. The challans are stored on AWS cloud infrastructure securely so that they are easily accessible and auditable. The violators are also notified via SMS utilizing the Twilio API for real-time communication and enforcement. This integrated, end-to-end platform not only increases traffic law enforcement accuracy and speed but also diminishes reliance on manual surveillance, laying the ground for smarter, safer cities.

FACEIQ : AI-POWERED FORENSIC TOOL

Submitted by,

Utsav Parekh
Nirzaree Devasthale
Yash Palkar
Chirag Konde

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Dashrath kale

Abstract

Security as well as authenticity processes have, since the emergence of the above noted landslide phenomenon, become an overwhelming issue. Law enforcement sketches, on the other hand, are incredibly time-consuming to produce and scan, heavily rely on graphic design, and thus are trained art that is invalid. This work introduces an AI hug that hopes to find proposal face for sketch recognition algorithms at free style for human character background image-to-sketch.The whole system interface can allow the user to input image files containing desired objects to be detected or scanned, as well as OPENCVblur the subjects. The VGG-16 model has the potential to estimate features including age, gender, and race according to the person's face. They are also reshaped by a second processing stage that produces facial embeddings. Cosine similarity comparisons are performed to a single pass encoded database to identify potential identity matches within a criminal archive of serialized identifiers.This multi-layered architecture scheme leverages the deep neural networks (DNN) based techniques together with conventional computer vision based techniques such that the flexibility is not compromised over the reliability and trust. The strong discriminative capability of VGG-16 and deep feature generation by the FaceNet yield the robustness to various face-scaled distortions.This app was built to run smoothly on mid-range and high-end machines and sports both a Streamlit interface and a modular architecture. This system can be run with or without GPU, being available for a broad type of users. This is a great demonstration of how deep learning can be a replacement for manual operation in high- risk application in the facial recognition. It offers a more rapid, reliable and scalable approach for the identification and can potentially be extended to other applications including border security and historical reconstruction. Improvements might include: combining high-quality sketch generation with GANS; uncertainly improve upon improvements derived from larger and more diverse criminal database.

EvalMate: Handwritten Assessment Grading Tool Using Large Language Model (LLM) Feedback

Submitted by ,
Rujuta Jariwala
Yukta Saraf
Jay Kansara

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Nikita Raichada

Abstract

EvalMate is an innovative tool designed to simplify and enhance the grading process for handwritten assignments. By combining advanced text recognition techniques with automated evaluation, it offers a seamless solution for educators. EvalMate extracts handwritten text with precision and evaluates it against a model answer provided by the teacher, offering consistent grading that aligns with predefined criteria. Through an intuitive Streamlit-based interface, the tool integrates grading automation with a standout feature: personalized feedback powered by language models.This feedback not only highlights areas for improvement but also provides constructive suggestions to help students refine their understanding. For educators, EvalMate significantly reduces the time and effort required for manual grading, allowing them to focus on meaningful interactions with their students.With its unique ability to deliver detailed, actionable insights and simplify the grading workflow, EvalMate bridges the gap between technology and education. Designed for scalability, it empowers teachers and students alike by making the evaluation process efficient, insightful, and consistent.

PYCHECKMATE - AUTOMATED PYTHON CODE REVIEWER FOR GITHUB PRS

Submitted by,

Yash Khatri
Aayushi Panchal
Yashvi Gogri
Janhvi Gandhi

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Nikita Raichada

Abstract

In software development, maintaining high code quality is essential for building secure, efficient, and maintainable applications. Manual code reviews, although efficient, tend to turn into time and inconsistent processes with the growth in project sizes. To overcome such limitations, this project introduces an Automated Code Reviewer specifically designed for Python. On the creation of a Pull Request (PR), the tool automatically inspects the code submitted with a mix of static analysis and AI based methods. It measures cyclomatic complexity via the Radon library, marking overly complex functions and highlighting them for developer review. Additionally, it detects common bugs such as unreachable code, unused variables, and improper function usage through static analysis. For readability of the code and for following conventions, it comes with linting tools such as Pylint and Flake8, which enforce Python's PEP8 recommendations. Apart from rule-based checks, it also incorporates a pre-trained T5-small transformer model fine-tuned to generate human-like review comments. This model gives natural-language feedback that imitates human reviewers, making the suggestions more readable and actionable.. The system is built on FastAPI, enabling lightweight deployment and straightforward scalability. Overall, this tool seeks to simplify the review process, minimize manual effort, and encourage consistent coding practices in Python development team.

PERSONALIZED REHABILITATION ASSISTANCE

Submitted by,

Tanmay Mistry
Dwiti Choksi

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Rashmi Ravikumar

Abstract

Physiotherapy acts as a saviour for the people who have suffered injury or have gone through a surgery. The rehabilitation process requires the supervision of physiotherapists and experts who can help correct posture while performing an exercise. Constant supervision of physiotherapists is not possible, and incorrect posture or form can cause hindrance in the process of recovery by delaying it or, worse, failing it. To overcome this, artificially intelligent systems are developed. Our study talks about how this system is used to provide real-time posture correction, performance tracking, and personalized guidance through a virtual care chatbot. Employing techniques like MediaPipe for pose estimation and a specialized neural network architecture combining LSTM, convolutional layers, and feed-forward networks, along with computer vision techniques and large language models, the application ensures accurate movement analysis and correction. The initial outcomes display enhanced exercise discipline and safety, indicating the potential of this technology to transform the practice of physiotherapy. The model's design allows for scalability in the future, hence making it adaptable to a wide range of exercises.

AI ASSISTANT FOR SCHOOL STUDENTS: AN INTERACTIVE LEARNING TOOL USING INDICTRANS2

Submitted by,

Darshil Joshi
Sahil Shah
Pratham Panchal

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Rashmi Ravikumar

Abstract

Learning Artificial Intelligence (AI) at the school level is essential to equip children with a specific skill set, preparing them for an AI-driven future. Through incorporating AI studies in school courses, we could eliminate the gap in technology and equip the students as producers, rather than merely as consumers of AI innovations. Our project offers easy-to-understand modules for young children, enabling them to learn AI quickly and effectively. This application will also furnish offline translation of the designed learning content to vernacular languages like Hindi and Marathi, so that they can easily understand the concepts of AI in their own learned language. All will benefit from the app's offline mode, which will ensure accessibility, especially in schools with inadequate internet infrastructure.

BIDIRECTIONAL SIGN LANGUAGE TRANSLATION WITH IMAGE INTEGRATION FOR INDIAN SIGN LANGUAGE (ISL)

Submitted by,

Vedant Pradhan
Vishal Mandhane
Virita Khanna
Nimisha Gupta

Course: B. Tech. Project

Date of Submission
May 15, 2025

Guide
Prof. Rashmi Ravikumar

Abstract

This research presents a robust and modular framework for a bidirectional Indian Sign Language (ISL) translator, aimed at bridging the communication gap between the hearing-impaired community and the general public in India. The system integrates deep learning, Natural Language Processing (NLP), and pre-recorded ISL gesture videos to enable real-time translation between ISL and both text and speech. Designed for inclusivity, the solution supports Sign-to-Text and Text/Speech-to-Sign conversions. The system is divided into functional modules—character recognition, word recognition, and sentence-level translation. A Convolutional Neural Network (CNN) trained on a custom dataset of ISL alphabet gestures achieved 98.98% accuracy, with Precision: 0.9919, F1 Score: 0.9898, and Recall: 0.9898. For word recognition, a CNN trained on 17,880 images of 20 medically relevant ISL gestures achieved an average accuracy of 73.33%. Dynamic sentence-level gesture recognition was implemented using extracted video frames, yielding 75% validation accuracy and balanced performance across Precision, Recall, and F1 Score. Two translation pipelines were proposed. The first converts Hindi speech to ISL by transcribing audio using Google's Speech-to-Text API, translating the result to English, and mapping it to gesture videos. The second is text-driven, where Hindi text is transliterated, translated to English, and adapted to ISL grammar using rule-based processing before visualization. Overall, the system demonstrates how machine learning, computer vision, and NLP can be combined to create an accessible, real-time ISL translator, promoting equitable communication through intelligent automation.


SVKM
ANNUAL
CAREER
FAIR