

Dr. MAHALINGAM



Dr. MAHALINGAM  
COLLEGE OF ENGINEERING AND TECHNOLOGY

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Institution

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COLLEGE OF ENGINEERING AND TECHNOLOGY

Enlightening Technical Minds

Udumalai Road, Pollachi - 642 003. Tamilnadu.

# DIGIFLASH PROUDLY PRESENTS DIGITIMES

*DEPARTMENT OF COMPUTER SCIENCE AND  
ENGINEERING*

**2023 - 24 ISSUE 2**



**MAY 2024**

## VISION OF THE DEPARTMENT

To develop engineers with global employability, entrepreneurship capability, research focus and social responsibility

## MISSION OF THE DEPARTMENT

- To develop internationally competent engineers in dynamic IT field by providing state-of-art academic environment and industry driven curriculum.
- To motivate and guide students to take up higher studies and establish entrepreneurial ventures. To enrich the department through committed and
- technically sound faculty team with research focus in thrust areas. To undertake societal problems and provide solutions through technical
- innovations and projects in association with the industry, society and professional bodies.

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### Programme Educational Objectives (PEOs)

**PEO 1: Domain Expertise** - Possess expertise and emerge as key players in IT integrated domains.

**PEO 2: Computing Skills and Ethics** - Employ computing skills to solve societal and environmental issues in an ethical manner.

**PEO 3: Lifelong Learning and Research** - Involve in lifelong learning and research to meet the demands of global technology.

## Programme Outcomes (POs)

**PO1.Engineering Knowledge** : Apply the knowledge of mathematics, science, engineering fundamentals and concepts of Computer Science to solve complex engineering problems.

**PO2.Problem Analysis** : Identify, review literature, formulate and analyse complex engineering problems using first principles of mathematics and engineering sciences.

**PO3.Design and Development of Solutions** : Design and develop computing solutions for complex engineering problems with societal and environmental awareness.

**PO4.Complex problem Investigation** : Investigate complex problems by employing research methods to arrive at valid conclusions.

**PO5.Modern Tool Usage** : Evaluate and use appropriate tools and techniques in engineering activities.

**PO6.Societal contribution** : Follow professional engineering practice by applying contextual knowledge to assess societal and legal issues.

**PO7.Environment and Sustainability** : Understand and provide professional engineering solutions taking into consideration environmental and economic sustainability.

**PO8.Ethics** : Follow ethical principles and norms in engineering practice.

**PO9.Individual and Team work** : Function effectively as an individual, team member or leader in diversified environments.

**PO10.Communication** : Communicate effectively through various modes for all engineering activities.

**PO11.Project Management and Finance** : Apply Engineering knowledge and management principles for effective project management in multi-disciplinary environments.

**PO12.Life-long Learning** : Engage in independent life-long learning and skill development for professional and social well being.

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## Programme Specific Outcomes (PSOs)

**PSO1. Systems Engineering:** Employ software engineering principles in the design and development of efficient systems.

**PSO2. Knowledge Engineering:** Apply data analytics techniques for solving real world problems.

# TABLE OF CONTENTS

Speech Processing Using ML	1
Predictive Maintenance For Vehicles	3
Mixed Reality Classroom	5
Precision Sales Forecasting Using LGBM Regressor	8
From Paper To Pixels: The Evolution of College Management Through Automation	11
Quick Summary Extractor Using Machine Learning Techniques	14
Smart Cane	16
Automated Timetable Generator	18
Smart Shopping Cart	21
Intelligent E-Bot	23
Facts and Riddles	25



# SPEECH PROCESSING USING ML

727620BCS039 SATHYA PRIYA S  
727620BCS063 LOGESH KRISHNA R  
727620BCS071 SUBHAANANDH S

The goal of this project is to improve user engagement and comprehension by adding emotional prosody into Text-to-Speech (TTS) systems in the English language. Conventional TTS systems frequently produce a distanced interaction because they lack emotional nuance. In order to solve this, the project analyzes speech patterns for emotional indicators including happiness, sadness, enthusiasm, and neutrality using machine learning techniques and Python tools.

The algorithm generates more emotionally expressive and natural-sounding speech by modifying rhythm and intonation in response to these inputs. This dynamic modulation redefines English content narration and advances Human-Computer Interaction (HCI) by creating a personalized, culturally relevant, and emotionally engaging auditory experience.

It also incorporates linguistic and cultural adaptability. The process encompasses the identification of emotional cues, dynamic modulation of rhythm and intonation, and adaptation to cultural and linguistic differences. Machine learning algorithms use speech pattern analysis to precisely determine emotional aspects. Algorithms modify intonation and rhythm to produce expressive speech.

The auditory experience is made more personal by language and cultural quirks, which encourage accessibility and inclusivity. This initiative expands the field and creates new opportunities for innovation in education, assistive technology, and entertainment by incorporating emotional prosody into the auditory content consumption process.

## Text Processor

The first part of the system is the Text Pre-processor. It takes care of things like tokenization, eliminating extraneous letters or symbols, and making sure that the input text is formatted consistently. In order to give future modules clean, consistent input, this step is essential.

## ML Model

The central component of the system is the machine learning (ML) model, which usually makes use of deep learning and natural language processing (NLP). The model picks up patterns and connections between textual input and matching vocal output throughout the training phase. Processing a sizable dataset of text-speech pairs is required for this to allow the model to generalize and produce precise predictions during the inference stage.

## Emotion Analyzer

The Emotion Analyzer assesses the emotional undertone present in the input text, which improves the system's performance. Sentiment analysis and other advanced emotion detection techniques may be used to identify emotions like happiness, sadness, rage, and so on. This module's output directs modifications to the speech synthesis procedure, enabling the system to generate emotionally charged speech.

## Text - to -Speech Analyzer

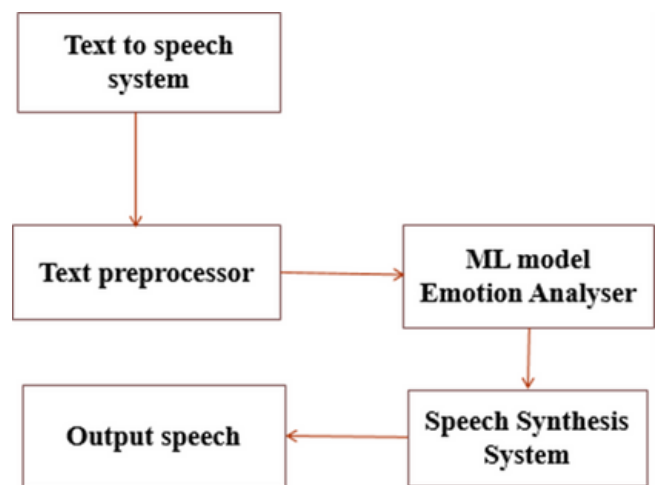
The pre-processed and analyzed text is converted into a set of phonemes and prosody elements using the Text-to-Speech (TTS) System. In order to produce a speech signal that sounds realistic, it entails selecting the appropriate voice, figuring out pitch, speed, and emphasis, and combining these components. Depending on how the system is designed, methods such as parametric or concatenative synthesis may be used.

## Speech Recognition Software

To produce the final Speech Recognition Software the Text Pre-processor. It takes care of things like tokenization, eliminating extraneous letters or symbols, and making sure that the input text is formatted consistently. In order to give future modules clean, consistent input, this step is essential.

## Output Speech

The Culmination of the entire procedure is the Output Speech. It is a representation of the speech synthesized to match the original input text. The objective is to provide a smooth, natural-sounding voice output that faithfully captures the meaning intended by the input while accounting for any subtle emotional overtones detected by the Emotion Analyzer. To put it briefly, the suggested system combines a number of different elements to transform text into meaningful and expressive voice. Each element plays a distinct role in this transformation, guaranteeing that the result is correct and captures the subtleties and emotions intended in the source text.



In conclusion, Speech synthesizing has improved significantly in human-computer interaction with the addition of sophisticated capabilities like emotional analysis, as well as the ability to monitor particular tones, intonations, and rhythms. In addition to improving the expressiveness and naturalness of synthetic speech, this cutting-edge technology helps computers recognize and react more effectively to human emotions and intents. It encourages more meaningful and empathic communication by examining linguistic patterns and emotional clues, creating new opportunities for applications in areas like customer service, therapy, education, and accessibility. Speech synthesizing has the ability to completely transform how we engage with technology and one another as long as we keep improving and innovating in this field. This is encouraging for an era where communication will be more meaningful and transparent than it has ever been.



# PREDICTIVE MAINTENANCE FOR VEHICLES

727620BCS013    ROSHAN R  
727620BCS017    AKARSHAN C  
727620BCS075    SHANJAI V

The Automotive industry is witnessing a paradigm shift in maintenance practices as it moves from traditional, time-based approaches to more proactive and data-driven strategies. This work explores the significance of predictive maintenance in vehicles, addressing the challenges posed by unplanned downtime, cost inefficiencies, and the evolving landscape of vehicle data. In the context of modern vehicles equipped with advanced sensors and connectivity, predictive maintenance harnesses the power of real-time data analytics to anticipate potential component failures, enabling timely interventions and optimal resource utilization. The project delves into the integration challenges associated with adopting predictive maintenance across diverse vehicle fleets, emphasizing the need for seamless compatibility and comprehensive data utilization.

Furthermore, discusses the potential impact on safety, asset lifespan, and overall cost savings, highlighting the importance of a well-founded cost-benefit analysis to justify the adoption of predictive maintenance. By embracing predictive maintenance, the automotive industry stands to enhance vehicle reliability, optimize maintenance costs, and pave the way for a future where vehicle maintenance is not just predictive but also preventive, ensuring safer and more efficient transportation.

## **Data Collection**

Assembling the information and gathering the normal maintenance level of a vehicle according to the manual of the vehicle's features. In this work a dataset that consist of training set and testing set of vehicle features

conditions has been used. The dataset is collected from Kaggle which extracts the data from a research platform.

### Data Collection

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### Data Processing

As given in the excel sheet with training and testing sets for predictive maintenance for cars, data processing is done on arrays or tables of measured or simulated data that can be managed with predictive ensemble data store.

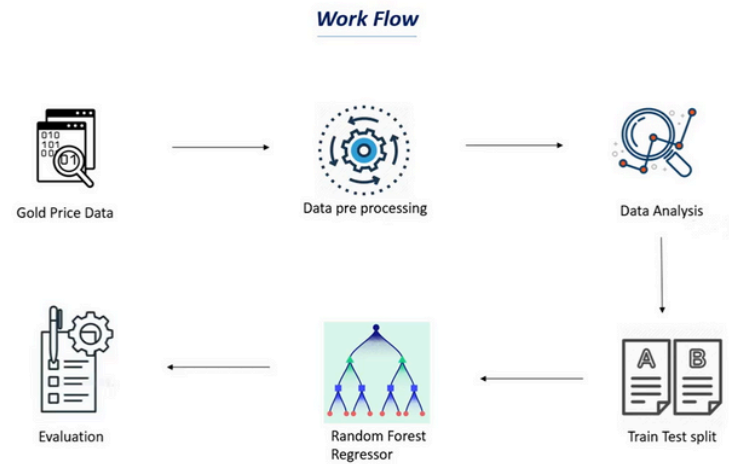
The processes of preprocessing and detecting condition indicators may occasionally overlap. However, processing usually yields a cleaned or altered signal, upon which additional analysis is conducted to distill the signal data into a condition indicator.

### Data Analysis

Through the process of data analysis, predictions about future events can be made with remarkably high accuracy. Real-time data collection from multiple sensors and embedded systems is facilitated by AI-powered Predictive Maintenance solutions. After that, this data is analyzed to establish a baseline of typical behavior for every car. Rather than relying on reactive maintenance methods or routine inspections, predictive maintenance allows potential vehicle issues to be remotely diagnosed before they become catastrophic breakdowns.

Predictive maintenance helps to identify indications of error and defect, and plan repairs or replacements before they become issues by utilizing sensors and data analysis. By doing this, expensive inventory losses can be prevented. In the context of predictive maintenance, regression algorithms help to establish this kind of relationship between maintenance requirements and equipment. Regression models are used by data science engineers to build machine learning models that use historical data to accurately predict equipment fault

and calculate the models performance with the test set. Accuracy is the degree to which the model's predictions and actual outcomes agree. The proportion of accurate positive forecasts among all favorable forecasts is called accuracy. Recall is the proportion of true positives that the model accurately predicts.



This project provide numerous benefits, including increased reliability, reduced runtime and cost savings. By leveraging advanced analytics and real-time monitoring, organizations can proactively address potential issues, extending the lifespan of vehicle components and enhancing overall fleet efficiency. This data-driven approach not only optimizes maintenance schedules but also contributes to improved safety and customer satisfaction, making predictive maintenance a valuable strategy for modern vehicle management. It is not possible to develop a machine learning model for predictive maintenance in a way that works for all scenarios. The approach taken to retrieve and process the data for the machine learning model will be solely determined by the maintenance responsibilities and unique difficulties encountered when interacting with the system. Not every system failure can be anticipated by a single model, and not every machine learning model can be developed using a single technique. With data-driven insights and AI innovation paving the way for safer, more dependable, and more efficient automobiles, predictive maintenance heralds a new age in automotive care. The attitude to car maintenance and care will completely change as predictive maintenance becomes the industry standard as technology advances and overcomes present obstacles.



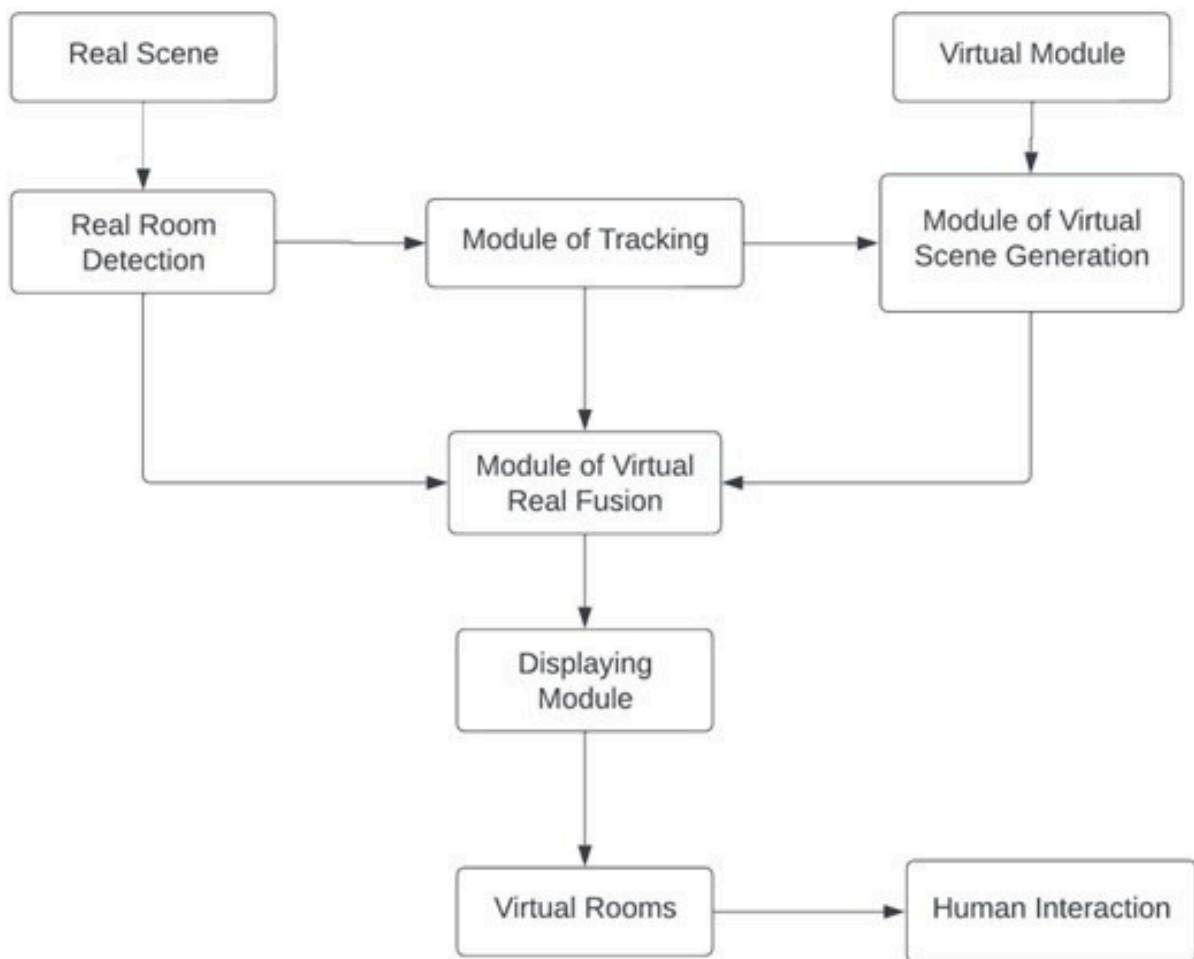


# MIXED REALITY CLASSROOM

727620BCS008 VAISHNAV S  
727620BCS010 JEEVASUDHARSAN R  
727621BCS327 HEMACHANDRAN P

This project aims to explore and implement the integration of Mixed Reality (MR) technology into traditional classroom environments, revolutionizing the way students engage with educational content. Mixed Reality offers a unique blend of physical and digital elements, creating immersive experiences that enhance learning outcomes and student engagement. The project begins with a comprehensive needs assessment, identifying the specific learning objectives and content areas suitable for MR integration across various grade levels and subjects. Drawing upon educational theory and cognitive science, the project team will develop a pedagogical framework that leverages MR technology to promote active learning, critical thinking, and collaboration among students.

Finally, the project will disseminate findings and best practices through workshops, conferences, and academic publications, empowering educators to harness the potential of MR technology in their own classrooms. By sharing insights and resources, the project aims to catalyze broader adoption of immersive learning technologies and inspire innovation in educational practice. In summary, this project seeks to transform traditional classrooms into dynamic, immersive learning environments through the thoughtful integration of Mixed Reality technology. By combining pedagogical expertise with cutting-edge technology, we aspire to empower students with the knowledge and skills needed to thrive in an increasingly complex and interconnected world.



Students must put in consistent effort if they want to succeed in the classes or learn anything. Thus, students' learning experiences in the classroom are more beneficial if the teachers provide them with incentives to keep up their motivation and efforts. A framework for understanding key components of human motivation in learning is the ARCS model. Four components of this framework attention (gaining or maintaining attention), relevance (the reason students study), confidence (the degree of knowledge), and satisfaction (feeling good to listen to classes) increase students' motivation to learn. Classes will be more effective if they are created with aspects in mind. Virtual reality (VR) is a technology that uses information technologies to provide sounds or images to give the impression that objects that don't exist. Introducing VR for class design works well when creating classes based on the paradigm because of these features.

Here are a few instances of how to apply the model's components. Each learner is forced to concentrate intensely when materials or items are presented right in front of them. Students can more readily comprehend the important points in the lectures when materials and objects are presented in a clearer and more comprehensible manner. Student messages are made anonymously available to the public. This is due to the fact that anonymity encourages more active and free speech. Publicly available questions can also benefit other students with similar inquiries. Additionally, even if their avatars are not in the front row, pupils may still view the blackboard directly in front of them. Students feel better when they use recognizable avatars as their agents, and their classes could become more fulfilling or pleasurable as a result.

Module design is an approach that subdivides a system into smaller parts (modules) that can be independently created and then used in different systems to drive multiple functionalities.

### **Virtual Rooms & Labs**

- Users can select different historical periods to explore.
- Each period transports them to a historically accurate environment.
- They can interact with objects and characters from that time.
- Informational pop-ups provide details about the period and its significance.

### **Environmental Simulation**

- Users can explore different ecosystems such as forests, deserts, and oceans.
- They can observe and interact with various flora and fauna.
- Environmental factors like weather and time of day change dynamically.
- Informational panels offer insights into the ecosystems and the importance of conservation.

### **Scientific Experiments**

- Users can conduct virtual experiments in fields like physics, chemistry, and biology.
- They have access to a range of laboratory equipment and materials.
- Guidance is provided through step-by-step instructions and explanations of scientific principles.
- Users can observe the results of their experiments in real-time and draw conclusions based on data analysis.

### **Space Exploration**

- Users can embark on simulated space missions to explore distant planets, moons, and galaxies.
- They can pilot spacecraft and operate scientific instruments.
- Mission objectives include collecting samples, conducting research, and solving space-related challenges.
- Audiovisual presentations provide educational content about space exploration and the cosmos.

In contrast to traditional classroom settings, virtual reality classrooms save money by eliminating the need for an instructor and pupils to meet in person. The method enables students to benefit from real-world classroom experiences, such as increased motivation due to peer interaction and real-time face-to-face communication, which are not possible in distant learning environments. Additionally, the suggested method was successful in inspiring students based on the model by introducing MR's benefits, such as the use of recognizable avatars, the ability to display 3D materials or objects in front of students, and the ability to communicate messages anonymously. As the experiment demonstrated in the research, VR Classroom has the potential to significantly increase student motivation.

Mixed reality simulations provide students with practical experience in a safe environment. For example, the University of Georgia uses a tool called Mursion to help education students practice teaching, conduct parent meetings, and manage classrooms through virtual avatars. This hands-on practice is invaluable, particularly when real-world practicum opportunities are limited.

Studies have shown that students using mixed reality in their lessons experience a 22% improvement in test scores and a 35% increase in engagement and retention rates. The immersive nature of MR helps students grasp complex concepts more effectively by visualizing and interacting with 3D content



# PRECISION SALES FORECASTING USING LGBM REGRESSOR

727620BCS001 THARUN ADHITHYA S S  
727620BCS061 SHYAM K  
727620BCS113 GOKUL KRISHNA SINGH M

In today's competitive market landscape precise sales forecasting is indispensable for businesses seeking to optimize resource allocation, capitalize on market opportunities, and maintain a competitive edge. Traditional forecasting methods often fall short in accurately predicting sales figures, leading to suboptimal decision-making and resource allocation. To address this challenge, this paper proposes a framework for precision sales forecasting using the LightGBM (LGBM) regressor.

The proposed framework leverages historical sales data, market trends, and external factors to generate highly accurate sales forecasts. The framework automates the forecasting process, allowing businesses to make informed decisions based on data-driven insights. Unlike conventional forecasting methods, which may overlook subtle patterns and fluctuations in sales data, the LGBM regressor excels in capturing complex relationships and non-linear trends, resulting in more accurate forecasts.

Central to the framework is the utilization of advanced feature engineering techniques to extract relevant features from the sales data. These features encompass a wide range of factors, including seasonality, promotional activities, and market demand, enabling the model to capture the underlying drivers of sales fluctuations effectively. Additionally, the framework incorporates ensemble learning techniques to enhance prediction accuracy further, combining multiple models to mitigate the risk of overfitting and improve generalization performance. To evaluate the performance of the proposed framework, extensive experimentation and validation are conducted using real-world sales data. The results demonstrate the superior accuracy and reliability of the LGBM regressor in predicting sales figures across different time horizons and business contexts. Furthermore, the framework's scalability and efficiency make it well-suited for handling large-scale datasets and real-time sales forecasting.

Sales forecasting using LGBM Regressor utilizes advanced preprocessing techniques, feature extraction methods, and cutting-edge machine learning algorithms, the proposed system for sales forecasting using LGBM Regressor is a comprehensive framework built to produce accurate sales projections based on previous sales data.

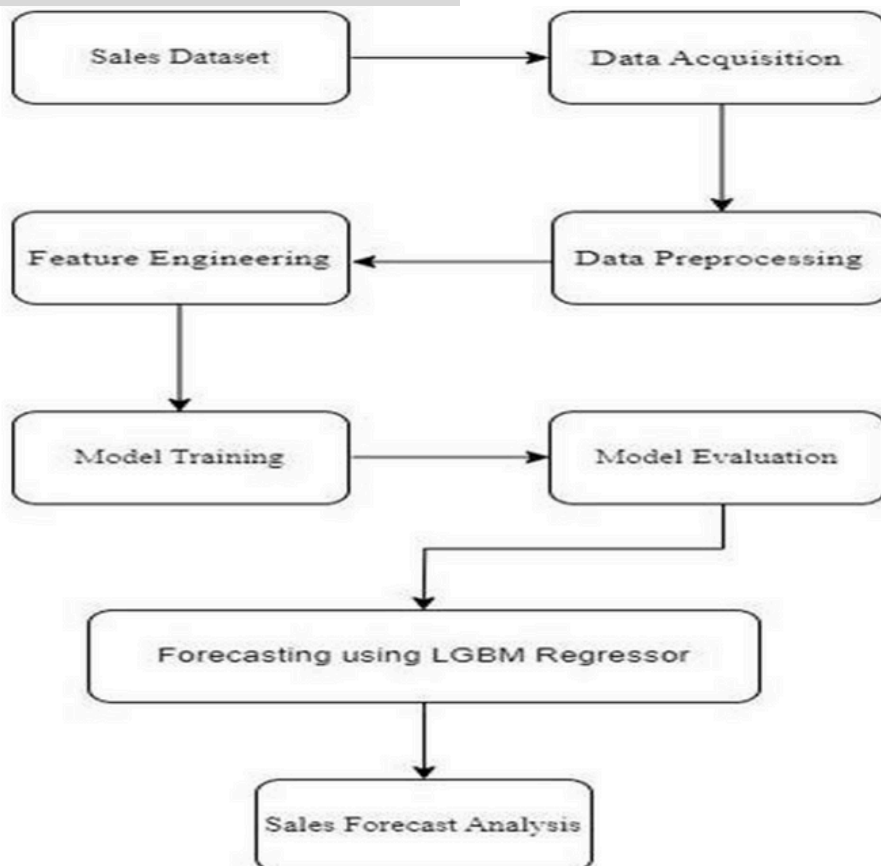
Preprocessing module includes the data preprocessing tasks such as cleaning and transformation of raw data which includes sales volume, time period and relevant variables among others. It means working with the casing of the variable, removing outliers, and encoding of the discrete variable to make the data more analyzable.

Feature extraction follows, aiming to enhance the model's predictive power. New features are created or existing ones are transformed using techniques like lag features, rolling averages and seasonality adjustments. These steps enable the model to capture complex patterns and trends present in the sales data.

Next, the LightGBM regressor, renowned for its efficiency and accuracy with tree-based models, is trained on the preprocessed and engineered features. This step leverages the model's capabilities to handle large datasets, making it ideal for sales forecasting scenarios.

The model assessment and hyperparameter tuning of LightGBM model is tested on a validation dataset that is either cross-validation dataset or hold-out dataset. Hyperparameter tuning creates the objective of optimizing parameters of the model to achieve maximum performance and a generalizability of the model.

With the trained and fine-tuned LightGBM regressor, the module generates accurate sales forecasts based on the input features. These forecasts provide valuable insights for strategic decision-making, inventory management, resource allocation, and marketing planning within the organization.



In order to maintain the model's accuracy and reliability, continuous performance monitoring constitutes an inherent part of the module. The main parameters like Mean Absolute Error (MAE) and Mean Squared Error (MSE) are followed to check the performance of the model and further decide the improvement aspects.

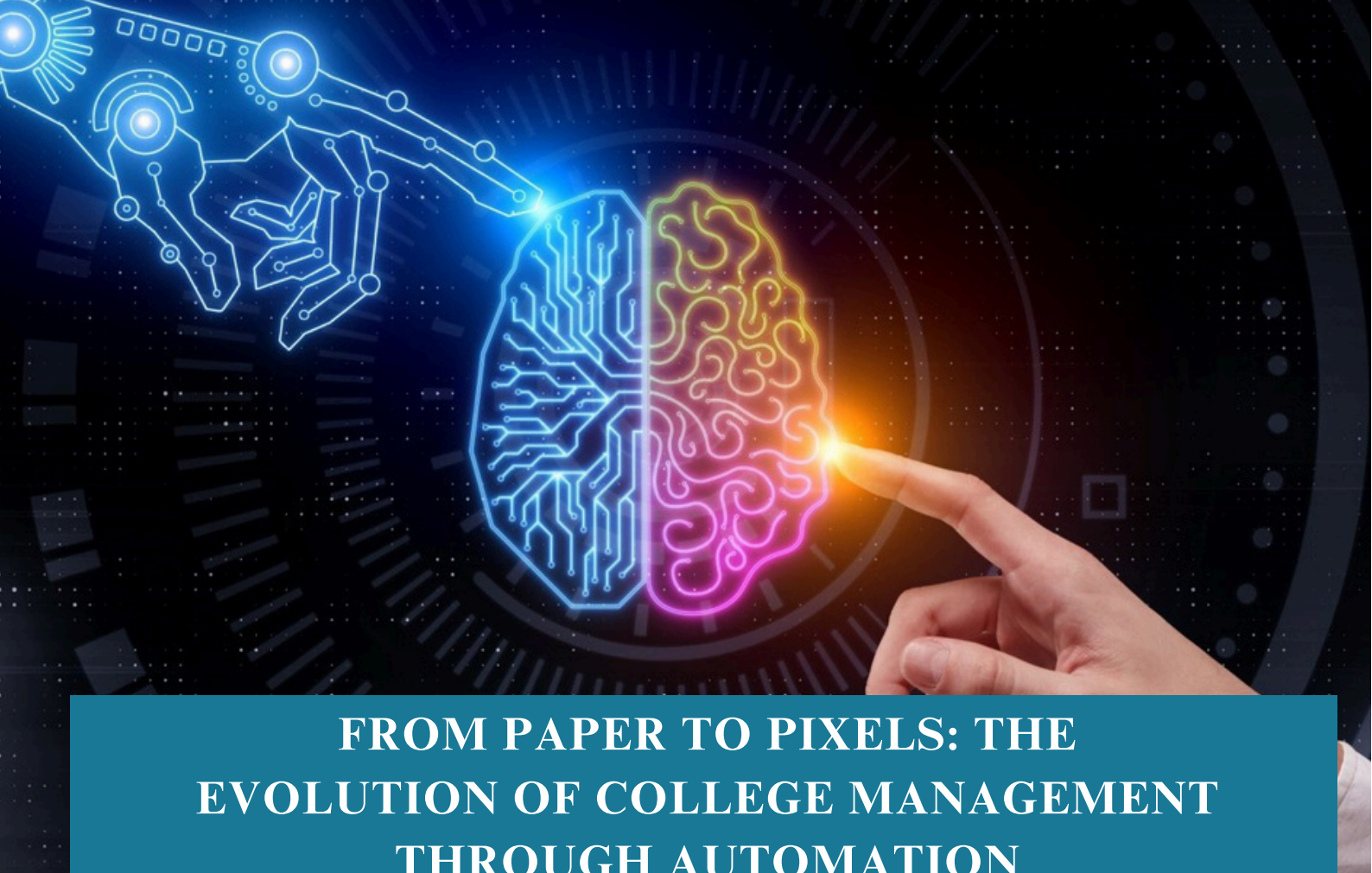
Overall, the proposed system for sales forecasting using LGBM Regressor offers a systematic approach to sales prediction, empowering organizations to make data-driven decisions, optimize operations, and stay competitive in the dynamic retail environment.

The use of LightGBM models for sales forecasting is crucial for organizations to remain competitive and make well-informed decisions. Through leveraging advanced machine learning techniques and optimization strategies, businesses can extract valuable insights from their sales data. This leads to enhanced operational efficiency, improved resource allocation, and increased customer satisfaction.

The process of optimizing LightGBM models involves a systematic approach to fine-tune hyperparameters and maximize predictive accuracy. Techniques such as grid search, which explores a predefined grid of hyperparameter values, and random search, which samples hyperparameters from predefined distributions, allow practitioners to efficiently search the hyperparameter space and identify optimal configurations.

Additionally, Bayesian optimization offers a probabilistic approach to hyperparameter tuning, balancing exploration and exploitation to converge on promising solutions efficiently. Hyperparameter importance analysis complements optimization efforts by identifying key parameters that significantly impact model performance. This insight enables practitioners to prioritize optimization efforts and allocate computational resources effectively. Cross-validation techniques further validate model performance, ensuring robustness and generalization across different subsets of the data.





# FROM PAPER TO PIXELS: THE EVOLUTION OF COLLEGE MANAGEMENT THROUGH AUTOMATION

727621BCS003 PUVIJAY G  
727621BCS021 SAKTHIVEL S  
727621BCS085 GOWTHAM P

The project aims to revolutionize traditional a fully automated and digitized environment. This evolution seeks to enhance operational efficiency, streamline administrative tasks, and provide a seamless experience for both students and faculty. Through the integration of cutting-edge technologies, this project envisions a future where every aspect of college management is optimized, facilitating a more agile and responsive educational ecosystem.

An attendance monitoring system can leverage. Amazon Textract to process scanned copies of attendance sheets. Textract would extract student names and mark them present/absent. This data can be stored in a database and displayed on a secure website. The website would require authentication for teachers to view and manage attendance record.

This can be done for simple text format the regular expressions if the text is in correct format. If

the text converted into machine readable using Machine Learning (ML) techniques such as Tesseract or Google Cloud Vision API to perform Optical Character Recognition. The collected text is exported to spreadsheet model for the further conversion. Users upload raw image to AWS Textract the services processes the input and converts into CSV/JSON format and then stores in Database. The UI fetch the data and display in the console.

## AWS Textract

Amazon Textract represents a machine learning service tailored for automatic extraction of text, handwriting, and data from scanned documents, surpassing conventional optical character recognition (OCR) by comprehending and interpreting document content. This facilitates the automation of document processing tasks and optimization of workflows.

### Boto3 API

Boto3 is a Python library enabling interact with diverse Amazon Web Services (AWS) offerings. It furnishes a high-level API for creation, configuration, and management of AWS resources, streamlining AWS operations through an object-oriented interface while automating numerous low-level tasks.

### MySQL Database

MySQL, a widely utilized open-source relational database management system (RDBMS) which serves as a platform for storing and managing structured data. Renowned for its reliability, speed, and user-friendliness, MySQL emerges as a versatile solution across various application domains.

### Web UI

Through a web application the information is displayed.

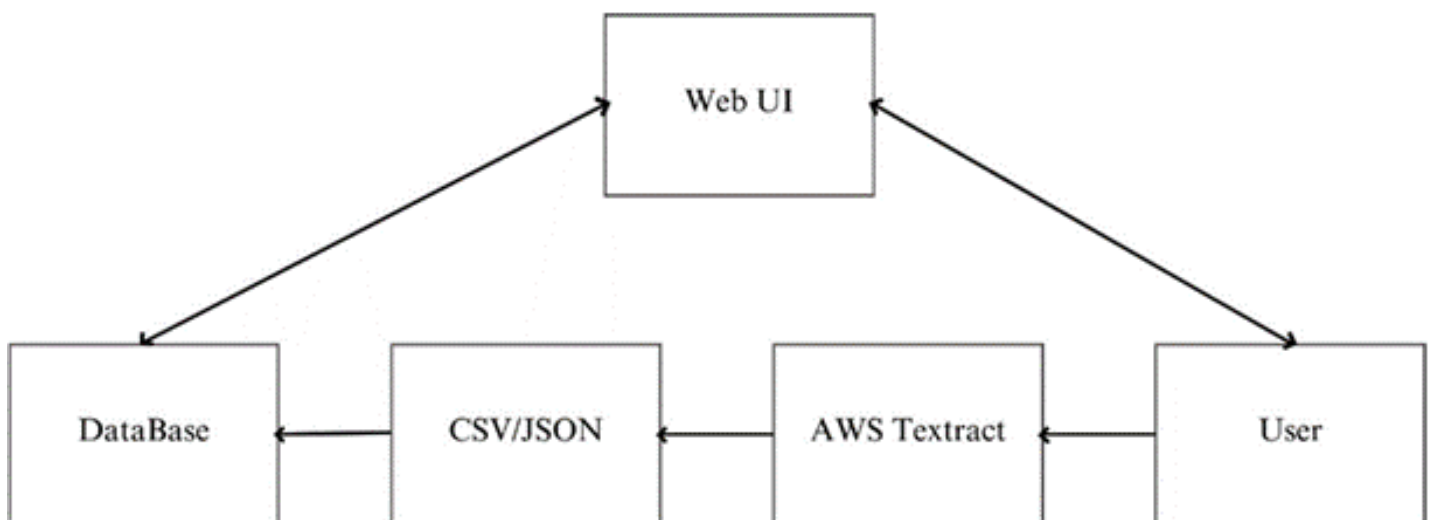
### Textract integration

The integration of Amazon Textract into the Attendance Monitoring System marks a transformative leap in educational technology leveraging textract's capabilities, attendance tracking is shifted from manual entry to automated

processing of scanned sheets, ensuring efficiency and accuracy. Centralized storage of attendance data in a secure database facilitates easy access and management for administrators. Real-time web access empowers teachers with instant insights into attendance records, enabling timely interventions and proactive student support. This system not only saves educators valuable time but also minimizes errors, enhancing data reliability. Furthermore, its scalability ensures adaptability to institutions of varying sizes, making it a cost-effective solution.

### Uploading Images to Boot3 API

The process of uploading an image sample to the Boot3 API for text recognition is a vital step in the text recognition pipeline. Through this process, an image containing text data is transmitted to the boto3 API endpoint, enabling the initiation of text recognition algorithms. This crucial step serves as the gateway for subsequent analysis and processing of the uploaded image data. By leveraging the boto3 API, developers can seamlessly integrate text recognition capabilities into their applications, enhancing the automation and efficiency of various tasks. Additionally, this process facilitates the extraction of textual information from images, enabling further analysis and utilization of the extracted text data. Overall, the uploading of image





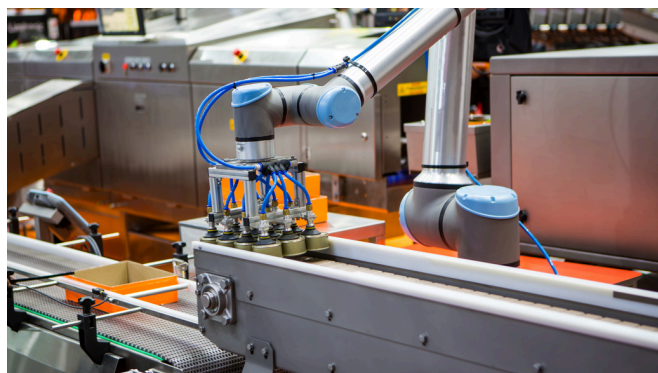
data to the boto3 API represents a foundational component in the broader framework of text recognition and analysis workflows.

### **Analysing relationships with Comprehend Client**

The Comprehend Client system stands as a pivotal tool in the realm of natural language processing, adept at dissecting complex relationships between disparate relationship models. Leveraging advanced algorithms and machine learning techniques, it navigates intricate data structures to unveil subtle connections and dependencies. Through its comprehensive analysis, the Comprehend Client provides invaluable insights into the underlying dynamics governing these relationship models, illuminating hidden patterns and correlations. Its robust capabilities empower researchers and analysts to unravel complex networks of associations within datasets, facilitating deeper understanding and informed decision-making. By scrutinizing relationships with precision, it equips stakeholders with actionable intelligence, guiding strategic initiatives and driving innovation across various domains.

### **Result From Textract Service**

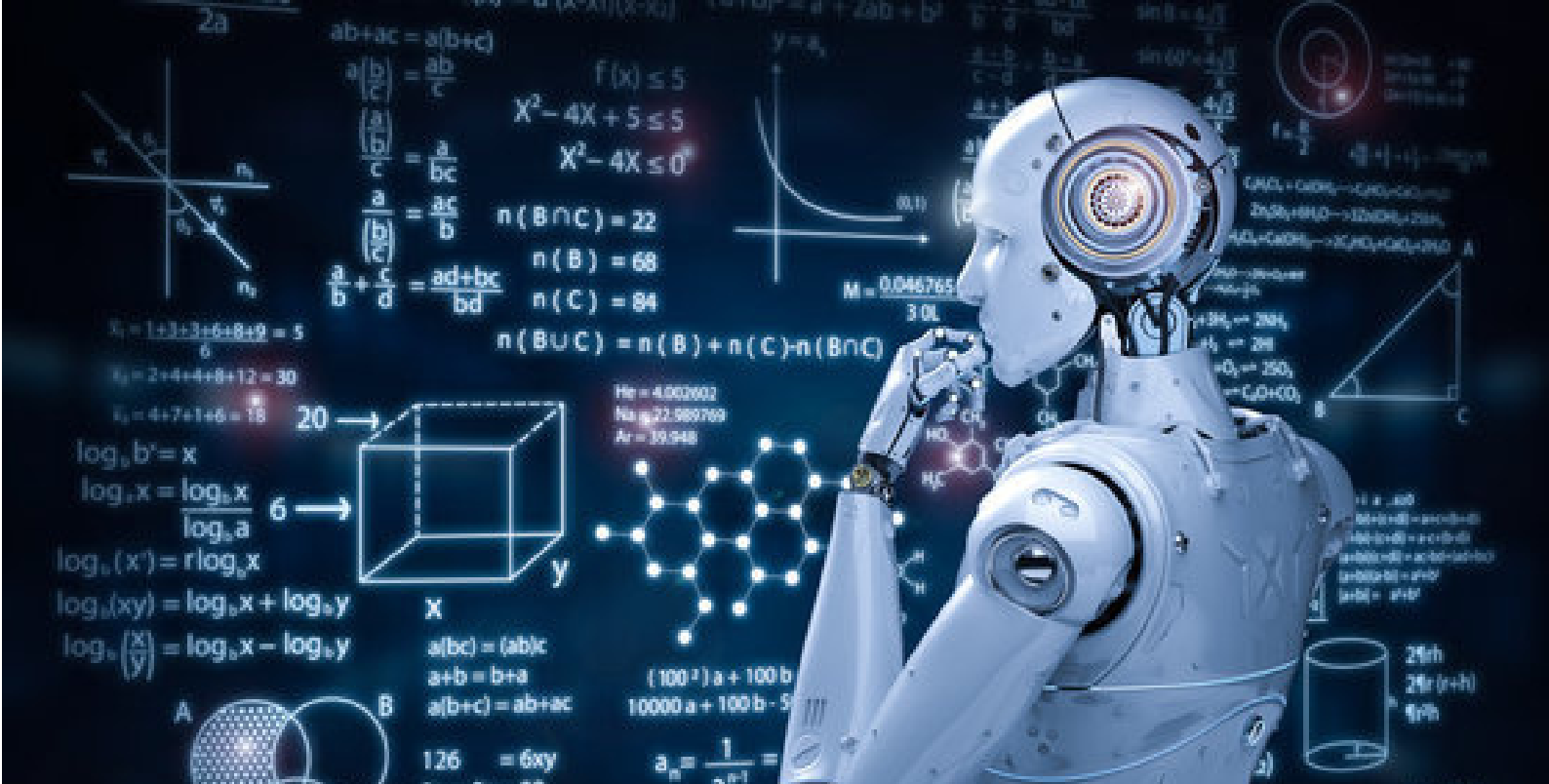
The outcome delivered by the Textract service presents a concise and structured representation of extracted raw text. This textual data serves as a fundamental resource for subsequent processing and analysis tasks. Leveraging advanced OCR algorithms, Textract meticulously parses through images and documents, ensuring accurate extraction. Its seamless integration capabilities streamline workflow processes, enhancing automation and efficiency. Overall, Textract's output serves as a crucial component in text analysis pipelines, facilitating informed decision-making and data-driven insights.



The Detect Document Text service performs OCR, accurately recognizing individual characters within documents and enabling the extraction of textual content from various sources. Comprehend Client complements this by establishing meaningful relationships between different entities such as tables, text and signatures within the document. The advanced natural language processing provides structure and context to the extracted data. Together, these services offer a comprehensive document analysis solution. By combining character-level recognition with context-aware entity classification, users gain valuable insights and efficient data processing for informed decision making.

### **Key Aspects of paper to pixel are,**

- Scanning
- Document Management Systems (DMS)
- Cloud Storage

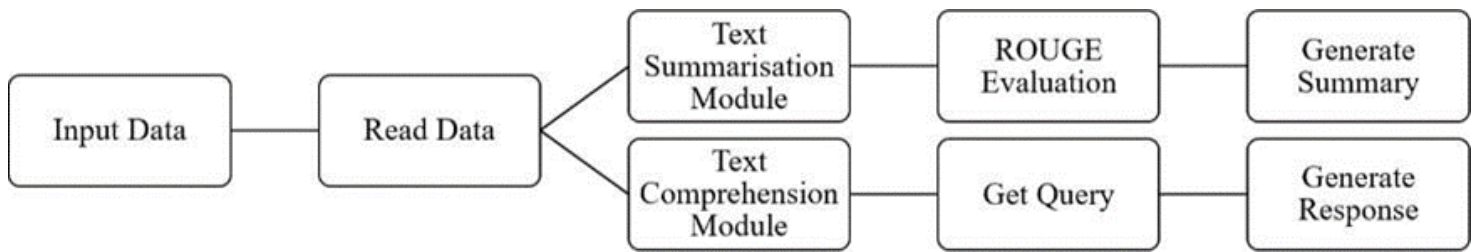


## QUICK SUMMARY EXTRACTOR USING MACHINE LEARNING TECHNIQUES

727621BCS013 THARAN S R  
727621BCS015 NAVEEN S  
727621BCS025 SHOBIKA C

Quick Summary Extractor introduces an advanced system for rapid summary extraction and interactive document engagement. Leveraging state-of-the-art BERT and T5 transformers, the system employs abstractive summarization techniques to distill input sentences from PDF or text documents into concise summaries. Furthermore, the implementation includes ROUGE evaluations to ensure the accuracy and fidelity of the generated summaries. Developed using Python, this system offers users a seamless experience, allowing users to efficiently access key information and engage in interactive dialogue with the document contents. By integrating cutting-edge natural language processing technologies, this project enhances document comprehension and user interaction, contributing to improved productivity and accessibility across diverse domains.

The proposed system is a comprehensive text analysis platform developed in Python, integrating advanced machine learning models and datasets for robust text summarization and comprehension. The Summary Generator Module commences by ingesting raw text or PDF files, which undergo extraction, tokenization, stopword removal, and lemmatization to distill the content into a preprocessed form ready for summarization. Utilizing a Summarization Transformers Module, it employs NLP techniques to generate concise summaries that maintain context, relevance, and coherence. Concurrently, the Text Comprehension Module leverages a TF-IDF vectorizer and cosine similarity to identify the most relevant sentence in response to a user's query. It processes the text and the query, converts them into TF-IDF vectors, and computes similarity scores, returning the sentence



with the highest relevance or indicating the absence of an answer if no sentence meets the threshold. This dual-module system ensures a streamlined process for summarizing and comprehending large volumes of text, making it a powerful tool for information retrieval and knowledge management. The algorithm and methodology used in proposed system involves several steps aimed at processing input text or PDF files and generating responses based on specific queries. Here's a breakdown of the algorithm and methodology.

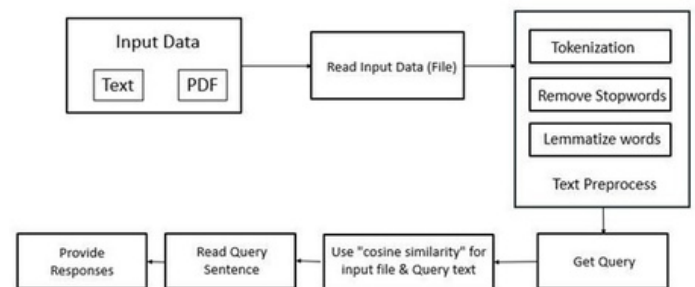
### Text Summarisation Module

The summarization module initiates by ingesting raw text or PDF files, extracting their content for summarization. After initial processing, tokenization breaks sentences into meaningful units, while stopwords removal reduces noise. Lemmatization ensures word consistency. These steps prepare the text for summarization. The core component, the Summarization Transformers Module, employs advanced NLP techniques to generate concise summaries. Considering context and coherence, it produces effective summaries. This streamlined process facilitates efficient extraction of key information from input data, enhancing the utility of the summarization tool.

### Text Comprehension Module

TF-IDF vectorization and cosine similarity are used to find the most relevant sentence in a text to a user's query. Text and query undergo preprocessing like lowercasing and punctuation removal. TF-IDF assigns word weights. Cosine similarity measures similarity between the text and query vectors. The function computes similarities for each sentence. The index of the highest score identifies the most relevant sentence.

If the score surpasses a threshold, that sentence is returned; otherwise, a message indicates that there is no suitable answer. The process enhances information retrieval by pinpointing the most pertinent response in the source text.



In conclusion, this work introduces the quick summary extractor, integrating advanced summarization techniques with user-friendly query-based retrieval functionalities. This comprehensive solution efficiently processes textual data from various sources, including text and PDF files. Its effectiveness and practical utility have been confirmed through experiments laying the groundwork for future advancements in text summarization and information retrieval systems. This approach addresses the challenges of condensing vast amounts of text while preserving context, contributing to ongoing improvements in text processing technologies



# IOT

## INTERNET OF THINGS



## SMART CANE

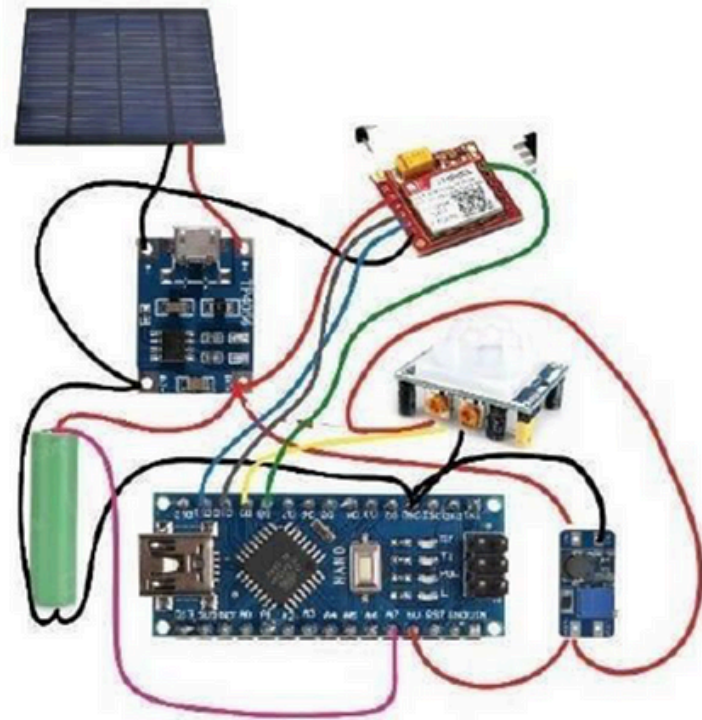
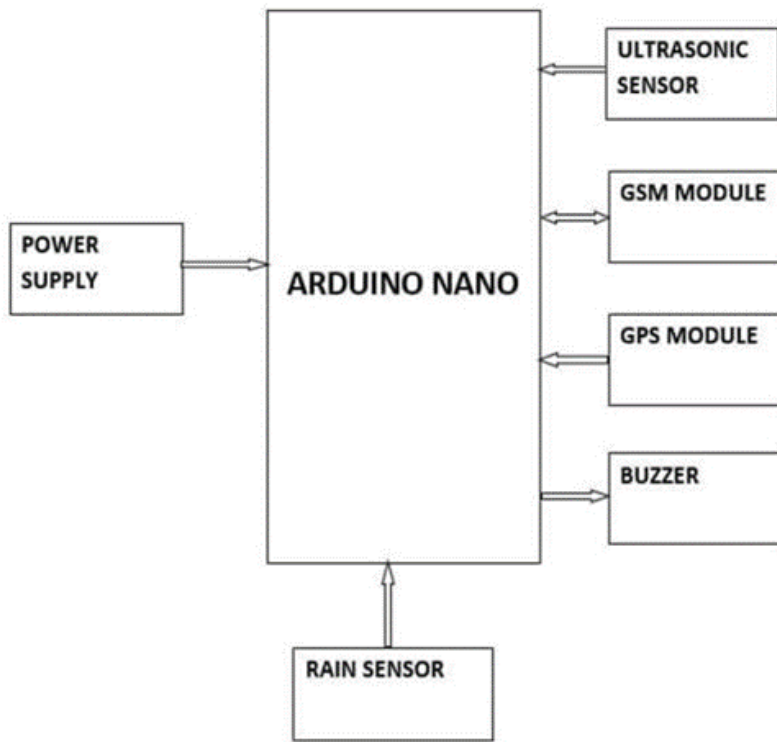
727622BCS056 GOKILADEVI T N  
727622BCS096 GODWIN JACOB J  
727622BCS110 ALAGU SUNDARAM M

The smart cane project uses an Arduino Uno in conjunction with parts such as a buzzer, LEDs, vibrator, and b-type charging module to provide a cutting-edge cane for the blind. With the use of sound, light and vibration cues, this novel technology seeks to improve safety and mobility while facilitating obstacle identification and navigation. By integrating these parts with the Arduino Uno, real-time data processing and feedback mechanism customization is made possible, allowing the cane to be adjusted to various user preferences and surroundings.

The smart cane project uses an Arduino Uno along with a number of other parts, including as a vibrator, buzzer, LED and B-type charging module, to create a high-tech mobility aid for people who are blind or visually impaired. The cane uses a variety of sensory inputs, including light, sound and vibration, to provide real-time feedback to help in obstacle avoidance and navigation.

The smart blind cane project's usability and sustainability are improved with the installation of a solar recharging system, which has various advantages. This is one way that it could be included Attaching a few small, light-weight solar panels to the cane's surface, placing them in the best possible location to get as much sunshine as possible when in regular usage. A circuit for a solar charge controller is incorporated into the design of the cane to regulate the voltage and current from the solar panels, guaranteeing ideal charging effectiveness and avoiding battery overcharging.

A rechargeable battery storage system is included into the cane to hold onto the solar energy gathered during the day to power the electronic parts of the cane at a later time. A USB charging port is incorporated into the body or handle of the cane so that users can easily connect and charge their gadgets (such as smartphones or other assistive technologies) directly from the solar energy that has been stored.



### Ultrasonic Sensor

The ultrasonic sensor is an essential component of the obstacle and proximity detection systems of the Smart Cane project. By giving the Smart Cane system real-time obstacle identification and proximity sensing capabilities, the ultrasonic sensor significantly improves the safety and mobility of people with vision impairments.

### Buzzer

The buzzer serves as an essential component of the smart cane project's user feedback system. The buzzer plays a crucial role in increasing the usability and efficacy of the smart cane since it provides aural cues to the user, improves situational awareness, and facilitates navigation for individuals who are blind or visually impaired.

### Vibrating Motor

The smart cane project's vibrating motor alerts users to impediments by giving them haptic input. The smart cane project's vibrating motor acts as a haptic feedback mechanism, warning users of obstructions that the cane's sensors have identified. This non-auditory input improves user safety and awareness, particularly for users with hearing problems or in noisy surroundings.

### 6V Solar Intake

Using solar energy to recharge the smart cane's battery, the solar panel in the project acts as an alternate power source for the gadget. By lowering reliance on conventional charging techniques, it increases autonomy and sustainability especially in outdoor settings where power outlets might not always be readily available. By using sustainable energy sources environmental conservation is ensured.

To sum up, the smart cane system is a major development in assistive technology for the blind or visually impaired, offering improved independence, safety, and mobility. The limits of conventional white canes are successfully addressed by this inventive device, which combines a variety of sensors and connection elements to provide real-time feedback and navigation help. The Smart Cane System makes use of ultrasonic sensors, GPS, and smartphone connectivity to help people navigate complicated situations more confidently and easily in addition to detecting obstructions.



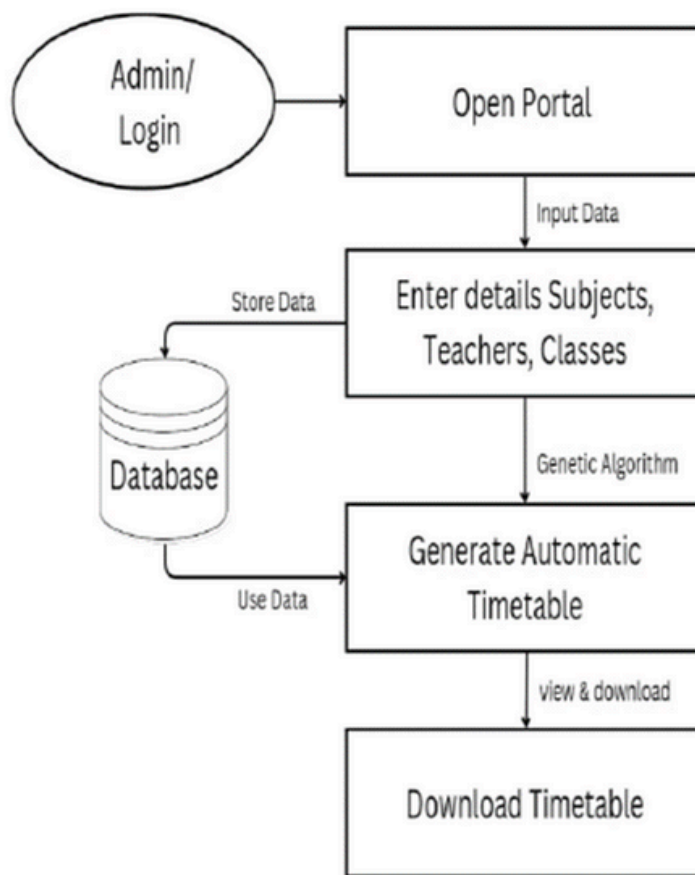
# AUTOMATED TIMETABLE GENERATOR

727622BCS064 RAJKUMAR M  
727622BCS074 TAMILSELVAN K  
727622BCS112 DEEPAK K

One essential tool for educational institution is the Automatic Timetable Generator (ATG), which makes it possible to schedule teachers, resources, and classes effectively. When input data like faculty preferences, available resources, and constraints are entered, the ATG generates an optimum schedule that satisfies predetermined standards. To make sure the created timetable is practical and ideal, the optimization process uses a variety of techniques, such as simulated annealing, genetic algorithms, and constraint satisfaction. The ATG also has dynamic change handling features, like the ability to reschedule in response to unanticipated events or modifications in needs. The advantages of ATG are also covered in the abstract including time savings, better resource management, and increased stakeholder satisfaction.

All things considered, educational institutions looking to improve resource allocation and expedite scheduling procedures will find the Automatic Timetable Generator to be an invaluable tool. The ATG also has dynamic change handling features, like the ability to reschedule in response to unanticipated events or modifications in needs. In this project web based Automated Timetable has been implemented using Python and MYSQL. This has been tested for a year with two sections.

Genetic Algorithms are well suited for optimization problems like timetable construction because they can handle complex constraints, search across large solution spaces quickly, and can improve solutions adaptively over time. They can mimic the process of natural selection by efficiently searching. It is possible to solve both



confined and unconstrained optimization problems with the inheritable algorithm.

Admin login can be used to enter into the portal. Based upon the requirements details like name of subject, number of teachers, total number of classes can be entered as a input data. So, all the details are stored in the MYSQL database. Using genetic algorithm an optimized timetable can be generated and printed in timetable format.

### Input Module

This module makes it easier to enter important data including available courses, faculty availability, room capacity, and scheduling restrictions. It guarantees that all data appropriately provided is needed for the creation of the schedule.

### Initialization Module

This module generates a starting population of timetable solutions, which are represented as chromosomes. A possible schedule solution, including class schedules, room assignments, and faculty allocations, is encoded in each chromosome.

### Fitness Evaluation Module

This module assesses each schedule solution's fitness by taking into account predetermined standards such avoiding conflicts, maximizing resource use, and meeting limits. It rates the applicability and quality of each schedule by giving it a fitness score.

$$\text{Fitness value} = 1 / (1 + \text{number of clashes})$$

### Selection Module

To pick parent chromosomes for crossover, the selection module uses selection methods such roulette wheel selection and tournament selection. Timetables that score higher on fitness are more likely to be chosen to be parents.

### Crossover Module

To create child chromosomes, the crossover module applies crossover operators to certain parent chromosomes. Genetic information from parent chromosomes is exchanged to produce diversified offspring that may be more fit.

## Mutation Module

To preserve genetic variation and investigate novel approaches, the Mutation module randomly modifies the chromosomes of progeny. It creates unique timetable configurations by applying mutation operators, such as switching classes between time slots, rooms, or faculty members.

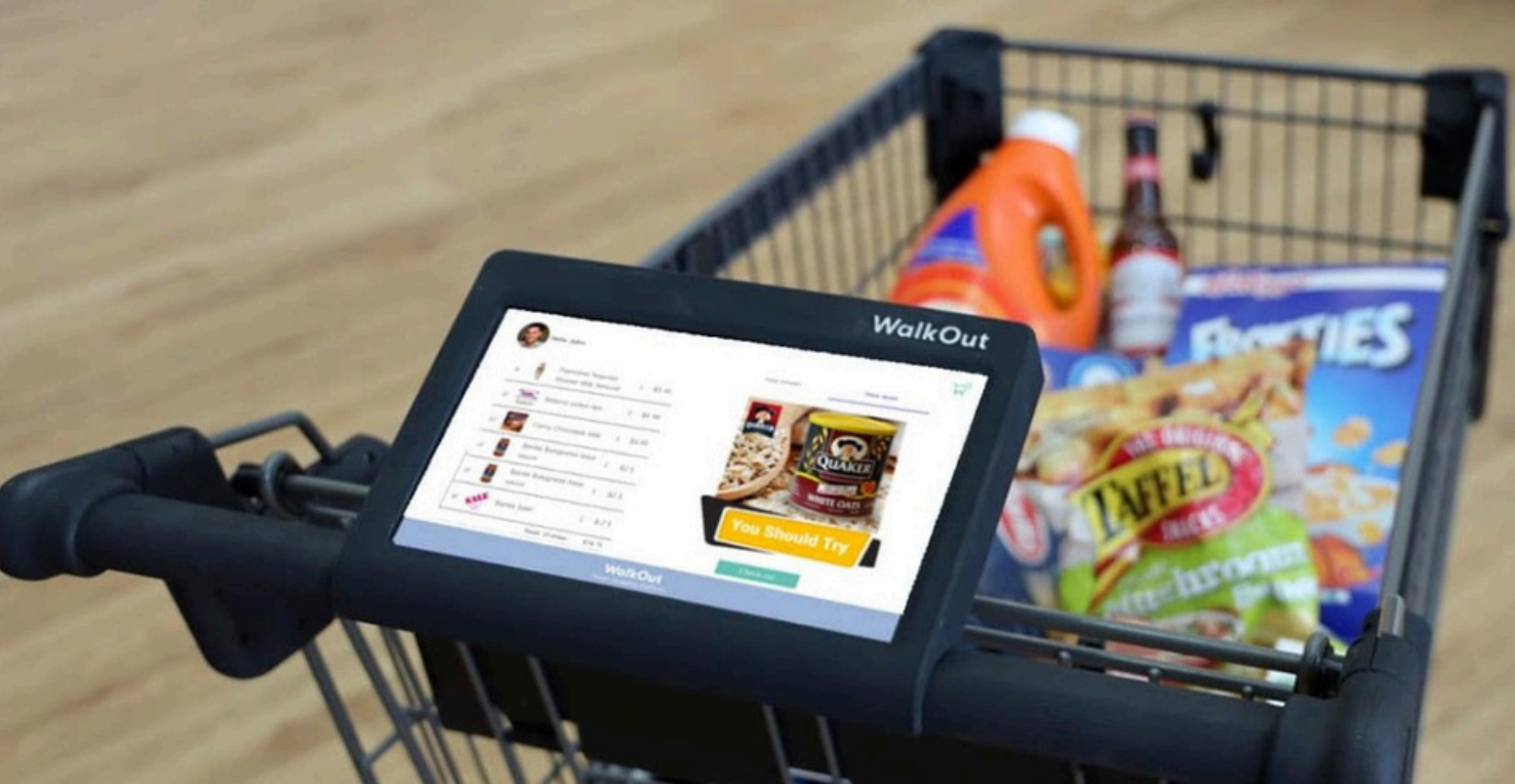
## Output Module

This module shows the final optimum timetable solution developed by the Genetic Algorithm. The timetable, which includes class schedules, room assignments, and faculty allocations, can be seen using an intuitive interface.

The Timetable generator application leverages Genetic Algorithms (GA) to create optimized academic schedules, integrating a MySQL-based user authentication system for secure access. Users log in or register through a Tkinter GUI, providing inputs such as subjects, professors, and periods to generate conflict-free timetables for two sections, displayed in a tabular format. The TimetablegeneratorGA class manages GA operations, including random timetable generation, fitness evaluation, selection, crossover, and mutation, ensuring balanced and optimized schedules with minimal workload imbalances among professors. The application evolves timetables over generations to enhance their quality and includes a feature to compare and adjust timetables to avoid clashes between sections. The application's ability to produce and display well-organized timetables demonstrates its utility in managing the intricate scheduling demands of academic settings, making it a valuable tool for optimizing educational operations.







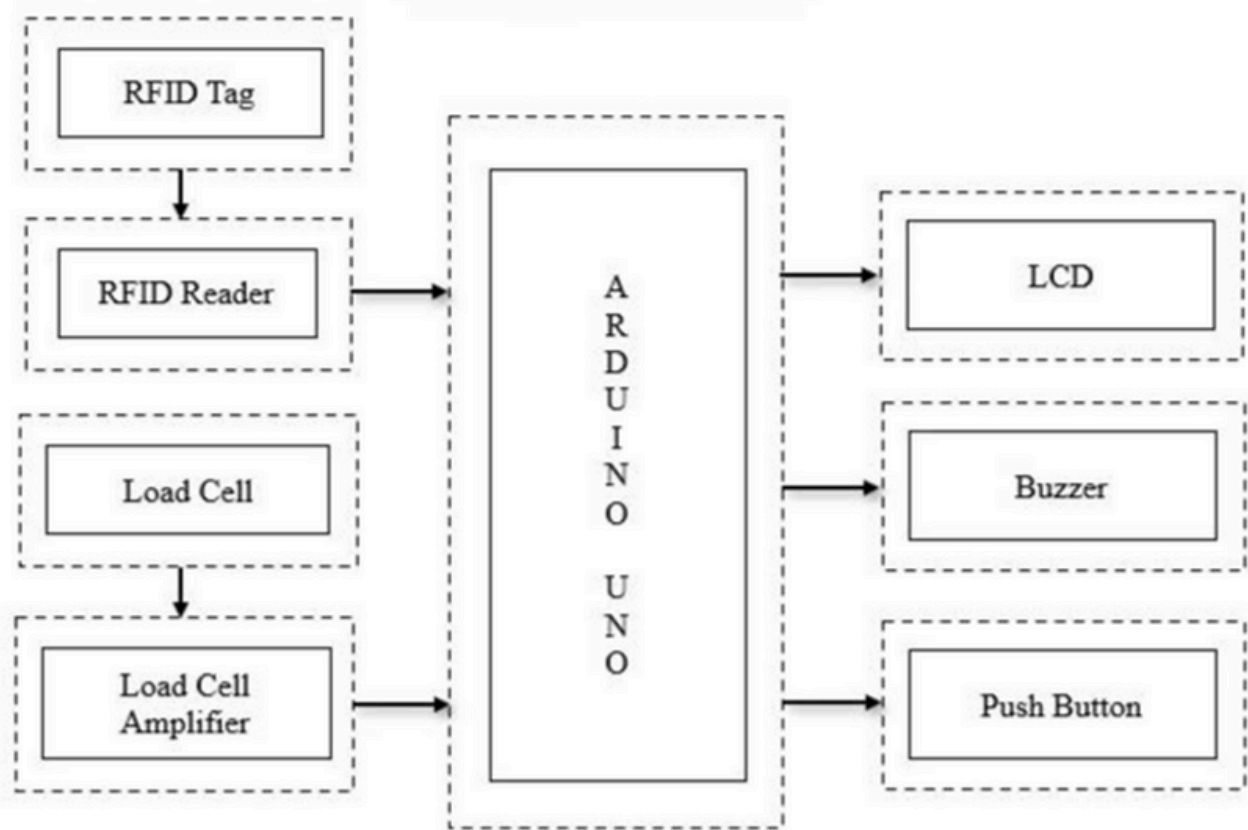
# SMART SHOPPING CART

727622BCS059 MUKESH R S  
727622BCS021 SHRI PATHI G  
727622BCS075 SUJITH G

In modern retail environments, the efficient of shopping carts plays a crucial role in enhancing the overall shopping experience and optimizing operational processes. This abstract introduces a Smart Shopping Cart System empowered by Radio Frequency Identification(RFID)technology. The proposed system aims to revolutionize traditional shopping experiences by seamlessly integrating RFID scanners into shopping carts, enabling automatic identification and tracking of items added or removed from the cart. By leveraging RFID tags embedded within products, the system eliminates the need for manual barcode scanning, streamlining the checkout process and reducing waiting times for customers. Overall, the Smart Shopping Cart System presents a promising solution to enhance efficiency, convenience, and customer satisfaction in retail environments through the innovative application of RFID technology

In order to overcome the challenges in Conventional Shopping, RFID based Shopping cart has been proposed. RFID (Radio-Frequency Identification)-enabled smart shopping carts transform the retail experience with smooth checkout and improved inventory control. These carts are outfitted with RFID readers, which eliminate the need for manual scanning by automatically detecting and tracking objects marked with RFID labels as they are placed inside. Customers and employees alike save time as a result of this streamlining of the purchasing process.

Smart Shopping Cart with RFID and Weight Sensor is a state-of-the-art technological innovation that aims to completely transform the shopping experience. This module offers effective and practical shopping assistance by fusing RFID (Radio-Frequency Identification) technology with a weight sensor.



### RFID Technology and Integration

An RFID tag with unique identifying information attached to every product. An RFID reader integrated into the shopping cart allows it to automatically recognize and identify items as they are added to or taken out of the cart, enabling instantaneous product identification and tracking, removing the need for manual scanning at checkout. The RFID system operates at a frequency range of 860-960MHz, providing a read range of up to several meters, ensuring seamless and efficient detection of tagged items throughout the shopping process.

### Product Addition and Removal

Products are easily added to the basket by users as they are attached to every product. An RFID reader integrated into the shopping cart allows it to automatically recognize and identify items as they are added to or taken out of the cart, enabling instantaneous product identification and tracking, removing the need for manual scanning at checkout. The RFID system operates at a frequency range of 860-960MHz, providing a read range of up to several meters, ensuring seamless and efficient detection of tagged items throughout the shopping process.

### Integration of Weight Sensor

There is a high precision weight sensor installed in the shopping cart. The weight sensor precisely determines the weight of the cart after every item is loaded, including the recently added item, giving consumers immediate feedback on the weight of the things in their cart, helping them to keep an eye on their spending and make sure they don't go over budget.

The retail experience has the potential to be revolutionised with the introduction of an RFID-enabled smart shopping cart system. This system strengthens loss prevention measures, optimizes inventory management, increases customer happiness, and increases operational efficiency through the automatic identification and monitoring of products. The initiative has effectively demonstrated the advantages of incorporating RFID technology into the retail setting, opening the door for a broad industry adoption.



# INTELLIGENT E-BOT

727621BCS026 NADISH KRISHNAN K

727621BCS102 IRFAN K T

727621BCS108 VISHWA K

The Intelligent E-bot is a python based chatbot framework that is intricately linked with MongoDB, showcasing its pivotal role in various business and customer service scenarios. This framework leverages the capabilities of Natural Language Processing (NLP) alongside a robust database infrastructure, thereby offering a scalable and adaptable solution to cater to a wide array of use cases. By seamlessly integrating NLP techniques with MongoDB's flexibility, the framework is positioned to efficiently handle user queries while maintaining accuracy and speed.

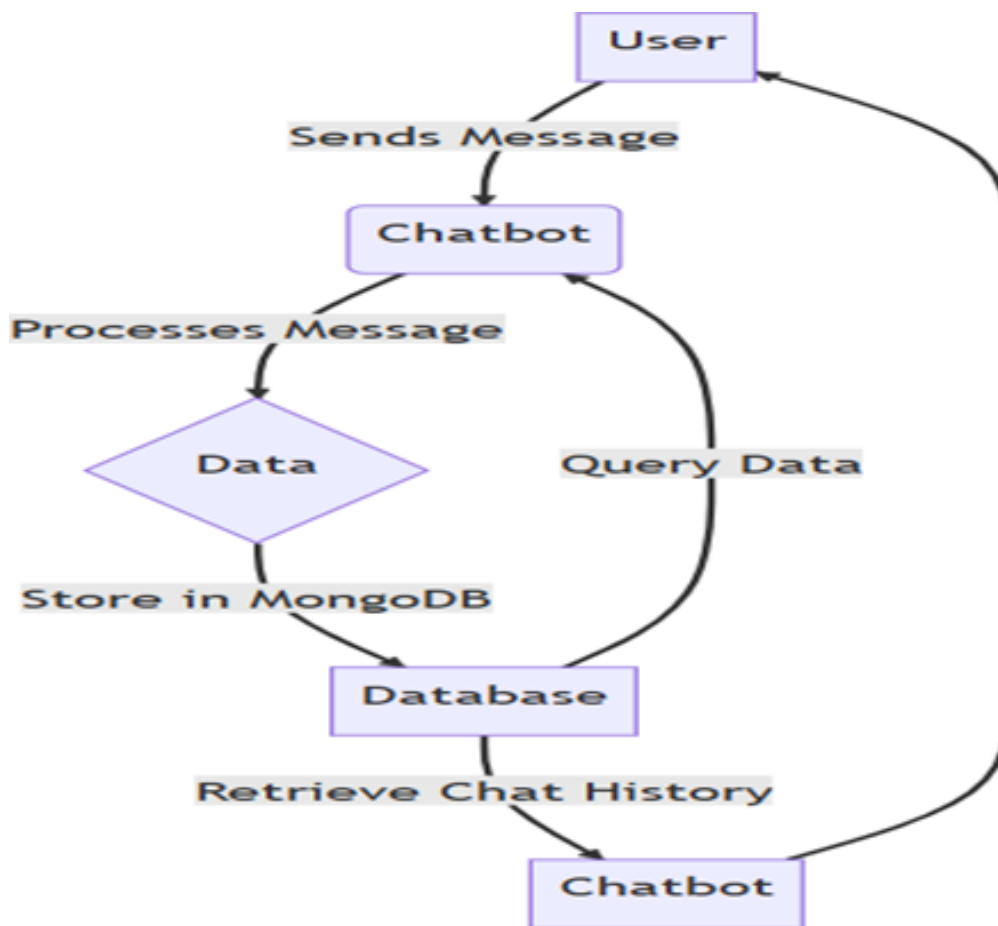
Chatbots are a critical component in modern business operations and customer service realms, portraying them as indispensable tools for enhancing user experiences through efficient query handling.

The proposed system is a web-based chatbot application designed to streamline the college enquiry process and provide users with instant and accurate responses to their queries.

Unlike traditional chatbots that rely solely on predefined rules, the proposed system incorporates advanced natural language processing (NLP) techniques and integrates a database backend to enhance functionality and responsiveness.

At its core, the proposed system consists of two main components: a robust backend powered by Flask and a user-friendly frontend interface developed with HTML, CSS and JavaScript. The backend functionality encompasses user query processing, information retrieval from the database, sentiment analysis and response generation. Leveraging NLP algorithms such as Named Entity Recognition (NER) and Part-of-Speech (POS) tagging, the system accurately interprets user queries and retrieves relevant information from the database in real-time.

On the frontend, the system provides an intuitive and interactive interface where users can input their college-related queries and receive prompt responses.



Through dynamic visualization of query results and personalized recommendations, users can easily navigate through the system and access the information they need efficiently. Additionally, the system's scalability and modularity ensure seamless integration with future enhancements or modifications, catering to evolving user needs and technological advancements. The proposed system aims to revolutionize the college enquiry process by offering users a convenient and efficient platform to access accurate information and make informed decisions regarding college admissions, courses, facilities, and other relevant aspects. By leveraging advanced NLP techniques and database integration, the system enhances user experience, improves query resolution times, and fosters greater engagement within the college community.

### User Query Processing

The proposed system begins by processing user queries using advanced NLP techniques such as Named Entity Recognition (NER) and Part-of-Speech (POS) tagging. These algorithms analyze the syntactic and semantic structure of user input to identify key entities, intents, and relationships, enabling accurate interpretation and retrieval of relevant information.

### Information Retrieval

Upon processing user queries, the system retrieves relevant information from the database based on identified entities and intents. The database stores comprehensive data regarding colleges, courses, admissions, facilities, and other pertinent details, allowing the system to provide users with accurate and up-to-date information in real-time.

### Response Generation

Based on the processed user queries and retrieved information, the system generates personalized responses to address user inquiries effectively. Responses may include detailed information about colleges, courses, admission procedures, eligibility criteria, fees, and other relevant details, presented in a user-friendly and comprehensible format.

The development of the user query response chatbot marks a significant step towards enhancing user interactions and providing efficient support in the realm of college enquiries. By leveraging advanced natural language processing techniques and interactive interfaces, the chatbot demonstrates its capability to address user queries effectively and provide relevant information in real-time.



# Riddles and Facts



# RIDDLES

1. I connect your home devices and make them smart,  
Control lights, temperature, even your car. From  
your phone or your voice, I take the command,  
What am I, in this smart home land?
2. I'm small and often unnoticed, but crucial to all, I  
send data from places both big and small. I track,  
measure, and communicate the needs, Found in  
wearables, homes, and even your seeds.
3. Though I'm not a person, I talk to many, Gathering  
data, my worth is plenty. I help your fridge and car  
stay in sync, What am I, can you think?
4. I learn from data, patterns I find, Improving with  
time, always aligned. I predict outcomes and help  
make decisions, What am I in this data-driven  
mission?
5. I analyze pixels and see the scene, Identifying  
objects, my vision is keen. From photos and videos,  
I learn what's true, What field am I, can you get the  
clue?
6. I find the best fit line to predict, Outcomes from  
data, with points so strict. Minimizing errors, I  
strive to be right, What method am I, that's clear in  
sight?

# FACTS



**Extended Reality (XR), which includes virtual reality (VR), augmented reality (AR), and mixed reality (MR), is being used for immersive training experiences in industries like healthcare, aviation, and manufacturing. This technology enhances learning outcomes and engagement while reducing training costs.**



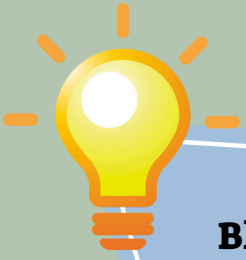
**Wearable Health Monitors: Advanced wearables are now capable of continuously monitoring various health metrics and using AI to provide insights and early warnings about potential health issues. This technology supports the shift towards preventive healthcare and personalized medicine.**



**Chiplets: As making transistors smaller becomes increasingly challenging, chiplets offer a solution by linking small, specialized chips together to perform the functions of conventional chips more efficiently. This approach is crucial for advancing computing power while managing costs and efficiency.**



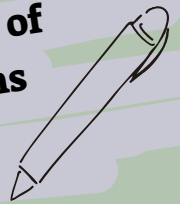
# FACTS



**Blockchain technologies, particularly cryptocurrencies like Ethereum, have faced criticism for their high energy consumption. However, recent advancements, such as Ethereum's transition from Proof-of-Work (PoW) to Proof-of-Stake (PoS), have significantly reduced its energy consumption by 99.9% .**



**The market value of blockchain in the agriculture and food sector is predicted to reach \$1.48 billion by 2026. Blockchain helps in providing tamper-proof tracking of food products and ensuring the integrity of supply chains**



**A neural network is a series of algorithms that attempt to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates. It consists of layers of nodes, where each node represents a neuron, and the layers are connected by edges that transmit signals.**





# ANSWERS FOR RIDDLES

**1** A smart home hub

**2** A sensor

**3** An IoT device

**4** A machine learning algorithm

**5** Computer vision

**6** Linear regression

# ABOUT DIGITIMES

DigiFlash is the student association of Computer Science and Engineering Department, MCET, Pollachi. The objective of our association is to innovate, create and sharpen the minds of the students to compete globally. It is a platform to improve the student's knowledge and also create opportunities to interact with leading industry persons. Digiflash is organizing number of Co-Curricular activities including special lectures by Experts, Workshops, Technical Seminars, Coding Events, Paper & Poster Presentations and Webinars. Digitimes is a part of Digiflash. A magazine that features the latest Technological advancements in the field of Computing.

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