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Smart Campus Technologies by using Artificial Intelligence

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ABSTRACT: This paper presents a comprehensive overview and analysis of a Student Database Management System (SDMS) designed to improve administrative processes and enhance student data accessibility. This is going to be an automated web application. The main objective of this application is that complete automation will be used in it. As the attendance percentage will be told after recognizing the student's face, it will be stored in the mobile application and also in the college's database. Along with this, the attendance of the student living in the hostel will also be created automatically, if the student is absent, then his parent will be informed through a message. This will focus on the activity level of the student.

KEYWORDS: Student Database Management System (SDMS), Administrative processes Student data accessibility, Automated, web application, Face recognition attendance, Mobile application integration, Hostel attendance automation, Absent student notification, Parent communication, Activity tracking.

I. INTRODUCTION

The rapid advancement of technology has revolutionized various sectors, including education. Educational institutions worldwide are increasingly adopting Student Database Management Systems (SDMS) to streamline administrative processes and optimize student data management. This paper examines the significance and advantages of implementing an SDMS, which aims to provide a centralized, secure, and efficient platform for managing student information. Traditional system which was mainly paper-based, required large amount of space to store information. It limits the exchange of information, updating and causes loss of documentation. A collaborative work in this system becomes rigid and degrades performance. This project on student information management system is one complete information management solution for students and staff of any educational institution. In today's world, it is a need to organize huge amount of data than ever before. In the absence of a great infrastructure for faculties, students and departments, management to exchange data, crucial information about students and organizations can be misplaced, which can cause loads of problems that can affect the reputation of the organization. For an academic institution, the data handling should be an easy task for which online approach is a must. Following which the proposed system uses internet as the solution for global access of data, record keeping and managing details of students which makes the student management system centralized.

At one time, the school depended intensely on paper records for this activity [1]. However, their use is not as widespread in universities in India [2]. The Management employees can now easily use this system to create records, keep attendance records, fee payment status which is a very time-consuming activity. Proposed system: Student management web-based system is the process of managing student's record in an institutional organization. It is done through the online method which traditionally, was prepared using papers and manual ledgers. It preserves student's and administrator's resources. This system provides a simple interface for the maintenance of student information [3].

It involves procedures like registering the scholar's details, assignment of the department according to the course chosen, and maintaining records. Being an online system, the availability of information is worldwide which means

accessibility and exchange of information is global. This data is stored safely in the repository that makes it simple to acquire and data modification can be done whenever required. It is the software created for everyday student record management in academic institutes. It helps to fetch the data of student from a specific class just by few clicks. This system will also help in generating a status report of a student such as total attendance, the event requested, fee payment details, admission info, and so on. Click on the mouse and the system will produce the students' report which reduces the requirement for manual labor which is vulnerable to errors and time expenditure. This application is constructed for automated processing of student record management. It even enhances the speed of solving tasks. The student information will be stored according to the batch, department, and section. The student and staff have a unique user login id and password available through the OTP concept for an email verification for valid user. [4] The student can only view and edit their profile information, fill railway concession forms, put event request queries but they can only check the updates and details regarding attendance, fees payment, admission status, etc. The staff can view as well as modify the attendance record, fee details, admission status as well as grant permission for event organization, and so on. A printing facility for attendance records, notices, and other records is available for both students and staff.

II. RELATED WORK

The [5] study focuses on various aspects of the campus, including energy management, security, transportation, and environment monitoring. The proposed system utilizes AI algorithms and data analytics to optimize resource allocation, improve security measures, and provide real-time monitoring of campus facilities. The article highlights the key features, advantages, and challenges associated with the implementation of a smart campus using AI. The [6] authors aim to create an intelligent and data-driven campus environment that enhances various aspects of campus life, including energy management, security, transportation, and student services. The system leverages AI techniques, such as machine learning and deep learning, to analyze large volumes of data collected from different sources and provide valuable insights for decision-making and optimization. The article describes the architecture, components, and functionalities of the smart campus system and discusses the potential benefits and challenges associated with its implementation. The [7] authors aim to utilize AI algorithms and models to enable intelligent decision-making and improve various aspects of campus life. The paper discusses the implementation of machine learning algorithms for tasks such as data analysis, prediction, and optimization in the context of a smart campus environment. The authors present case studies and results to demonstrate the effectiveness and potential benefits of applying machine learning in a smart campus setting. The [8] conference paper presents the design and implementation of an intelligent parking system for a smart campus, with a focus on leveraging artificial intelligence (AI) techniques. The authors propose an AI-based approach to improve the efficiency and effectiveness of parking management within the campus environment. The paper discusses the integration of AI algorithms and technologies for tasks such as parking space detection, vehicle identification, and parking guidance. The authors provide insights into the system architecture, algorithms utilized, and experimental results to demonstrate the feasibility and benefits of the proposed intelligent parking system. The [9] authors propose an AI-based approach to optimize energy consumption and enhance energy efficiency within the campus environment. The paper discusses the integration of AI algorithms and techniques for tasks such as energy monitoring, prediction, and optimization. The authors provide insights into the system architecture, AI models utilized, and experimental results to demonstrate the effectiveness of the proposed intelligent energy management system.

The [10] conference paper presents the design and implementation of a smart campus system that utilizes artificial intelligence (AI) for resource management. The authors propose an AI-based approach to optimize the utilization of resources within a campus environment, such as energy, water, and infrastructure. The paper discusses the integration of AI techniques for resource monitoring, prediction, and management. The authors provide insights into the system architecture, AI algorithms employed, and experimental results to demonstrate the effectiveness of the proposed smart campus system for resource management. The [11] authors propose an AI-based approach to enhance the functionality and efficiency of classrooms within a smart campus. The paper discusses the integration of AI technologies for various classroom activities, such as intelligent attendance management, automated evaluation, personalized learning support, and smart content delivery. The authors provide insights into the framework's architecture, AI algorithms used, and experimental results to demonstrate the effectiveness of the proposed smart classroom system. The [12] authors propose an integrated approach to create a smart environment on the campus, leveraging AI and IoT for various applications and services. The paper discusses the architecture and components of the smart campus system, including intelligent security monitoring, energy management, environmental monitoring, and resource optimization. The [13] authors highlight the benefits and challenges of deploying AI and IoT technologies in a campus setting and present experimental results to demonstrate the effectiveness of their proposed approach. The conference paper provides a review of recent advancements in AI-enabled smart campus systems. The authors discuss the integration of artificial intelligence (AI) techniques and technologies in various aspects of a smart campus, such as infrastructure management, security systems, energy efficiency, and student services. The paper explores the potential benefits and challenges of

AI-enabled smart campus solutions and presents a comprehensive review of recent research and developments in this area. The authors highlight key technologies, applications, and trends, providing insights into the current state of AI-enabled smart campus systems.

III. MODULES OF THE SYSTEM FOR STUDENTS (USERS) AND TEACHERS (ADMIN)

Once the student has registered in college the administration provides them with user credentials to log into the system. Due to the role-based access model the user will get only those privileges for which one has registered. Fig 1. Here, the user is a student, so the privileges of students are: • Viewing and editing profile dashboard. • Viewing timetable, calendar, and notice boards. • Access to fee payment gateway. • On the self-help portal, students can fill railway concession form and request for organizing any events in the college. • Contact/ Complain/ Request Form.

Attendance management system: Teachers can take attendance by selecting the section of a given department they need. Teachers will also be able to modify the attendance of a student if wronged by chance. Students can only view the attendance for their respective lectures. Fig 2. Wronged attendance can only be amended within a week followed which it cannot be changed.

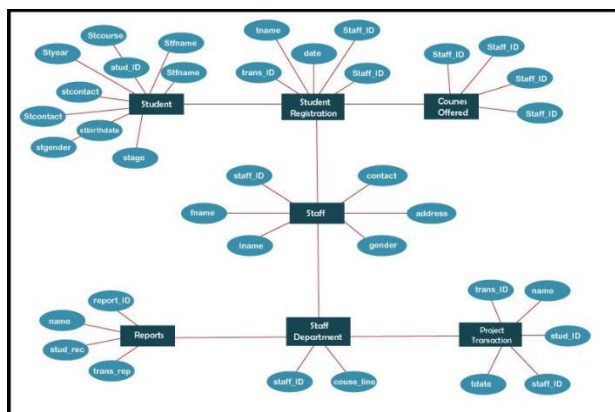


Fig:1

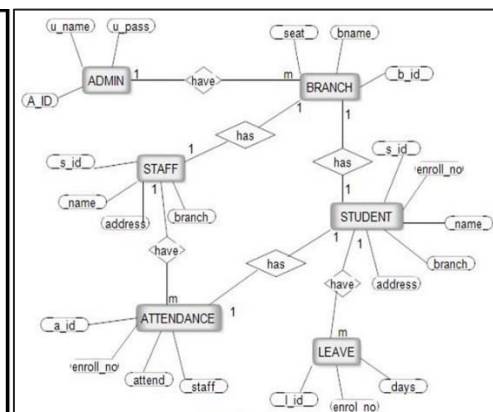


fig:2

IV. FACE RECOGNITION

Here faces will be recognized using face recognition algorithms. The processed image will then be compared against the existing stored record and then attendance is marked in the database accordingly. Compared to existing system traditional attendance marking system, this system reduces the workload of people. This proposed system will be implemented with 4 phases such as Image Capturing, Segmentation of group image and Face Detection, Face comparison and Recognition, Updating of Attendance in database. Face detection: The first step in facial recognition is to detect a face in an image or video frame. This is done using a face detection algorithm, which searches for patterns in the image that are indicative of a face.

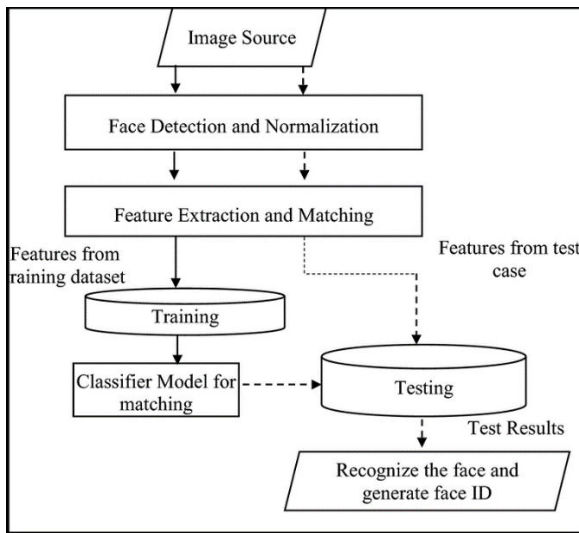


Fig:3

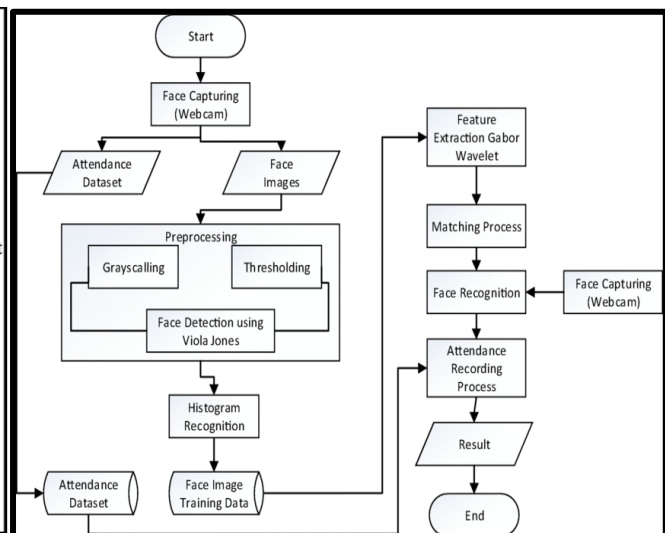


fig:4

These patterns may include the presence of facial features such as eyes, nose, and mouth. Face alignment: Once a face is detected, the next step is to align it. This involves normalizing the position, orientation, and scale of the face to a standard reference frame. This is necessary to ensure that the facial features are in the same location and have the same size and orientation across different images. Face recognition: The final step in facial recognition is to recognize the face. This involves comparing the aligned face with a database of known faces to identify a match. This is done using a face recognition algorithm, which extracts features from the face and compares them to features of known faces in the database. The algorithm calculates a similarity score between the two sets of features and determines if there is a match.

V. ARTIFICIAL INTELLIGENT IN DATABASE WORKING PROCESS

Data preparation: The first step in using AI with a database is to prepare the data. This involves selecting relevant data from the database, cleaning it, and transforming it into a format that can be used by AI algorithms. This may include normalizing data, handling missing values, and encoding categorical variables. Model training: Once the data is prepared, the next step is to train an AI model on the data. This involves selecting an appropriate algorithm and tuning its parameters to achieve the best performance. The model is trained using the prepared data and validated using a separate dataset to ensure it can accurately generalize to new data. The technology has been developed which can make interaction between the human and the computer very easy. The face recognition is the best example for that. For the past two decades the researches are made in the face recognition. The face recognition can involve in all the below mentioned process such as computer vision, pattern recognition, image processing and the machine learning. In this paper they mainly process the face recognition and the color identification. The faces are captured and the pattern segmentation, identification and comparison are made. Then the next stage is the color identification which uses the Neural Network Model which is applied in the color uniform of the college students. From the captured image of the color uniform the RGB color components are extracted.

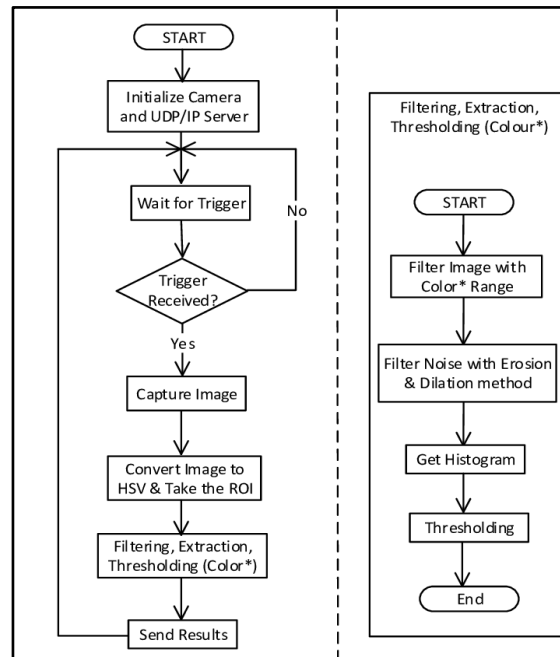


Fig 5

The color components of the resized images are scaled using SHM Simple Heuristic Method. From feature vector identification in the color uniform the rescaled image is extracted. The accuracy of the method is about 95%. The RGB and the neural network plays a main role in the color identification. Image acquisition: The first step in clothing detection is to obtain an image or video frame that contains clothing items. This can be done using a camera or by retrieving an image from a database. Preprocessing: The next step is to preprocess the image to prepare it for clothing detection. This may involve resizing the image, converting it to grayscale, or applying filters to enhance contrast or remove noise. Object detection: Once the image is preprocessed, the next step is to detect clothing items in the image. This is done using object detection algorithms, which search for patterns in the image that are indicative of clothing items. These patterns may include the shape, texture, and color of the clothing. Classification: After clothing items are detected in the image, the next step is to classify them according to their type, such as shirts, pants, or dresses. This is done using a classification algorithm, which uses features extracted from the clothing items to determine their type. Post-processing: Finally, the results of clothing detection and classification may be post-processed to refine the output. This may involve filtering out false positives or grouping similar clothing items together.

VI. CONCLUSION AND FUTURE WORK

Finally, with due diligence, the student management web-based Application system is carried out. It is system that assists the user to work with the day to day activities involved in the academic institution. It lessens the amount of manual hard work and provides greater efficiency diminishing the amount of time taken for detailing different modules. The interface provides user-friendly experience to everyone. Only verified users can access

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