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AI Based College Surveillance System for Class Skipper

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ABSTRACT

In many of the educational institutions, managing attendance of students/candidates is tedious, as there would be large number of students in the class and keeping track of all is onerous. There are situations where student act as proxies for their friends even though they are not present. The presence of students repeatedly skipping classes and spending considerable time wandering on campus signals potential underlying issues, such as disengagement, personal challenges, or dissatisfaction with the educational experience. Traditional methods of monitoring attendance are often inadequate in addressing these nuanced challenges. Therefore, there is a need for an AI-based College Surveillance System using Faster R-CNN to accurately detect class skippers and provide insights into their behavioural patterns. In this system, a database containing the trained student's face. A camera installed in the college campus captures the face of all the student in the classroom and other places too. This face image is processed using FRCNN algorithms to detect faces and to mark the attendance automatically in an excel sheet. The system records the entire class session and identifies when the students pay attention in the classroom, and then reports to the facilities and also this system can record violations of classroom, that is absence, roaming around the college campus during the class hours and send alert message to the H.O.D. This dynamic attendance system uses face recognition as an important aspect of taking attendance which saves time and proxy attendance and is avoided. The system identifies faces very fast needing only 100 milliseconds to one frame and obtaining a high accuracy. Our face recognition model has an accuracy rate of 98.87%.

Keywords: Faster R-CNN , AI-based College Surveillance System.

I. INTRODUCTION

Attendance, the act of being present at a class, event, or meeting, is fundamental in educational institutions for tracking student participation. Schools often require students to maintain a certain level of attendance, which can be monitored through various methods including physical registers and digital tools. Traditional attendance methods, such as calling out names or signing papers, are time-consuming and prone to inaccuracies. Modern advancements have introduced biometric systems using student identification cards, fingerprints, and even facial recognition technology to streamline the process. During online classes, teachers mark attendance digitally to ensure all students are present. In educational settings, attendance is not just a formality; it directly impacts students' academic performance. Regular attendance is linked to better grades and a lower risk of failure and dropout. Conversely, absenteeism can be indicative of underlying issues such as health problems, personal challenges, or even bullying. Addressing these issues through effective attendance management helps in identifying and mitigating factors that hinder a student's academic journey. Automated attendance systems are emerging as solutions to overcome the inefficiencies of traditional methods. These systems utilize various technologies, including RFID, iris recognition, and increasingly, face recognition, to ensure accurate and efficient tracking. The advent of deep learning and AI technologies has further revolutionized attendance systems. Deep learning, a subset of machine learning, mimics human brain functions to process data and recognize patterns. Neural networks, particularly convolutional neural networks (CNNs), are highly effective for image-related tasks such as facial recognition. These networks consist of multiple layers that process input data to extract features, enabling precise identification and classification of images. Faster R-CNN, an advanced form of CNN, offers rapid and accurate object detection by generating region proposals and classifying objects within those regions. This project aims to implement an AI-based College Surveillance System that integrates Faster R-CNN and FaceNet technologies to automate attendance management and enhance campus security. By leveraging deep learning techniques, the system will provide real-time facial recognition to accurately track student attendance and identify behavioral patterns. The integration of these technologies promises not only to streamline administrative processes but also to improve the overall safety and efficiency of educational environments. The project includes the development of a centralized administrative dashboard, user-friendly interfaces for different roles, and a comprehensive notification system to ensure effective communication and management.

II. LITERATURE SURVEY

A student attendance management method based on crowdsensing in classroom environments was developed. This method, which combines active reporting and sampling checks of students' location information, boasts high real-time performance and low disturbance. The system, named AMMoC, operates without additional hardware devices or the need to collect students' biological characteristics. Instead, it relies on two Android applications

installed on teachers' and students' mobile devices, utilizing mutual verification among students to complete attendance checking through crowdsensing tasks within classroom subregions[1]. Another attendance management system designed in QR codes that change every 30 seconds to prevent proxy attendance. This system automates the attendance recording process, providing separate interfaces for teachers and students. Teachers retain the ability to manually mark attendance if needed, ensuring flexibility and reducing the time spent on attendance during lectures [2] . In face recognition attendance system based on real-time video processing was introduced. Utilizing convolutional neural networks (CNN), this system addresses challenges such as image blur, posture changes, and occlusion in surveillance videos. The approach includes artificially blurring training data to improve feature learning, resulting in a robust system with an accuracy rate of approximately 82% [3]. Another 2020 study proposed an e-attendance checker using Histogram of Oriented Gradients (HOG) with Support Vector Machine (SVM) for facial recognition. This system optimizes camera and class size considerations to enhance accuracy. The process involves face detection followed by recognition, with results displayed in an online database . A deep learning-based attendance system utilizing convolutional neural networks (CNN) and edge computing was developed in [4]. This system recognizes faces even under varying positions and lighting conditions, providing real-time data processing to improve latency and response times in smart classrooms[5].,A cloud-based class attendance record system (CBCA System) was introduced, leveraging Baidu cloud AI for face training and recognition. This system captures individual student faces through a video camera, significantly improving recognition rates by mitigating lighting and angle issues.[6] .a model combining face recognition with Radio Frequency Identification (RFID) for attendance verification was developed. This system records entry and exit times using Real Time Clock (RTC) modules and can log data locally or upload it online, enhancing security and efficiency in attendance management[7].

III. PROPOSED SYSTEM

This paper proposed a system that can automatically attend using surveillance cameras. The camera will be installed in front of the class in an area that can reach all parts of the class and other area of the campus including vehicle stand, canteen, seminar hall, library etc. Propose a deep unified model for Face Recognition based on Faster Region Convolution Neural Network. Furthermore, by using a face detection system, the camera will mark the part of the frame from the captured image which is the face of students in a class and other area. The process is continued with an introduction to the face that has been detected so that it will automatically be kept a record that the student is present in the class or outside the class with a specific course and time.

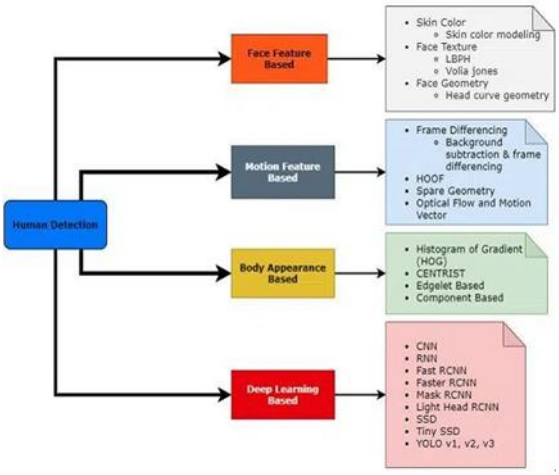

Figure 1: System Architecture of the proposed system

3.1 IMPLEMENTATION

The College Management Dashboard is a cloud-based educational ERP system designed to streamline various administrative tasks in higher education institutions and colleges. It offers a comprehensive suite of features, including online admission management, student enrollment, attendance tracking, fee collection, grades, assignments, and library book management. With the integration of biometrics and advanced business intelligence tools, the system provides precise reports on various aspects like college admission, enrollment, scholarship, previous academic records, fees, alerts, attendance, and compliance management. The interface is user-friendly, making it accessible to college admins, teaching staff, and students, ensuring efficient and effective management of college operations.

The College Admin Dashboard is the central hub for managing all administrative activities. It includes secure login pages, department management, semester management, syllabus management, student and staff management, timetable organization, and attendance viewing. It also allows for report generation and notification customization. The staff and HoD (Head of Department) dashboards provide functionalities tailored to their roles, such as viewing timetables, attendance records, and class skipper details. Additionally, the HoD dashboard includes features for sending SMS notifications to parents regarding their ward's attendance or behavior, enhancing communication and engagement with stakeholders.

The system leverages advanced face recognition technology using the FaceNet model, integrated with Faster R-CNN for enhanced face detection and feature extraction. This technology is employed to automate the attendance system by capturing and enrolling student faces. The real-time live feed from classrooms and campus areas allows for continuous monitoring and immediate identification of individuals. This automation not only simplifies

attendance tracking but also enhances campus security by detecting and validating individuals in real-time, thus contributing to a secure and disciplined learning environment.

The College Surveillance System includes modules for attendance automation, violation alerts, notifications, and reporting. The attendance automation module eliminates manual recording, providing a user-friendly interface for easy navigation. The violation alert module ensures swift intervention by capturing images during violations and triggering immediate alerts. The notification module automates communication by sending timely updates through various channels like SMS, emails, or in-app messages. The reports module generates detailed insights into attendance, behavioral patterns, and violations, enabling administrators to make informed decisions and foster a disciplined and engaging educational environment.

IV. RESULTS AND DISCUSSION

The College Management Dashboard has demonstrated significant efficiency in managing various administrative tasks within higher education institutions. By integrating advanced technologies such as biometrics and facial recognition, it has streamlined processes like student enrollment, attendance tracking, and fee collection. The system's real-time monitoring capabilities and automated notifications have enhanced campus security and improved communication with stakeholders. The user-friendly interface has facilitated easy adoption among college admins, teaching staff, and students, ensuring seamless management of educational operations. Overall, the implementation of this ERP system has led to improved administrative efficiency and a more secure and well-organized campus environment.

V. CONCLUSION

The AI-based College Surveillance System using Faster R-CNN for attendance management and behavioral analysis represents a significant milestone in modern educational technology. Through the integration of cutting-edge technologies like Faster R-CNN and FaceNet, the system revolutionizes traditional attendance tracking methods. By automating attendance marking, identifying class skippers, and providing real-time behavioral analysis, the system enhances efficiency, security, and discipline within educational institutions.

VI. FUTURE ENHANCEMENT

Overcoming Facial Recognition Challenges Enhancing the system's capability to accurately detect tilted faces, moustaches, and growing beards by refining the face recognition algorithms

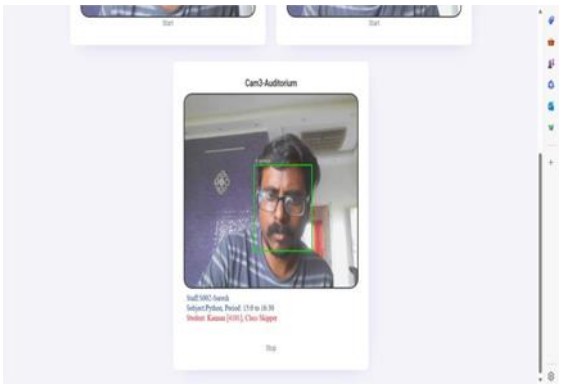

Figure 2: Covert Into Frames

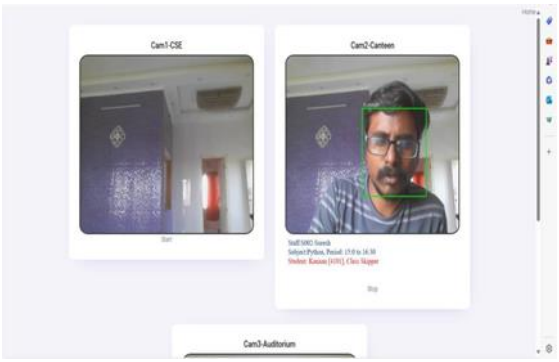

Figure 3:Result

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