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REAL TIME AI POWERED FACE RECOGNITION SYSTEM WITH DATABASE INTEGRATION

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***Abstract*—** In the digital century face recognition technology finds application in many areas as a commonly used biometric tool. With relatively lower accuracy when compared to finger recognition techniques, its non-contact and non-invasive nature renders it highly desirable. It is found to work best in applications involving security, authentication, as well as attendance tracking within academia and the workplace. This project designs an AI-based attendance monitoring system that works on the principle of face recognition to treat the inefficiencies and scope for incorrectness in conventional attendance systems, whereby the possibility of proxy attendance is a concern. The system involves four primary stages: building a database of student images, face detection, identity recognition, and updating attendance information. It adopts Haar-Cascade classifiers and Local Binary Pattern Histogram algorithm for the face identification process, handling video flows recorded in real-time in the classroom. Attendance records are automatically sent to the involved faculty member by email after the session.

I.INTRODUCTION

Traditional marking of attendance at schools and colleges is generally a time-consuming and laborious activity. Faculty members are required to mark the names of the students manually by calling them out, which takes around five minutes of a class time each time. The method is not only wastage of class time but is also a source of proxy attendance. To overcome these limitations, alternative technologies similar to Radio Frequency Identification (RFID) [3], iris scanning [4], and fingerprint scanners have gained usage by many institutions of learning. But they also tend to be based on queuing, which creates a delay, and they are invasive for the users.

While face recognition is a viable biometric solution that is easy to capture and non-intrusive, it is less impacted by various facial expressions and is applicable for use with both verification (1:1 matching of a face with a stored template) and identification purposes (1:N matching to find a face from a group of faces) [1]. This application is to design an attendance solution based on using face identification technology for taking attendance by identifying students' faces. Increasing usage has made face recognition a proven and efficient technique. This paper considers a proposed system that receives live class video feed, recognizes students' faces from class, and takes attendance when a match from the database is found.

II.PROPOSED SYSTEM

Each student needs to register with the required details, after which their photographs are captured and stored in a dataset. At the time of each class session, face detection is done using a live feed video. The detected faces are compared with those stored within the dataset. When a match is made, the presence of the student is marked as present. When the session is over, a list of absent students is sent to the faculty scheduled for the session via email.

2.1REGISTER AND LOGIN

Figure 2.1 illustrates the Register and Login Page, the main entry for the real-time AI-powered attendance system. It enables users to register, log in or recover forgotten passwords, ensuring secure and seamless access.

2.2REGISTER DETAILS

Figure 2.2 displays the Register Details Page, where new users can enroll in the system. This interface simplifies the registration process, requiring essential details like name and contact details. Security questions enhance account protection, while a checkbox ensures users agree to the terms and conditions. The design effectively balances usability with security.

2.3HOME

Figure 2.3 shows the Home Page, which serves as the central hub of the attendance system. It features real- time attendance tracking, employee profiles, and customizable reports, accessible via intuitive icons or menus. The page also provides quick access to attendance statistics, system announcements, and upcoming events, offering users a streamlined and informative experience.

2.4STUDENT DETAILS

Figure 2.4 represents the Student Details Page, offering a detailed view of each student's information. Users can search or filter students by ID, name, department, course, year, and semester. The "Class Student Information" section includes personal details such as roll number, gender, DOB, contact details, and teacher name. The page also allows for photo management, with options to capture, update, or replace student images.

2.5STUDENT PHOTO TRAINING

Figure 2.5 highlights the Student Photo Training Page, where the system trains its facial recognition algorithm using labeled student photos. The interface includes a friendly robot illustration and a grid layout of student images, each linked to a unique ID. This process is vital for ensuring accurate face identification during attendance recording.

2.6STUDENT FACE AND SPOOF DETECTOR

Figure 2.6 presents the Student Face and Spoof Detector Page. It features a live camera feed and uses facial recognition to verify a student's identity. The system detects and flags spoofing attempts—such as photographs or videos—ensuring only genuine students are marked present. This robust validation mechanism upholds the security and accuracy of attendance records.

2.7STUDENT ATTENDANCE

Figure 2.7 depicts the Student Attendance Page, the main interface for monitoring attendance in real time. It lists students along with their ID, roll number, entry/exit times, date, and attendance status. Useful features like "Export CSV" and "Update Exit Time" enhance administrative efficiency and data accuracy.

2.8DEVELOPER

Figure 2.8 shows the Developer Page, which lists the system's developers. Clicking on a name opens the developer's email, enabling users to contact them directly for support or feedback. This feature promotes transparent communication and ensures prompt technical assistance.

III.LIST OF FIGURES

Figure 2.1: *Register and Login*

Figure 2.2: *Register Details*

Figure 2.3: *Home*

Figure 2.4: *Student Details*

Figure 2.5*: Student Photo Training*

Figure 2.6: *Student Face and Spoof*

Figure 2.7: *Student Attendance Page*

Figure 2.8: *Developers*

IV.RESULTS AND DISCUSSIONS

Figure 4.1 presents the core AI models that power the real-time attendance system. The Single Face Recognition model achieves 96% accuracy, enabling precise, real-time identification of individual students. The Multiple Faces Recognition model detects small groups with 90% accuracy, while the Group Faces Recognition model handles larger groups in complex environments with 88% accuracy, showcasing its reliability under varied conditions.

A built-in spoof detection system prevents unauthorized access using masks or photos, ensuring data integrity. The system also features database integration for real-time tracking, CSV report exports, and detailed student profile management.

High-quality web cameras, including night vision support, are used to capture reliable video feeds in all lighting conditions. With its intuitive design and automated workflow, the system offers a secure, accurate, and scalable solution for modern attendance management.

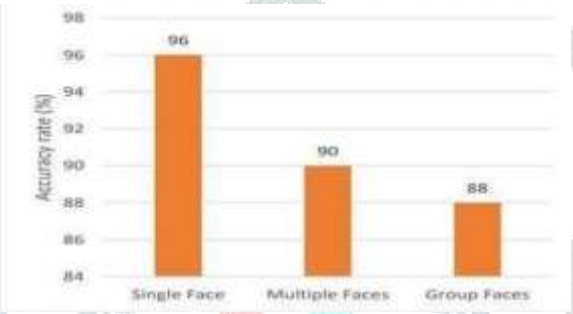

Figure 4.1: *Accuracy and Validation of Real-Time AI-Powered Attendance System*

V.CONCLUSION

This project deals with the implementation of a robust class attendance system based on facial identification technology. The system is aimed to take attendance using face identification. It will take the frontal view images using a webcam, identify the recognized faces, and then mark the presence of recognized students by making entries into the records accordingly.

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