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CLASSROOM MANAGMENT USING AI AND IOT

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Abstract: Face recognition technology has emerged as a smart solution for addressing various contemporary needs, including empathy and identity verification. It combines the unique aspects of biometric methods, which seek to establish individual identity through bodily characteristics, with the familiar capabilities of visual recognition systems. This project is designed to streamline the process of maintaining daily attendance records for students. The system operates by recognizing the faces of students and automatically saving their attendance status in a database.

Keywords: Face Recognition, Attendance system and Bio-metric, etc.

I. INTRODUCTION

Face recognition technology stands out among biometric methods for its exceptional combination of accuracy and non-invasiveness. The face recognition has found valuable applications in multimedia information processing. Traditionally, classroom attendance has been taken manually, with faculty members relying on attendance registers, but this process is time-consuming and impractical in large classrooms.

Various Techniques for Attendance Marking:

Manual attendance recording: This traditional method relies on faculty members manually marking attendance in registers, which can be time-consuming and error-prone.

Automated Face Recognition: The proposed system employs face recognition technology to automatically mark student attendance. This approach not only reduces the administrative burden but also enhances accuracy and efficiency.

1) Fingerprint based System
2) Iris Recognition
3) RFID based System
4) Face Recognition
5) Signature based System

Face Recognition stands out as a natural and user-friendly technique that operates independently of the subject's cooperation. It involves addressing a series of interrelated challenges through a step-by-step approach:

1) Image Capture and Facial Detection: The initial step involves capturing an image and identifying all the faces present within it.
2) Individual Face Focus: Subsequently, the focus shifts to individual faces, requiring an understanding that even under challenging conditions such as unusual facial orientations or poor lighting, the system can still recognize the same person.
3) Distinctive Facial Features Identification:The next task involves pinpointing various unique facial features that aid in differentiation from other individuals. These distingu

II. LITERATURE SURVEY

[1] The paper details the creation of a compact and dependable attendance tracking system designed for classrooms, seamlessly integrating RFID technology with facial verification. In the initial phase, the RFID system authenticates students by means of RFID cards, using unique card numbers for each student. Subsequently, the system employs a Fast Adaptive Neural Network Classifier (FANNC) to verify the identity of each student through facial recognition. To evaluate its performance, the system was trained and tested using the FEI face database, with classifiers trained on students' face images in various head poses and then tested across different poses. The results indicate a high level of accuracy, with the system correctly identifying students' frontal faces and varying poses about 98% of the time. Additionally, the system exhibits effectiveness in detecting proxy attendance, achieving an efficiency rate of 73.28% for

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frontal face verification and 79.29% for different poses, thus highlighting its potential as a robust and effective tool for classroom attendance management

[2] This paper introduces an innovative access control system that combines Radio-frequency identification (RFID) technology with face recognition. The system employs a swift face detection approach and applies a normalization process to enhance the accuracy of detected faces. To verify the detected face, The application employs the Speeded Up Robust Features (SURF) algorithm for enrollment, juxtaposing the identified face with a previously stored reference image. The final step of authentication involves employing the Complex Wavelet Structural Similarity method. Experimental results confirm the system's effectiveness, showcasing a high recognition rate. In real-world application, the proposed method successfully operated within a multinational enterprise, garnering high satisfaction levels. This integration bolsters security and reliability in access control, making it a promising solution for access management in various context

[3] This paper addresses the critical importance of efficient attendance management in academic institutions to ensure the delivery of quality education. It introduces an automated attendance system model designed to streamline attendance recording and eliminate the possibility of fraudulent practices. The core of this model involves the integration of face recognition technology with Radio Frequency Identification (RFID) to identify and record authorized students as they enter and exit classrooms. This Smart Attendance System maintains an accurate record of registered students, replacing the labor-intensive traditional attendance process. Furthermore, it maintains a comprehensive attendance log for each course, offering necessary information as needed. By combining face recognition and RFID verification in the project, it effectively overcomes the limitations of manual attendance systems. An additional environmentally friendly feature involves the use of IR modules to control room electronics, conserving energy by activating them only when people are present. This innovative system promises enhanced efficiency and resource conservation for attendance management in educational institutions [3].

[4] This study tackles the labor-intensive and time-consuming nature of classroom attendance procedures in Chinese universities, acknowledging the elevated costs involved. To address these challenges, the research introduces an innovative method that incorporates deep learning principles to enhance the convolutional neural network, specifically AlexNet. The Web Face dataset is utilized for more effective network training and testing, resulting in an impressive Top-5 error rate of only 6.73%. Subsequently, the investigation applies this model to the field of facial recognition and integrates it with RFID card reading technology to formulate an intelligent classroom attendance system. The findings showcase the system's effectiveness and reliability, leading to a substantial reduction in overall costs associated with managing classroom attendance. This innovative integration of technology promises to streamline attendance management in Chinese universities, offering a more efficient and cost-effective solution.

III. SYSTEM DESIGN

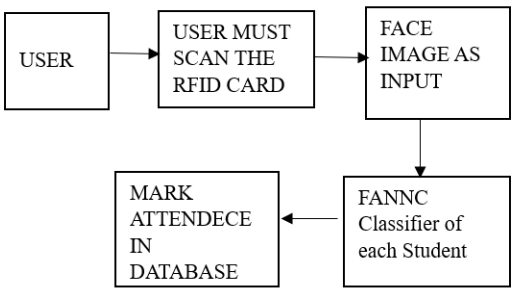

Fig.1: System architecture

The proposed system is a biometric attendance system that leverages face recognition technology. Face detection, a critical component of this system, has been the subject of extensive research over the past decades. It falls under the broader category of object detection and serves the purpose of identifying the size and location of candidate faces within an image. The process involves designing a system that takes images containing faces as input and then training a classifier to accurately identify faces within those images. The primary objective of this endeavor is to minimize false positive results, thereby enhancing the overall accuracy of the system. In summary, this biometric attendance system relies on cutting-edge face detection techniques to improve accuracy, making it a valuable tool in various applications.

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The Attendance System is a standalone product designed to operate independently. It will interact with RFID card scanners, cameras for face recognition, and a database system for data storage.

User Authentication: Users must scan RFID cards to gain access to the system.

Face Recognition: After RFID authentication, the system will perform face recognition for user identification.

IV. ADVANTAGES

1. Easy to Maintain Attendance: • With an AI and IoT-based system, attendance management becomes much simpler. Students can be automatically recognized and marked as present, reducing the need for manual attendance taking. This minimizes the chances of human error and ensures a more accurate and up-to-date record of attendance.
2. Reduced Paperwork: • Traditional attendance methods often involve physical attendance sheets and manual data entry, leading to a significant amount of paperwork. With an automated system, there is no need for paper-based records, which not only saves time but is also more environmentally friendly.
3. Automatic: • An AI and IoT-based system operates automatically. Students' presence is detected through sensors and facial recognition technology. This automation streamlines the attendance process, freeing up valuable class time for actual instruction and learning.
4. Reliable: • The combination of AI and IoT technologies ensures reliability in attendance management. Facial recognition, occupancy sensors, and real-time data processing provide a highly dependable way to track and verify attendance. This reliability is crucial for academic institutions in ensuring accurate student records.

V. CONCLUSION

The system aims to implement an automated attendance system for lectures, sections, and laboratories, enabling lecturers or teaching assistants to efficiently record students' attendance. This solution is particularly valuable in situations where A lecture comprises a considerable student population, leading to substantial time and effort savings. The rationale behind the implementation of the Automated Attendance System is to overcome the constraints associated with conventional manual attendance recording techniques.

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