

SMART AI-POWERED ATTENDANCE AND ENGAGEMENT MONITORING SYSTEM

¹MRS. N. Sulakshna, ²Asritha Pallapu, ³Bole Sowmya, ⁴Amarthaluri Pramod Kumar

¹Assistant Professor, Dept of Computer Science and Engineering, St. Ann's College of Engineering and Technology, Chirala-523187, India.

^{2,3,4}U. G Student, Dept of Computer Science and Engineering, St. Ann's College of Engineering and Technology, Chirala-523187, India.

ABSTRACT - Most schools and colleges still use manual attendance systems based on roll numbers, which consume time, increase teachers' workload, and allow proxy attendance. To overcome these issues, the Smart AI-Based Attendance and Engagement Monitoring System uses face recognition to automate the attendance process. The system is developed as a desktop application using Python, OpenCV, and the face_recognition library. It identifies registered users by matching their faces with stored records and automatically records attendance with the date and time in an Excel sheet. During registration, multiple face images are captured from different angles to improve recognition accuracy. The application provides separate interfaces for users and administrators to register students, manage face data, and record attendance. The system is simple, secure, accurate, and time-saving, making attendance management more efficient while allowing teachers to focus on education instead of manual attendance.

Keywords: Artificial Intelligence (AI), Face Recognition, Computer Vision, Deep Learning, Real-Time Detection, Image Processing, Face Authentication, Smart Attendance System.

INTRODUCTION

It is critical to keep an accurate record of attendance in educational institutions nowadays. Calling out the roll numbers or taking the attendance manually with the help of a sheet of paper is time-consuming. Also, such a way of taking attendance could lead to human errors or attendance by proxy. The new 19 words of attendance management using face recognition is easy with the use of artificial intelligence (AI) and computer vision technology. The Smart AI Based Attendance and Engagement Monitoring System is designed to simplify the attendance process by appearing to easily identify registered students through facial recognition

and records their attendance in a secure manner. The system is accurate, has less manual involvement and offers a sure method for the management of education attendance records.

LITERATURE SURVEY

Many researchers have worked on improving attendance systems by using biometric technologies, especially face recognition. Traditional attendance methods, such as paper registers and ID cards, are slow, require manual effort, and can lead to proxy attendance or record errors. Face recognition provides a simple and contactless way to identify individuals accurately. Recent studies have shown that technologies like OpenCV, Dlib, Artificial Intelligence, and Flask help build efficient attendance systems with real-time face detection and recognition. These systems automatically mark attendance, store records securely, and reduce the workload of teachers and administrators, making attendance management faster, more accurate, and reliable.

RELATED WORK

Face recognition has become one of the most effective technologies for smart attendance and security systems. Earlier attendance

methods relied on manual registers, ID cards, or fingerprint scanners, which often resulted in proxy attendance, data loss, and longer processing time. With the advancement of artificial intelligence and computer vision, researchers developed face recognition systems that automatically identify individuals with higher accuracy. Many studies have used machine learning and deep learning techniques to improve recognition under different lighting conditions and facial expressions. Recent systems also integrate cloud databases and real-time monitoring to enhance efficiency. These developments have inspired the design of secure, reliable, and user-friendly AI-based attendance systems that reduce human effort while improving accuracy and overall performance.

EXISTING SYSTEM

The existing attendance system mainly depends on manual registers, ID cards, or fingerprint scanners to record attendance. These methods are time-consuming, require physical interaction, and are prone to human errors. Manual attendance can lead to proxy attendance, inaccurate records, and additional paperwork. Maintaining and managing attendance data also becomes difficult, especially in large educational institutions with many students.

PROPOSED SYSTEM

The proposed work aims to develop a smart attendance system that uses face recognition technology to make the attendance process simple and efficient. The system captures a user's face through a webcam, verifies it with the registered database, and automatically records attendance with the date and time. This approach reduces manual effort, prevents proxy attendance, improves accuracy, and provides a secure and reliable attendance management solution for educational institutions.

SYSTEM ARCHITECTURE

Camera, face detection module, face database, attendance control module and admin interface. The webcam can be attached to any computer with a simple USB. The face recognition module receives users' facial pictures in real-time through the webcam. The taken face is processed and compared with the registered face data stored in the database. Once the match is confirmed as valid, the attendance management module records the date, time, and attendance of the user automatically.

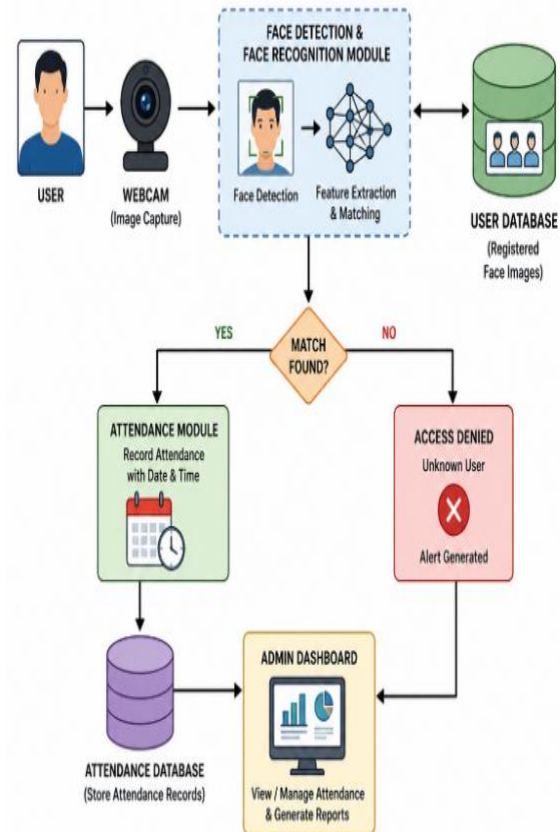


Fig 1: System Architecture

METHODOLOGY DESCRIPTION

The methodology of the proposed attendance system involves a systematic process of face image acquisition, face detection, face recognition, attendance verification and recording of attendance.

Facial images obtained from the webcam are processed using computer vision techniques. The verified face is matched with the existed database, and attending is marked if a match is found. The data collected is stored for the administrator to monitor and produce reports

RESULTS AND DISCUSSION

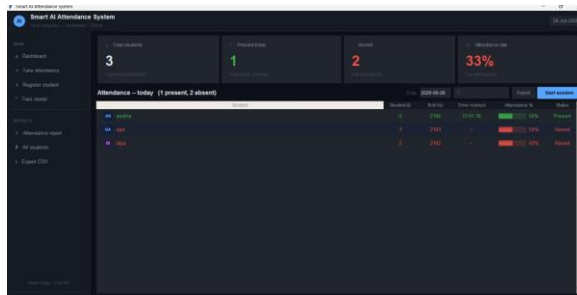


Fig2: Home page of Facial Recognition

The Home Page is the main page of the Smart Attendance System. It provides a straightforward, user-friendly environment. Users can easily view the main features of the system and register as users. Users can easily see face recognition, and attendance records. The page is designed to ensure ease of navigation and smooth usage with robust security.

User Registration Module

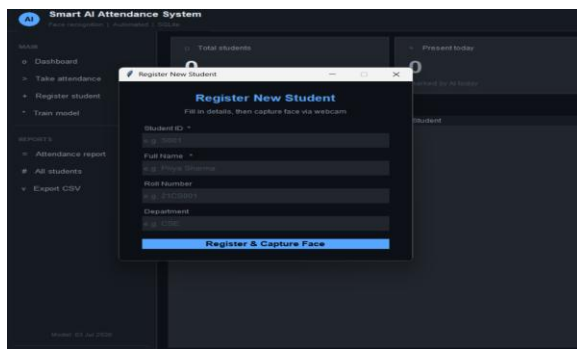


Fig. 3: Register Page

This module allows to add new users in the system. It captures the face with the help of a webcam and saves the user details with a

database. The information is later used for accurate identification of user at attendance.

Face Recognition Module

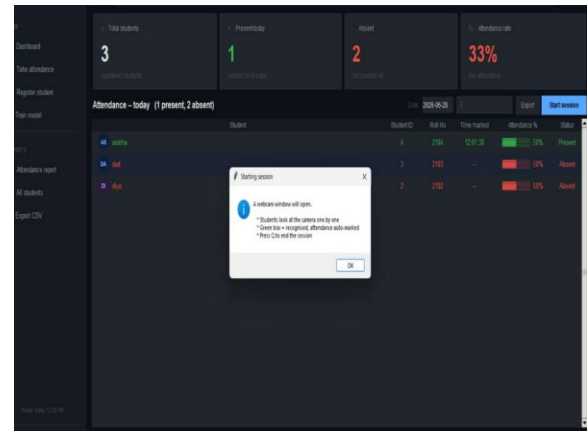


Fig. 5: Face Recognition

The system is primarily driven by the Face Recognition module. It detects faces from a live camera feed and then matches them with registered facial data. Once the match is found, the user is identified and the attendance is automatically marked based on the current date and time, leading to less work and more accuracy.

CONCLUSION

The Smart Attendance System Using Face Recognition offers an easy, quick, and dependable means of taking attendance. The system determines the individual through biometric facial recognition rather than by means of manual register or id card and automatically records their attendance date

and time. Thanks to this, human errors are reduce, proxy attendance is prevent and it saves substantial time. The software is user-friendly, secure, and enhances the attendance management process overall. The attendance solution is ideal for education institutes and organizations that seek something accurate and efficient

FUTURE SCOPE

By implementing advanced AI and deep learning techniques, the system can further enhance the accuracy of face recognition unless there are variations in lighting conditions or facial expressions. Furthermore, the option of Cloud storage can also be added to have secure storage of attendance records and access from anywhere. You can also create a mobile application for the administrator to monitor attendance remotely. Improvements such as mask-detection, liveness detection, and instant alerts may be included in a later version to enhance security and prevent fake attendance. Automated and efficient attendance can be ensured by integrating with the college or office management system.

REFERENCE

[1] P. Harini, "Sms based wireless e-notice board," *International Journal of Emerging*

Technology and Advanced Engineering, vol. 3, no. 3, pp. 181-185, 2013.

[2] P. Harini, "Enhanced packet delivery techniques using crypto-logic riddle on jamming attacks for wireless communication medium," *Int. J. Latest Trends Eng. Technol*, vol. 2, no. 4, pp. 469-478, 2013.

[3] P. Harini, "[Retracted] Machine Learning Algorithms Are Applied in Nanomaterial Properties for Nanosecurity," *Journal of Nanomaterials*, vol. 2022, no. 1, p. 5450826, 2022.

[4] Taigman, Y., Yang, M., Ranzato, M., & Wolf, L. (2014). DeepFace: Closing the Gap to Human-Level Performance in Face Verification. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*.

[5] Parkhi, O. M., Vedaldi, A., & Zisserman, A. (2015). Deep Face Recognition. *British Machine Vision Conference (BMVC)*.

[6] Jain, A. K., Ross, A., & Prabhakar, S. (2004). An Introduction to Biometric Recognition. *IEEE Transactions on Circuits and Systems for Video Technology*, 14(1), 4–20.

[7] Wayman, J., Jain, A. K., Maltoni, D., & Maio, D. (2005). *Biometric Systems:*

Technology, Design and Performance Evaluation. Springer.

[8] Ratha, N. K., Connell, J. H., & Bolle, R. M. (2001). Enhancing Security and Privacy in Biometric Systems. *IBM Systems Journal*, 40(3), 614–634.

[9] Maltoni, D., Maio, D., Jain, A. K., & Prabhakar, S. (2009). *Handbook of Fingerprint Recognition*. Springer.

[10] Jain, A. K., Ross, A., & Pankanti, S. (2006). Biometrics: A Tool for Information Security. *IEEE Transactions on Information Forensics and Security*, 1(2), 125–143.

[11] Li, S. Z., & Jain, A. K. (2011). *Handbook of Face Recognition* (2nd ed.). Springer.

[12] Galbally, J., Marcel, S., & Fierrez, J. (2014). Biometric Anti-Spoofing Methods: A Survey in Face Recognition. *IEEE Access*.

[13] Erdogmus, N., & Marcel, S. (2014). Spoofing in 2D Face Recognition with 3D Masks and Anti-Spoofing with Kinect. *IEEE Biometrics Special Interest Group (BIOSIG)*.

[14] Pinto, A., Pedrini, H., Schwartz, W. R., & Rocha, A. (2012). Face Spoofing Detection Through Visual Codebooks of Spectral Temporal Cubes. *IEEE Transactions on Image Processing*.

[15] Patel, K., Han, H., & Jain, A. K. (2016). Secure Face Unlock: Spoof Detection on Smartphones. *IEEE Transactions on Information Forensics and Security*.