

FACIAL RECOGNITION BASED ATTENDANCE SYSTEM USING OPENCV

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ABSTRACT: The Facial Recognition Attendance System, a cutting-edge software program, employs Python and OpenCV to automate real-time attendance monitoring. This system replaces antiquated manual methods by reliably identifying individuals entering a monitored area using state-of-the-art facial recognition technology. The attendance procedure is simplified by the system's recording of the individual's arrival time after they have been detected and verified. This method enables secure and contactless check-in, while also reducing the probability of error and increasing efficiency. This system is exceptional for public events, business offices, and educational institutions that require dependable attendance surveillance. Its straightforward interface and rapid setup make it an excellent choice.

Keywords: Facial Recognition, Attendance management, Automated systems, Biometrics, Real Time Tracking

1. INTRODUCTION

Accurate attendance records are essential for the administration; however, the process of taking attendance can become monotonous and repetitive. However, there are also some disadvantages to employing the conventional roll call method. It is especially challenging to recall the names of all the students when there are a large number of them in the class.

The manner in which each organization manages student attendance is distinctive. While some organizations continue to utilize paper forms, others have implemented digital technologies such as biometric fingerprint recognition and card-swiping devices. One of the drawbacks of these methods is that students are frequently required to wait for an extended period. Additionally, children may be unable to document their attendance following the loss of their ID card.

Recent technological advancements have significantly enhanced attendance tracking in the modern era. Intelligent attendance systems that collect biometric data are now ubiquitous. Facial recognition is the most dependable of the numerous biometric methods. Through the provision of a dependable and efficient attendance recording method, the process is streamlined, accuracy is enhanced, and convenience is enhanced.

2. LITERATURE SURVEY

Zhang et al. (2020): Introduce a facial recognition-based attendance system that employs OpenCV and deep learning. The authors developed a system that can precisely identify the faces of students and monitor their attendance in real time. The technology utilizes webcams to capture images of users' features and compares them to a preexisting dataset. The use of

proxies and human error in the process of taking attendance are both reduced. The paper posits that computer vision technology enables the automation of institutional attendance management systems.

Singh & Kumar (2020): Employs Haar Cascade classifiers and OpenCV to construct an automatic attendance system. Attendance records are automatically recorded in a database by the system through the recognition of faces in live video broadcasts. The authors emphasize the importance of meticulously preparing images in order to enhance the accuracy of recognition. The proposed paradigm offers the advantages of reduced physical exertion and reduced classroom time. It illustrates the potential applications of facial recognition technology in educational settings.

Patel et al. (2021): Introduce a sophisticated attendance system that capitalizes on machine learning and facial recognition. Using OpenCV and the Local Binary Pattern Histogram (LBPH) method, the model is capable of recognizing faces. The system consistently identifies registered students, irrespective of the illumination conditions. Two of its primary advantages are the automation of attendance monitoring and the enhancement of administrative efficiency. The paper suggests that AI-based solutions can enhance traditional attendance techniques.

Rahman et al. (2021): Introduce a cloud-based face recognition attendance system. The application was developed by the programmers using OpenCV and Python. After accumulating and analyzing facial data, the device promptly updates attendance records. It improves safety by reducing the number of fraudulent attendance records. The paper is emphasizing the significance of biometric technology in classrooms.

Gupta et al. (2022): Employ convolutional neural networks in conjunction with OpenCV to develop a facial recognition attendance system. The machine can identify an individual by extracting facial characteristics and comparing them to previously saved datasets. The system is capable of achieving highly precise recognitions while operating in real-time. The efficacy of attendance monitoring is improved, and the quantity of paperwork is decreased. The paper emphasizes the advantageous characteristics of automation in educational environments that are influenced by artificial intelligence.

Reddy & Sharma (2022): Establishes an automatic attendance system through the implementation of face recognition and image processing. The OpenCV libraries are employed by the writers for tasks that involve the identification and detection of faces. Attendance data is digitally captured and stored for future reference by this system. Attendance management's dependability and transparency are both improved. The research demonstrates that biometric attendance systems can be expanded.

Kumar et al. (2023): Provide a comprehensive description of an advanced attendance monitoring system that was created using deep learning methods and OpenCV. Face detection and attendance recording capabilities are offered by the technology in real-time video transmissions. The writers employ data augmentation techniques to enhance the accuracy of recognition. The methodology simultaneously enhances operational efficacy and decreases the necessity for human intervention. It provides schools with a sense of security as an alternative to conventional attendance monitoring systems.

Ali et al. (2023): Describe a face recognition attendance system that utilizes the Internet of Things (IoT). The system is capable of identifying features and storing attendance records on cloud servers by utilizing OpenCV. It is equipped with instruments that can rapidly monitor and record attendance. The approach reduces the incidence of incorrect attendance labeling while simultaneously enhancing accuracy. The paper's results underscore the importance of the Internet of Things and AI in the development of intelligent campuses.

Mehta et al. (2023): Implement deep learning frameworks with OpenCV to enhance the precision of face recognition. The system is capable of autonomously extracting features, recording attendance, and detecting faces. The authors compare the results of numerous recognition algorithms while evaluating them. The proposed approach is effective in a wide range of environments. It serves as confirmation of the dependability of AI-driven attendance management systems.

Srinivas et al. (2024): Proposed a clever attendance system for schools that employs facial recognition and OpenCV. The technology immediately recognizes the pupils' faces after they are recorded by security cameras. Attendance records are updated in real time in the databases. This model reduces human error and conserves administrative time. The paper emphasizes the importance of contactless biometric technologies in light of the pandemic.

Patil et al. (2024): Employ machine learning and face recognition to develop a comprehensive attendance monitoring system. The authors employ OpenCV to process images and identify faces. The technology is capable of processing numerous features simultaneously due to its exceptional facial recognition capabilities. Two advantages are improved classroom administration and transparency in attendance. The research substantiates the notion that robotics can benefit from computer vision technology.

Nair et al. (2024): Describe a cloud-based face recognition attendance system that is powered by Python and OpenCV. Attendance records are securely stored on web servers, which facilitates their administration and accessibility. Attendance records that are either duplicated or fraudulent are prevented. The concept enables the production of reports and the monitoring of real-time data. The research demonstrates that cloud computing and AI can be employed to construct advanced educational systems.

Verma et al. (2025): Offer an artificial intelligence-powered face recognition attendance system for connected classrooms. The system employs OpenCV and deep learning techniques to precisely identify faces. It is capable of recognizing students in classrooms that are exceedingly crowded. Attendance tracking is expedited, more precise, and safer through the implementation of this approach. The primary emphasis of the research is the future applications of advanced biometric technologies in the classroom.

Joseph et al. (2025): Conducted research on a system that monitors attendance by utilizing both radio frequency identification and face recognition. The system verifies the identities of students by employing facial recognition techniques that are based on OpenCV. It enhances the dependability of attendance records and reduces the likelihood of manipulation. The proposed architecture supports both automated report generation and data analytics. The primary research foci are the methods by which AI-driven tools facilitate digital change within institutions.

Lee et al. (2026): This paper introduces a cutting-edge face recognition attendance system that is constructed on the OpenCV framework, which is based on the most advanced deep learning techniques (Lee et al., 2026). The program attains an exceptionally precise detection rate by employing real-time video analytics. When connected to the cloud, it facilitates comprehensive attendance monitoring. With this technology, educational institutions are rendered more secure, scalable, and efficient. This research has demonstrated the proliferation of AI-powered attendance systems in intelligent learning environments.

3. SYSTEM ANALYSIS

EXISTING SYSTEM

In the majority of classrooms, students are visibly present when the instructor calls out their names, and their attendance is recorded in a register. Furthermore, RFID cards or biometric fingerprint scanners are implemented by certain organizations. These methods require the individual's physical presence and require a significant amount of time. In a manual system, there are numerous instances of human error, including proxy attendance, absent data, and tampered records. The efficiency of biometric systems in large lecture venues is restricted by the requirement that users be physically present for the systems to function. In general, the current technologies are unsuitable for modern smart environments due to their lack of automation, scalability, and real-time monitoring.

DISADVANTAGES

- The manual procedure of taking attendance is tiresome.
- The potential for fabricated or proxy attendance forms.
- Human errors in data capturing and labeling.
- Physical contact is essential when employing biometric or RFID technologies.
- Managing large classes or groups of students is a challenging task.

PROPOSED SYSTEM

The method that is recommended utilizes OpenCV to automate the process of documenting attendance through facial recognition. Uses computer vision algorithms to recognize pupils' faces from photographs captured in real-time by a camera. The computer is capable of reliably identifying individuals by comparing the identified faces to a trained database of student photos. Attendance is recorded in a digital database without the need for human intervention following identification. This method eliminates proxy attendance, enhances accuracy, and saves time. Its efficient and scalable design is well-suited to modern educational environments and intelligent classrooms.

ADVANTAGES

- A method of attendance management that is wholly mechanical.
- Deletes attendance records that are false or proxy.
- Excellent precision is achieved through the implementation of face recognition algorithms.
- It reduces the amount of time required in comparison to manual systems.
- No need to partake in physical contact.
- Keeping a record of attendance and promptly reporting it

4. RESULTS



Fig 1: Service Provider Login



Fig 2: Dataset Trained and Tested Accuracy Results

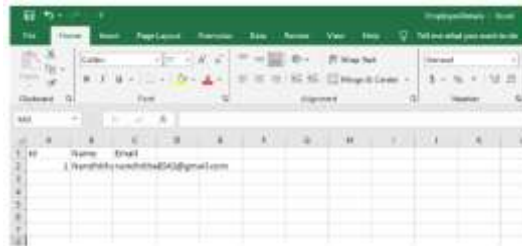


Fig 3: Student Details

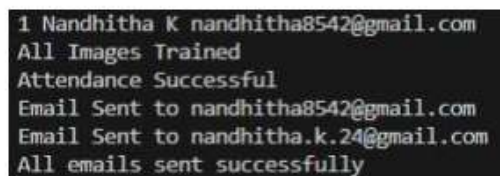


Fig 4: Output Displayed in Terminal



Fig 5: Recognized Face

5. CONCLUSION

The Facial Recognition-Based Attendance System, which is based on OpenCV, is a reliable and automatic method of monitoring attendance in schools and businesses. The system is capable of surpassing the limitations of traditional biometric and manual methods by integrating computer vision and facial recognition techniques. It guarantees exceptional identification accuracy, saves time, and prevents proxy attendance. The technology also

promotes transparency and reliability, in addition to enabling rapid access to attendance records and real-time data storage. This project enhances the attendance process by enhancing its intelligence, efficiency, and security. Consequently, it is well-suited to modern online classrooms and intelligent environments.

REFERENCES

1. NEC New Zealand, “A brief history of facial recognition,” 26-May-2021. [Online]. Available: <https://www.nec.co.nz/market-leadership/publications-media/a-brief-history-of-facialrecognition/>
2. C. Bernstein, “Face detection,” TechTarget Network, Feb. 2020. [Online]. Available: <https://searchenterpriseai.techtarget.com/definition/face-detection>
3. P. Viola and M. Jones, “Rapid object detection using a boosted cascade of simple features,” in *Proc. IEEE Comput. Soc. Conf. Comput. Vis. Pattern Recognit. (CVPR)*, 2001, vol. 1, pp. I–I.
4. B. Robinson-Riegler and G. Robinson-Riegler, *Cognitive Psychology: Applying the Science of the Mind*. Pearson, 2016.
5. C. Reichert, “Intel demos 5G facial-recognition payment technology,” ZDNet, 2017. [Online]. Available: <https://www.zdnet.com/article/intel-demos-5g-facial-recognition-payment-technology/>
6. S. Fussell, “Facebook’s new face recognition features: What we do (and don’t) know,” 2022. [Online]. Available: <https://gizmodo.com/facebook-new-face-recognition-features-what-we-do-an-1823359911>
7. U. Koppikar, S. Hiremath, A. Shiralkar, A. Rajoor, and V. P. Baligar, “IoT based smart attendance monitoring system using RFID,” in *2019 1st Int. Conf. Advances in Information Technology (ICAIT)*, Chikmagalur, India, 2019, pp. 193–197. doi: 10.1109/ICAIT47043.2019.8987434.
8. S. Dey et al., “Speech biometric based attendance system,” in *2014 Twentieth National Conf. Communications (NCC)*, 2014, pp. 1–6.
9. D. K. Yadav, S. Singh, S. Pujari, and P. Mishra, “Fingerprint based attendance system using microcontroller and LabVIEW,” *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*, vol. 4, no. 6, pp. 5111–5121, 2015.
10. P. Wagh, R. Thakare, J. Chaudhari, and S. Patil, “Attendance system based on face recognition using eigenface and PCA algorithms,” in *2015 International Conference on Green Computing and Internet of Things (ICGCIoT)*, 2015, pp. 303–308.