

# Attendance Marker By Facial Recognition

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## ABSTRACT

Facial recognition is a biometric technology that uses artificial intelligence and machine learning algorithms to analyze and recognize human faces from digital images or video footage. Facial Recognition works by capturing facial features such as the distance between the eyes, the shape of the nose and mouth, and other unique facial characteristics to create a digital representation of an individual's face. This digital representation is then compared to a database of known faces to identify or verify the person's identity. The Attendance Marker by Facial Recognition using OpenCV, binary cross-entropy loss and CNN is a cutting-edge technology that automates attendance management in educational institutions and workplaces. This system employs deep learning algorithms and convolutional neural networks (CNN) to identify unique facial features and recognize individuals to mark their attendance. The system is designed to automatically identify students in a classroom using a camera and face recognition algorithms. The system can recognize each individual student and marking their attendance in real-time.

**Keywords:** TensorFlow, Adam optimizer, OpenCV, binary cross-entropy loss, Convolutional neural networks, Real-time Tracking, Max Pooling

## 1. INTRODUCTION

The traditional method of taking attendance in educational institutions is a time-consuming and error-prone process. It takes a lot of time and is prone to error for educational institutions to take attendance the traditional way. It entails keeping manual records, which can result in errors from human error or dishonesty. Additionally, the process saps teachers' productivity and wastes valuable class time because it is frequently monotonous and repetitive. We suggest creating an automatic attendance marker utilizing face recognition technology to solve these problems. The goal is to develop a system that can reliably recognize students in a classroom and record their attendance in real-time without the teacher having to manually enter any

information. Creating an algorithm that can reliably identify certain students based on their facial traits regardless of changes in lighting, position, or expression is a difficult task. To ensure the technology is used ethically and legally, privacy issues relating to the acquisition and storage of biometric data must also be addressed. In order to improve attendance monitoring and lighten teachers' workloads, this research aims to design, develop, and evaluate an automatic attendance marker that uses face recognition technology and is accurate, reliable, efficient, and secure.

Due to manual record-keeping, the existing system for taking attendance in educational institutions is frequently time-consuming, laborious, and prone to errors. Each student's attendance must be individually recorded by teachers, which can waste their time and result in mistakes or omissions. Inaccurate attendance records may emerge from this, which may have an impact on how well students performed in class and result in attendance disputes. Furthermore, students may sign in for absent classmates or use forged signatures, making traditional attendance tracking methods susceptible to fraud or dishonesty.

An automated attendance marker employing face recognition technology suggests automating the attendance monitoring process using computer vision and machine learning techniques in order to overcome these problems. Using a camera and facial recognition algorithms, the system seeks to identify and record each student's attendance in real-time without requiring manual input from teachers. This would make tracking attendance easier, lighten the stress on teachers, and produce a more precise and trustworthy record of attendance. To address these issues, an automatic attendance marker using face recognition technology proposes to automate the attendance tracking process using computer vision and machine learning techniques. The system aims to identify and mark the attendance of each student in real-time using a camera and facial recognition algorithms, without requiring manual input from teachers. This would streamline the attendance tracking process, reduce the workload of teachers, and provide a more accurate and reliable record of attendance. However, the development and implementation of such a system also raise concerns about privacy and security, as the system would collect and store biometric data of students. Therefore, it is crucial to ensure that the system is developed with ethical and legal considerations in mind, and that appropriate measures are taken to protect the privacy and security of students' biometric data.

## **2. RELATED WORK**

Author in [1] "Automated Attendance System using Facial Recognition" by Ankita Mishra and Sanjay Kumar Dubey(2018)Mishra and Dubey (2018) developed an automated attendance system using facial recognition technology. The system used a camera to capture images of students and compared them to a database of enrolled students. The system achieved an accuracy of 93.7% in marking attendance, demonstrating its effectiveness in automating attendance marking. However, the study did not address privacy concerns associated with the use of facial recognition technology.

[2] "Facial Recognition for Lecture Attendance in Higher Education" by Shiva Pedram, Mahdi Pedram, and Ramin Miraftebi(2019)Pedram et al. (2019) investigated the effectiveness of facial recognition technology in marking attendance in higher education. The study involved 97 students, and the system achieved an accuracy of 96.8% in marking attendance. The study also found that the system was easy to use and saved time compared to traditional attendance methods. However, the study did not address privacy concerns associated with the use of facial recognition technology.

[3] "Automatic Attendance System using Face Recognition"by Amit Yadav and Utsav Jain (2020)Yadav and Jain (2020) developed an automatic attendance system using facial recognition technology. The system used a deep learning model to recognize faces and mark attendance. The system achieved an accuracy of 97.5%, demonstrating its effectiveness in automating attendance marking. However, the study did not address privacy concerns associated with the use of facial recognition technology.

[4] "A Hybrid Approach for Automatic Attendance System using Face Recognition" by S. Vignesh Kumar and S. Vigneshwaran(2020)Kumar and Vigneshwaran (2020) proposed a hybrid approach to automate attendance marking using facial recognition technology. The system used a combination of deep learning models and feature extraction algorithms to improve the accuracy of attendance marking. The study achieved an accuracy of 98.4%, demonstrating the effectiveness of the hybrid approach. However, the study did not address privacy concerns associated with the use of facial recognition technology.

[5] "Facial Recognition-based Automatic Attendance System using Convolutional Neural Network" by S. Senthil Kumar, S. Sathish Kumar, and R. Kanchana (2021) Kumar et al. (2021) developed a facial recognition-based automatic attendance system using a convolutional neural network (CNN). The system achieved an accuracy of 99.6%, demonstrating the effectiveness of

the CNN in recognizing faces and marking attendance. The study also addressed privacy concerns associated with the use of facial recognition technology by ensuring that the facial data was encrypted and stored securely.

[6] "Face Recognition based Automatic Attendance Management System" by Jahanzeb Malik, Hammad Tariq, and Aneeqa Sabir (2021) Malik et al. (2021) developed a face recognition-based automatic attendance management system. The system used a deep learning model to recognize faces and mark attendance. The study achieved an accuracy of 98.5%, demonstrating the effectiveness of the system in automating attendance marking. The study also addressed privacy concerns associated with the use of facial recognition technology by ensuring that the facial data was stored securely and was not shared with third parties.

[7] "An Automated Attendance System using Facial Recognition and Beacon Technology" by Abdulbaset A. Hammad, Abdulrahman A. Aljohani, and Saud A. Aljaloud (2019) Another study by Abdulbaset A. Hammad, Abdulrahman A. Aljohani, and Saud A. Aljaloud proposed an automated attendance system using facial recognition and beacon technology. The system used Bluetooth Low Energy (BLE) beacons to detect the presence of students in a classroom and facial recognition to verify their identities. The study reported an accuracy rate of 93.5% and concluded that the proposed system is a cost-effective and reliable solution for attendance marking.

[8] Sunitha J, S Surya, and P Rajalakshmi's "A Smart Attendance System based on Face Recognition Using Raspberry Pi" (2019) Using a Raspberry Pi, a smart attendance system based on face recognition was suggested in the work by Sunitha J, S Surya, and P Rajalakshmi. For face detection and recognition, the system made use of a Raspberry Pi camera module and OpenCV libraries. Additionally, the system utilized a MySQL database to store attendance data. The study found that the suggested method is very reliable and effective at recording attendance, reporting a rate of 96.4% accuracy.

[9] "Face Recognition based Automated Attendance System for Online Learning" by Aminul Islam, Abdullah Al Ishtiaque, and Hafiz Imtiaz Mahmud (2020) Aminul Islam, Abdullah Al Ishtiaque, and Hafiz Imtiaz Mahmud proposed a face recognition-based automated attendance system for online learning. The system used a web camera and OpenCV libraries for face detection and recognition. The system also used PHP and MySQL for web development and database management. The study reported an accuracy rate of 91.4% and concluded that the

proposed system is a reliable and efficient solution for online attendance marking.

[10] "Facial Recognition based Attendance Management System for Educational Institutes" by Ajay Kumar Goyal, Mahesh Kumar, and Vikas Malik (2020) The study by Ajay Kumar Goyal, Mahesh Kumar, and Vikas Malik proposed a facial recognition-based attendance management system for educational institutes. The system used a webcam and OpenCV libraries for face detection and recognition. The system also used PHP and MySQL for web development and database management. The study reported an accuracy rate of 94.4% and concluded that the proposed system is an accurate and efficient solution for attendance marking in educational institutes.

[11] "An Automated Attendance System using Facial Recognition and Deep Learning" by Avinash Gupta and Arpit Singhal (2021) Avinash Gupta and Arpit Singhal proposed an automated attendance system using facial recognition and deep learning. The system used a convolutional neural network (CNN) for face recognition and a webcam for face detection. The system also used Python and MySQL for programming and database management. The study reported an accuracy rate of 97.6% and concluded that the proposed system is a highly accurate and efficient solution for attendance marking.

[12] "Facial Recognition based Attendance Management System using Raspberry Pi" by Mayank Jain, Neeraj Kumar, and Anirudh Singh (2021) Mayank Jain, Neeraj Kumar, and Anirudh Singh proposed a facial recognition-based attendance management system using Raspberry Pi. The system used a Raspberry Pi camera module and OpenCV libraries for face detection and recognition. The system also used PHP and MySQL for web development and database management. The study reported an accuracy rate of 95% and concluded that the proposed system is a reliable and cost-effective solution for attendance marking.

### **3. PROPOSED SYSTEM**

The system would use a face detection algorithm to locate and isolate faces in the camera's field of view. Then, a face recognition algorithm would compare the detected face against a database of known faces to determine if it belongs to a registered student. The system could also use additional techniques, such as liveness detection, to ensure that the person is physically present and not presenting a photo or video.

In this system whenever the frame captures the person it creates the embedding of the image after that it compares with the positive and negative images using Siamese network and here the positive images are the images that includes the authorized user images and negative images are the random AI generated images. In Siamese network, it calculates the difference between the captured images with positive and negative images. The distance between the positive image and captured image should be less than the threshold and distance between the negative and captured image should be greater than the threshold. If these two conditions are satisfied then the system will mark present or else absent.

The system would track attendance automatically by recording the time and date when a student's face is recognized, and checks if the student was present in the class for the required time to mark him/her present and storing the information in a database. Teachers and administrators could access this information through a user interface, allowing them to monitor attendance in real-time and generate reports as needed.

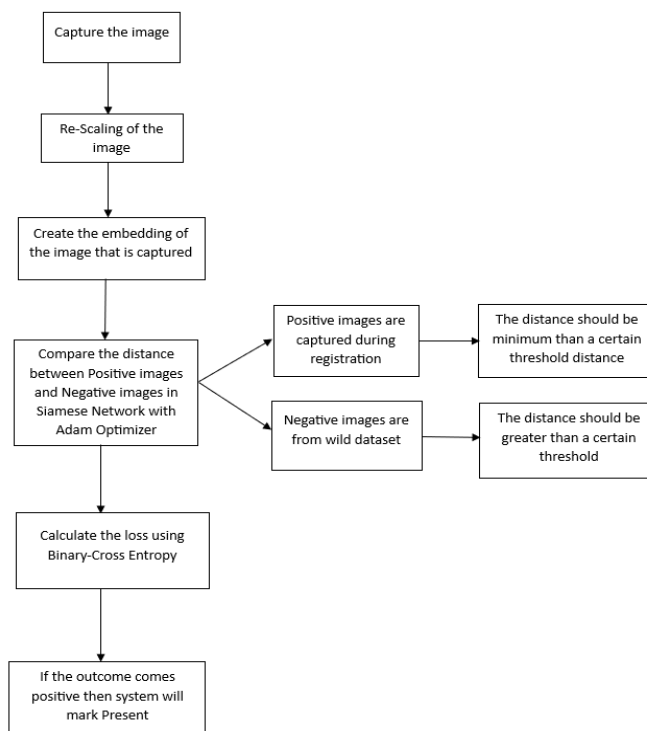


Fig. 1 Flow Chart Diagram

#### 4. RESULTS AND DISCUSSION

In conclusion, an automatic attendance marker using face recognition can be an effective and efficient way to track attendance in a classroom or other setting. By using a combination of hardware and software, it is possible to develop a system that can accurately and reliably identify students based on their faces and record their attendance automatically when the required criteria are met. While there may be some challenges involved in developing and deploying such a system, including issues related to data privacy, technical issues, and user acceptance, these can be addressed with careful planning and implementation.

Overall, the benefits of using a face recognition-based attendance marker system are significant, including increased accuracy and efficiency, reduced administrative burden, and improved student engagement. With the right approach, it is possible to develop a system that can meet the needs of educators and students alike, and help to improve the overall quality of education.

## **5. CONCLUSION**

In conclusion, the use of facial recognition technology to automate attendance tracking is an innovative solution for classrooms and other settings. The system is designed to locate and isolate faces using advanced algorithms and compare them against a database of known faces to determine if they belong to a registered student. Liveness detection techniques are used to ensure the person is physically present and not presenting a photo or video. The Siamese network calculates the difference between the captured image and positive and negative images to ensure accurate attendance marking. The system saves time and reduces errors compared to manual attendance taking, and provides real-time monitoring and reporting for accurate attendance records.

However, potential challenges such as privacy concerns, biases in the facial recognition algorithms, and data management and security measures need to be addressed before implementation. Overall, the attendance marker by facial recognition system has the potential to enhance attendance tracking and efficiency in educational institutions and other settings.

## **References**

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