# Face Authentication Attendance System Using Image Processing and Machine Learning

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**Abstract -** *Common practices of recording student movement during class, such as roll-number and sign-in sheet, have been shown to be ineffective at the time and work of staff [1]. In addition, they can also be caught by human error and fraudulent travel, which brings inaccuracies into recorded data. Many studies were conducted to improve the way we record our attendance at classes [2]. However, many of the proposed solutions are very expensive and ineffective. Many solutions fail to address fraudulent visits. Low-cost solution for recording student attendance. Attendees are recorded on photos of classmates, students' faces are set by default, and students register their presence by simply pointing their faces at store records. Mobile applications are designed for students and educators because they are the main communication areas for system interaction. Authentication can be a major challenge in controlling a computer-based system worldwide [3],[4]. Human face recognition has traditionally been a key component in many programs such as departmental control, video surveillance, network security and computer communications [5]. Default presence system with real-time facial recognition with a database of college student information. This task is very difficult because the real-time output of the image is always a challenge. In addition to this, managing a database with a lot of student information is also an additional challenge to the current system. The proposed system can be a real time tracking system that supports face recognition with simple and fast algorithms and most importantly to get a high accuracy rating [6].*

*Key Words*: **Image Processing, Face Recognition, Authentication, Automatic Attendance, Enrollment, Verification**

## 1. INTRODUCTION

In recent years, national government agencies like Indians they are working on the construction of a security system development to fight terrorism. A lot of authentication systems of offices, government agency based on security data based on behavioral and physical conditions called biometrics. The biometric system processes raw data such as faces, fingerprints, iris etc. on the essential elements from which it arises. Describe the feature the nature of the data provided in the biometric system and make the format decision according to it [1].

There are various biometric systems based on the face, iris,

Fingerprints, palm print etc. but, in most cases, face recognition is used as an outstanding technology. Face recognition technology is not only used in offices, immigration control at the airport but also the use of new one's production technologies such as robots, digital cameras and various websites like Facebook [1].

The traditional way of marking attendees is a tedious task in many schools and colleges. It is also an additional burden on the power that should mark the presence by hand gesture student names may take up to five minutes time. This is time consuming. There are certain possibilities for representative representation. Thus, more institutions began posting many other ways to record attendees such as using Radio Frequency Identification (RFID), iris vision, recognition of fingerprints, and so on. However, these programs are expected in a line that can consume much time and they are natural by nature [2].

### 1.1 Face Recognition

Face recognition system is a technology that can identify a person's face from a digital photo or video frame compared to a face background, which is often used to authorize users with ID verification services, by identifying and measuring face features in a given image. [1]

While at first it was computer use, face recognition systems have seen widespread use in recent times in smartphones and other forms of technology, such as robots. Because computer face recognition involves the measurement of a person's physical facial features, they are classified as biometrics. Although the accuracy of face recognition systems such as biometric technology is less than the iris and fingerprint recognition, it is widely accepted due to its communication process and non-invasive process. Face recognition systems are used for advanced personal communication with computers, video surveillance and automatic image encoding.[2]

Face recognition sets an important biometric feature, which is easily accessible and unobtrusive? Face visual systems are based on various observations facial expression. The face recognition system consists of two stages: verification and facial recognition. Face confirmation procedure 1: 1,

matching face image against template face images and at 1: N. problems comparing images of the face of the question [2].

## 1.2 Image Processing

Image Processing digital images with an algorithm. As a sub-category or digital signal processing field, digital image processing has more benefits than analogue image editing. It allows a much wider range of algorithms to be used in input data and can avoid problems such as noise formation and disruption during processing. [3] As images are defined in more than two dimensions (perhaps more) digital image processing can be done with a multi-program model. The production and development of digital image processing is mainly affected by three factors: first, computer development; second, the development of mathematics (especially the development and improvement of another mathematical teaching method); third, demand for a variety of applications in the natural, agricultural, military, industrial, and medical fields have skyrocketed.[3]

## 2. LITERATURE SURVEY

Authors in [2] suggested automated model presence system. The model focuses on how the face recognition combined with Haar-Cascade classifier and Local Binary Pattern Histogram to find accredited students and enumerators as they receive entry and exit make up the classroom. System saves file for a true record of every registered student. The program also keeps a record of all students enrolled in an event course in the attendance log and provide necessary details as needed.

From the [3], we have identified many suggestions to improve our recording practice to student attendance. In generally, the most focused of these suggestions is to reduce staff responsibility while collecting and processing student data, which will also improve efficiency over time data reliability. We've divided these suggestions into two categories: tokens based on biometrics and biometrics programs

In this paper [4], This paper introduced an automated face-to-face monitoring system recognition in the real-world world with a database of student information through Personal Component Analysis (PCA) algorithm. This task is very difficult as a real-time domain photography is still a challenge. In addition, manage a database with multiple of

Student details are also an additional challenge to this program. The proposed biometric system is a a real-time arrival system based on the perception of a person's face with simple and fast algorithms and most importantly to get a high accuracy rating.

In [5], the authors proposed a presence system based on facial recognition. This attendance recorded using a camera attached to the front of the class namely continuously taking photos of students, get a face at photos and compare found

faces with database and tag they are not present. The paper reviews the related work in the field of presence plan describes the construction of a program, software algorithm and results.

Authors in [6], propose an automatic attendance management system. This technique, which is based on face detection and recognition algorithms, automatically detects the scholar when he enters the class room and marks the attendance by recognizing him. The system architecture and algorithms utilized in each stage are described during this paper. Different real time scenarios are considered to gauge the performance of varied face recognition systems. This paper also proposes the techniques to be utilized in order to handle the threats like spoofing. In comparison to traditional attendance marking this technique saves the time and also helps to watch the scholars.

## 3. PROPOSED SYSTEM MODEL

The proposed face recognition method is based on machine learning algorithms. Figure 1 describes the suggested system block diagram [1].
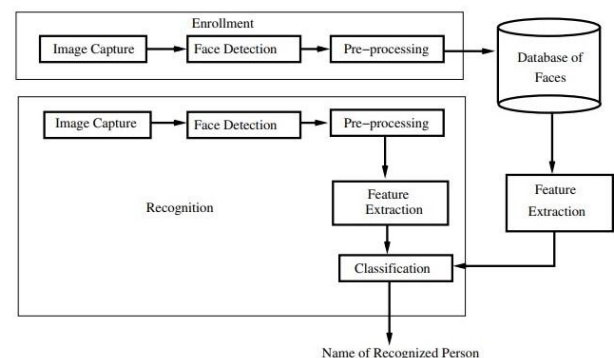


Fig., 1. Proposed System Model

The proposed automatic attendance management system based on a face recognition algorithm. When someone enters

Classroom his picture was taken by the camera in Admission [2]. The face region is extracted and processed first continuous processing. Since no more than two people can enter the classroom during the face detection algorithm has little work. Face recognition seems to be beneficial there are other plans as discussed in Table 1 [6]. When the face of the student is recognized as being supplied for post-processing use. The system algorithm is discussed.

Table 1

Drawbacks of various Attendance Systems

| Type of the System | Drawback |
|---|---|
| RFID-based | Fraudulent usage |
| Fingerprint-based | Time Consuming for students to wait and give their attendance |
| Iris-based | Invades the privacy of the user |
| Wireless-based | Poor performance if topography is bad |

The stages in the proposed Attendance Management System are as shown within the Figure 1. Technical details of implementation of every stage are discussed in the next sections [6].

**A. Image Capture:**

The Camera is mounted at a distance from the doorway to capture the frontal images of the scholars. The captured image is preferred to be of the dimensions 640x480 to avoid resizing of the image within the back-end as we observed resizing may sometimes leads to poor performance [3].

**B. Face Detection:**

A proper and efficient face detection algorithm always enhances the performance of face recognition systems. Various algorithms are proposed for face detection like Face geometry-based methods, Feature Invariant methods, Machine learning based methods. Out of these methods Viola and Jones proposed a framework which provides a high detection rate and is additionally fast [2][3].

**C. Pre-processing:**

The recovered faces are extracted and subjected to processing. This pre-processing step includes the histogram balance of the extracted facial image as well resized to 100x100. Histogram Equalization is the best standard Histogram Normalization process. This enhances image contrast as you stream a file the width of the images in the image by making it more it is clear [4],[5],[6].

**D. Database Development**

As we chose biometric based system enrollment of each individual is required. This database development phase consists of image capture of each individual and extracting the bio-metric feature, in our case it's face, and later it is enhanced using pre-processing techniques and stored in the database. In our project we've taken the pictures of individuals in several angles, different expressions and also in several lighting conditions [6].

**E. Feature Extraction and Classification**

The functionality of the Face Recognition system also depends on the feature ad and its classification to get accurate results. A feature is available using feature-based techniques or complete techniques. In some perfect techniques we can use size reduction before separation [6].

Principal Component Analysis (PCA) was the first algorithm to represent economically. In PCA, face pictures should be used with eigenface as well corresponding guesses on each eigenface. In turn to use all image sizes only reasonable size is considered to represent picture. Statistically the image using the PCA is represented as

$$\chi = W\,Y + \mu$$

where $\chi$ is the face vector, Y is vector of eigenfaces, W is the feature vector, and $\mu$ is the average face vector [6].

**F. Post-processing**

In the proposed program, after seeing the face of students, the words are updated to be a sheet of prominence. At the end of the class the arrangement for the announcement of the names of all the students in the class are re-installed. This is done using text to speech conversion. The system has also been installed to send a notification email to those who are not at work their location enabled [6].

**4. ADVANTAGES**

**A. Automated Time Tracking System**

In our normal attendance system teachers were take the attendance by calling the roll calls of the scholars. So, by using this traditional method the time won't recorded at what time the attendance was taken. So, by using the face recognition attendance system will record the time of the capture attendance. Hence automated time are going to be recorded.

**B. Cost Effective**

Since the entire process are going to be done by a computer, it means the entire attendance registrations and calculations are going to be automated and done by the system itself, therefore, saving us the cash which might are otherwise spent on the labor cost to try to that.

### C. Increased Security

The presence program based on facial expressions will not only count attendees but also comment down student or college entry. At times when there is a situation where the identity and time of the student's entry need to be considered, the program will do so it becomes useful as it will show you easily when a student enters.

### D. Time Saving

The whole world is affected by COVID19 and it's time we must give heed to social distancing. Having a secure distance with others has become a necessity nowadays. Times like this will be problematic if you've got manual attendance system, having a face recognition-based attendance system won't only allow you to register the attendance of the person but also keep you at a secure distance from them as you'll work remotely. The whole system may be a much safer, time-saving, and faster method record attendance.

### E. Easy to Manage

As the face-to-face presence system is completely automated, managing the recording and keeping track of daily activities will be much easier than it is hand system. Everything will be done according to plan. [4],[5]

### 5. DISADVANTAGES

**A.** If in the wrong hands, it will be a disaster

**B.** Data Privacy Breach [5]

### 6. APPLICATIONS

**A.** The system can be used in Educational institutes, Universities etc.

**B.** It can also be used in Government offices as well as in IT companies [1],[2].

### 7. CONCLUSIONS

Face-to-face visits are considered for the purpose of mitigation errors arising from the traditional participatory system (manual). The purpose is to modify and use a useful organization as an institution. It works and an accurate form of office space that can replace the old manual methods. This method is secure enough, reliable and available to be used. There is no need for special items hardware installation office. It can be built using the camera too computer [1], [2], [3].

Face detection methods have thus proved to be time-saving and safe. This program too used to identify an unknown person. In real-time cases LBPH is superior to others algorithms have a better rate of recognition and a lower level of false positives. SVM and Bayesian as well prove they are better dividers compared to distance dividers [4], [5], [6].

### 8. FUTURE SCOPE

The future work is to enhance the popularity rate of algorithms when there are unintentional changes during a person like tonsuring head, using scarf, beard. The system developed only recognizes confront to 30 degrees angle variations which has got to be improved further. Gait recognition are often fused with face recognition systems so as to realize better performance of the system.

The system can be measured to be used at Universities where the content is re-recorded are maintained when students are given grade points in the overall performance of their subject's jobs [1-5].

### REFERENCES

[1] Radhika C. Dhamale and Prof. Bageshree V. Pathak, "Face Recognition Based Attendance System Using Machine Learning Algorithms", Proceedings of the Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018)

[2] Smitha, Pavithra S Hegde, Afshin, "Face Recognition based Attendance Management System", International Journal of Engineering Research & Technology (IJERT), Vol. 9 Issue 05, May-2020

[3] Setia Budi, Oscar Karnalim, Erico D. Handoyo, Sulaeman Santoso, Hapnes Toba, Huyen Nguyen, Vishv Malhotra, "IBAtS - Image Based Attendance System: A Low Cost Solution to Record Student Attendance in a Classroom", 2018 IEEE International Symposium on Multimedia (ISM) Conference Paper - December 2018

[4] S. Sayeed, J. Hossen, S.M.A. Kalaiarasi, V. Jayakumar, I. Yusof, A. Samraj, "Real-Time Face Recognition For Attendance Monitoring System", Journal of Theoretical and Applied Information Technology XXst Month 201x. Vol. x No.x, Article - January 2017

[5] Naveed Khan Balcoh, M. Haroon Yousaf, Waqar Ahmad and M. Iram Baig, "Algorithm for Efficient Attendance Management: Face Recognition based approach", IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, July 2012, Article in International Journal of Computer Science Issues · July 2012

[6] Shireesha Chintalapati, M.V. Raghunadh, "Asutomated Attendance Management System Based On Face Recognition Algorithms", 2013 IEEE International Conference on Computational Intelligence and Computing Research

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