# AUTOMATED ATTENDANCE MANAGEMENT SYSTEM THROUGH FACE RECOGNITION

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**Abstract—***This paper is about automated attendance through face recognition using machine learning. The automated attendance management system is designed to replace the traditional methods of taking attendance. The traditional methods of attendance management either take too much time or are difficult to maintain so they must be replaced. Using our system we will capture the image of student or employee and is recognized by our system to mark attendance. The cameras are fixed in classrooms or offices. The system will use the OpenCV library of python to extract facial features to recognize them.*

**Keywords—** Face Detection, Face Recognition, Skin Segmentation, Histogram Equalization, White Balance Correction.

## 1. INTRODUCTION

Traditionally, the attendance of students or employees is marked by using manual methods like signing on a sheet of paper, which is time-consuming and is also difficult to manage. Moreover, there could be a good chance that someone else can mark the attendance of a person as it is difficult to remember each person by his/her name.

With the evolution of python and machine learning, face feature extraction and recognition has become easy. Face recognition is also a technique which would require zero virtual effort from the user. It is a highly accurate method and can also be used for high enlistment and authentication.

Biometric methods like fingerprint detection or eyeball detection are being used for identification and authentication of a person at different places. But neither of this method is automated instead, they require a manual effort from a person which is again time-consuming.

The task of recognizing the face and marking the attendance should be done in real-time within a definite time constraint to prevent omission. The system must be designed in such a way that the extraction of facial feature from a captured image must be consistent toward diversity of backgrounds, poses and expressions. The important aspects of evaluating the performance of the system would be accuracy and processing time.

From many available methods of biometric authentication, face recognition possesses the advantage of high accuracy and fast processing. Because of this reason only, face recognition is drawing attention in the field of machine learning and image.

Enhancing our comfort, facial recognition has become faster and accurate under all conditions from different angles. It has become so fast that it can identify a person on spot. The attendance can be marked automatically in ERP system which can be viewed anytime for specific date or time. It can also mark the entry and exit time of an individual.

Face recognizing system will train its classifier for recognizing and detecting faces. It can identify the face of the person from a digitally captured images or running video frame. It compares the extracted facial feature in the image with a facial database. The proposed algorithm for our face recognition system can detect multiple faces at the same time. Its classifier is also accurate, flexible and correct. It can also process the data in real-time.

The automated attendance management system is deployed using the Haar cascade object detection algorithm which is available in OpenCV library of Python. To distinguish between faces the nodal point of the human face are used every human has at least 75-80 nodal point on his face. Some of the nodal points are the contour of cheekbone, width or length of the nose. The attendance of a candidate is marked in the database after successful detection and recognition of a face. In our system, we have used knowledge-based techniques for the detection of the face and neural network to recognize it. The reason behind using this approach is smooth applicability and high reliability.

Our face recognition system can be used in various other fields like recognizing a terrorist or a criminal in any part of the country, scanning video evidence, guessing mood of a person by examine his facial expression, detecting a sleepy or drunken face inside a car to avoid accidents.
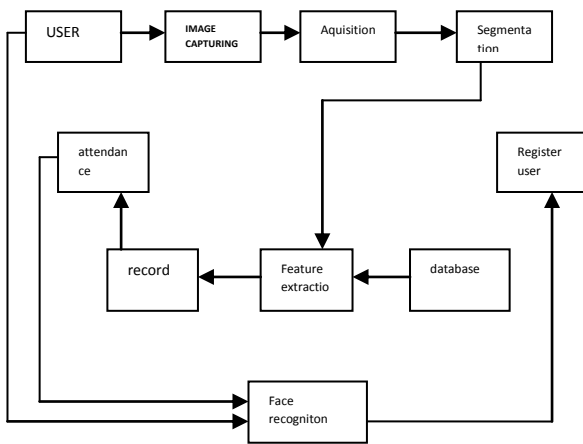
## 2. PROPOSED SYSTEM



**Chart -1**: flow chart of the automatic attendance system

### 2.1 Different approaches to face recognition:

1. General Approach
2. Feature-Based Approach
3. Mixed Approach

### 2.2 Input Part

Input part of our system will be based on image acquisition. Image acquisition in digital image processing is a process of translating an image into digital data for performing computational operations. The captured image on our system is then sent for detection of facial features.

### 2.3 Face detection and cropping

In the first step of the process, the background of the image is removed from it. After subtracting background of the image is used for detection. Face image is marked by using predefined faces like square or oval. For facial feature extraction, an image with the background is not compatible hence, for the accuracy of the result, the subtraction of the face is necessary.

The detected face is extracted from the image. Finally, all the available faces in an image are detected then, cropped from the image. All the cropped images are then taken for comparison. The comparison is done with the results stored in the database.

Through our experiment, we have analyzed that skin segmentation will help us in reducing the processing and computational time for searching image. Because if an image is segmented then only the segmented part is searched otherwise the whole image will be searched which will be less accurate. The white balance of the acquired image must be corrected before segmenting it.
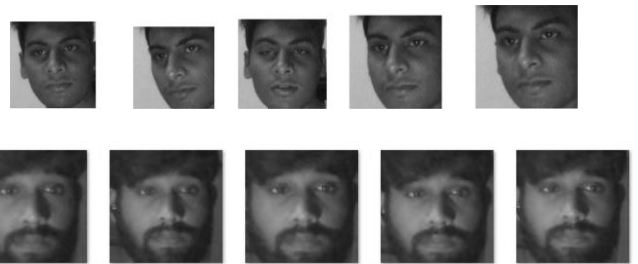


### 2.4 Face recognition:

Face recognition could be done by using various methods like Eigenvalue, linear discriminate analysis etc but for high accuracy and consistency, we have used knowledge base for face detection and neural network for face recognition. The extracted and cropped face is now sent for facial feature detection and extraction. Spatial filters are applied to extract the features of the face.

### 2.5 Methodology for Implementation:

The methods for implementing the facial recognition system are discussed below –;

1. Classical face recognition algorithm:-.These methods projects the face into a linear space based on Eigen Face. The distance from the face is orthogonal so it is turned into Mahanobois distance. ˆ

2. Discriminant common vector:- Patterns are collected using similarities among the features. Further, the subspaces are developed based on it.

3. Neural networks. In this type of system first, the system is trained by using a database of faces and then it can be used to recognize faces.

For designing an accurate and consistent system algorithms must be developed by using combinations of these methods. We have designed our system based more on neural networks. So we have to train our system

## 3. RESULTS

Our system can replace traditional attendance system which requires lots of manual effort and is also time-consuming. We have introduced a modern and technical approach of taking attendance in our paper. The management of attendance in this our system is more automated and the attendance is taken more precisely. One the difficult task of this system could be the identification of twins and we are working towards it.

**Table -1:** Efficiency of the system

| Person | Face Detection | Face Recognition |
|--------|---------------|------------------|
| Male 1 | 94% | 80% |
| Female 1 | 100% | 96% |
| Male 2 | 100% | 70% |
| Female 2 | 88.8% | 78% |
| Male 3 | 90% | 75% |

## 4. CONCLUSIONS

There could be various kinds of lightning and arrangement in different classes we have tried testing our system in most conditions and it is working accurately. There could be various other implementations of our system like security surveillance, mood detection and accident prevention due to drunk and drive. The system can also detect multiple faces at a time and performance of the system is also acceptable.

The automated attendance system would save time and reduce the efforts made by the administration in the management of attendance. The results are stored in the database so could be retrieved anytime and anywhere.

The classifier of the system can classify the faces with good accuracy. Classification is also flexible so that it could also work in minor differences like closed eyes, short hairs or long beards. The proposed system is working accurately and is also having a real-time operability.

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