



## ATTENDANCE SYSTEM USING FACIAL RECOGNITION

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*Abstract--In this digital era, face recognition system plays a vital role in almost every sector. Face recognition is one of the mostly used biometrics. It can used for security, authentication, identification, and has got many more advantages. Despite of having low accuracy when compared to iris recognition and fingerprint recognition, it is being widely used due to its contactless and non-invasive process. Furthermore, face recognition system can also be used for attendance marking in schools, colleges, offices, etc. This system aims to build a class attendance system which uses the concept of face recognition as existing manual attendance system is time consuming and cumbersome to maintain. And there may be chances of proxy attendance. Thus, the need for this system increases. This system consists of four phases- database creation, face detection, face recognition, attendance updating. Database is created by the images of the students in class. Face detection and recognition is performed using Haar- Cascade classifier and Local Binary Pattern Histogram algorithm respectively. Faces are detected and recognized from live streaming video of the classroom. Attendance will be mailed to the respective faculty at the end of the session.* INTRODUCTION

This is a project about Facial RecognitionBased Attendance System for Educational Institutions. In this chapter, the problem and motivation, research objectives, project scope, project contributions and the background information of the project will be discussed in detail. The main objective of this project is to develop face recognition based automated student attendance system. In order to achieve better performance, the test images and training images of this proposed approach are limited to frontal and upright facial images that consist of a single face only. The test images and training images have to be captured by using the same device to ensure no quality difference. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

### PROBLEM STATEMENT AND MOTIVATION

According to the previous attendance management system, the accuracy of the data collected is the biggest issue. This is because the attendance might not be recorded personally by the original person, in another word, the attendance of a particular person can be taken by a third party without the realization of the institution which violates the accuracy of the data. For example, student A is lazy to attend a particular class, so student B helped him/her to sign for the attendance which in fact student A didn't attend the class, but the system overlooked this matter due to no enforcement practiced. Supposing the institution establish an enforcement, it might need to waste a lot of human resource and time which in turn will not be practical at all. Thus, all the recorded attendance in the previous system is not reliable for analysis usage. The second problem of the previous system is where it is too time consuming. Assuming the time taken for a student to sign his/her attendance on a 3-4 paged name list is approximately 1 minute. In 1 hour, only approximately 60 students can sign their attendance which is obviously inefficient and time consuming. The third issue is with the accessibility of those information by the legitimate concerned party. For an example, most of the parents are very concerned to track their child's actual whereabouts to ensure their kid really attend the classes in college/school. However, in the previous system, there are no ways for the parents to access such information. Therefore, evolution is needed to be done to the previous system to improve efficiency, data accuracy and provides accessibility to the information for those legitimate party.

### PROJECT SCOPE AND DIRECTION

The main intention of this project is to solve the issues encountered in the old attendance system while reproducing a brand new innovative smart system that can provide convenience to the institution. In this project, an application will

be developed which is capable of recognizing the identity of each individual and eventually record down the data into a database system. Apart from that, an excel sheet is created which shows the students attendance and is directly mailed to the respected faculty.

The followings are the project scopes:

- The targeted groups of the attendance monitoring system are the students and staff of a n educational institution. ▪ The database of the attendance management system can hold up to 2000 individual's information.
- The facial recognition process can only be done for 1 person at a time.
- An excel sheet is created which contains the student attendance and is mailed to the respected faculty. The project has to work under a Wi-Fi coverage area or under Ethernet connection, as the system need to update the database of therunning is powered up by power bank to improve the portability of the application.

## EXISTING SYSTEM

Traditional method of attendance marking is a tedious task in many schools and colleges. It is also an extra burden to the faculties who should mark attendance by manually calling the names of students which might take about 5 minutes of entire session.

This is time consuming. There are some chances of proxy attendance. Therefore, many institutes started deploying many other techniques for recording attendance like use of Radio Frequency Identification (RFID) iris recognition, fingerprint recognition, and so on.

## PROPOSED SYSTEM

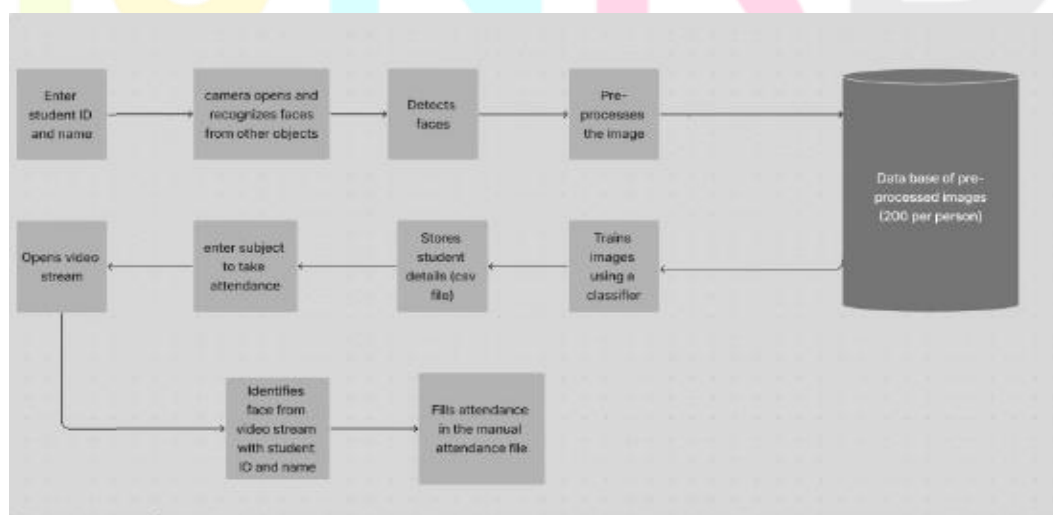
The purpose of this system is to build an attendance system which is based on face recognition techniques. Here face of an individual will be considered for marking attendance.

Nowadays, face recognition is gaining more popularity and has been widely used. In this paper, we proposed a system which detects the faces of students from live streaming video of classroom and attendance will be marked if the detected face is found in the database. SYSTEM REQUIREMENTS

- Visual Studio Code
- Windows
- Python IDLE Libraries

## SYSTEM ARCHITECTURE

All the students of the class must register themselves by entering the required details and then their images will be captured and stored in the dataset. During each session, faces will be detected from live streaming video of classroom. The faces detected will be compared with images present in the dataset. If match found, attendance will be marked for the respective student. At the end of each session, list of absentees will be mailed to the respective faculty handling the session. The system architecture of the proposed system is given below.



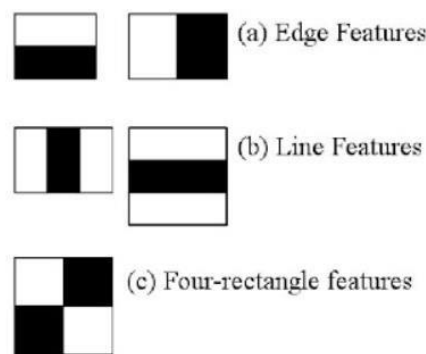
## ALGORITHM USED

### HAAR CASCADE

Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper, "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.

Here we will work with face detection. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. For this, Haar features shown in the below image are used. They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under the white rectangle from sum of pixels under the black rectangle.

Now, all possible sizes and locations of each kernel are used to calculate lots of features. (Just imagine how much computation it needs? Even a 24x24 window results over 160000 features). For each feature calculation, we need to find the sum of the pixels under white and black rectangles. To solve this, they introduced the integral image. However large your image, it reduces the calculations for a given pixel to an operation involving just four pixels. Nice, isn't it? It makes things super-fast.



### Dataset Creation

- Images of students are captured using a web cam. Multiple images of single student will be acquired with varied gestures and angles. These images undergo preprocessing.
- The images are cropped to obtain the Region of Interest (ROI) which will be further used in recognition process. Next step is to resize the cropped images to particular pixel position. Then these images will be converted from RGB to Gray scale images. And then these images will be saved as the names of respective student in a folder.

### Face Detection

Face detection here is performed using HaarCascade Classifier with OpenCV. Haar Cascade algorithm needs to be trained to detect human faces before it can be used for face detection. This is called feature extraction. The haar cascade training data used is an xml file- haarcascade\_frontalface\_default. The haar features shown in Fig.2 will be used for feature extraction. Here we are using detect Multiscale module from OpenCV. This is required to create a rectangle around the faces in an image. It has got three parameters to consider- scale Factor, minNeighbors, minSize. scaleFactor is used to indicate how much an image must be reduced in each image scale.

### Face Recognition

- Face recognition process can be divided into three steps.
- prepare training data, train face recognizer, prediction. Here training data will be the images present in the dataset. They will be assigned with a integer label of the student it belongs to. These images are then used for face recognition.
- Face recognizer used in this system is Local Binary Pattern Histogram. Initially, the list of local binary patterns (LBP) of entire face is obtained. These LBPs are converted into decimal number and then histograms of all those decimal values are made. At the end, one histogram will be formed for each image in the training data. Later, during recognition process histogram of the face to be recognized

is calculated and then compared with the already computed histograms and returns the best matched label associated with the student it belongs to.

## ATTENDANCE UPDATING

After face recognition process, the recognized faces will be marked as present in the excel sheet and the rest will be marked as absent.

## CONCLUSION

Before the development of this project. There are many loopholes in the process of taking attendance using the old method which caused many troubles to most of the institutions. Therefore, the facial recognition feature embedded in the attendance monitoring system can not only ensure attendance to be taken accurately and also eliminated the flaws in the previous system. By using technology to conquer the defects cannot merely save resources but also reduces human intervention in the whole process by handling all the complicated task to the machine. The only cost to this solution is to have sufficient space in to store all the faces into the database storage. Fortunately, there is such existence of micro-SD that can compensate with the volume of the data. In this project, the face database is successfully built. Apart from that, the face recognizing system is also working well. At the end, the system not only resolve troubles that exist in the old model but also provide convenience to the user to access the information.

## FUTURE ENHANCEMENT

The world is using facial recognition technology and enjoying its benefits. Why should India be left out? There is a huge scope of this technology in India and it can help improve the country in various aspects. The technology and its applications can be applied across different segments in the country.

Preventing the frauds at ATMs in India. A database of all customers with ATM cards in India can be created and facial recognition systems can be installed. So, whenever user will enter in ATM his photograph will be taken to permit the access after it is being matched with stored photo from the database.

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