

# Face Recognition Based Attendance Management System

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## ABSTRACT

One of the major challenges in a smart classroom system environment is to develop a computer vision based unobtrusive classroom attendance management system. Already existing traditional attendance system uses a manual attendance system to mark attendance of students by forwarding attendance sheet or by calling names of students. Both of these methods interrupts the teaching as well as learning process and also consume a lot of time of faculty. It has some basic problems such as students proxy etc. which can result in wrong attendance marking. In this paper, we propose an face recognition based smart classroom attendance management system using the high definition camera for capturing the faces of students The system will capture faces of students sitting in a classroom and will recognize face of each student using pre-trained dataset and will mark the attendance of students in an excel sheet.

**Keywords:** Face detection, Recognition, Attendance

## I. INTRODUCTION

In traditional classroom environment, students' attendance management is one of the key factors to analyze the students' learning process and also to keep track of other factors like discipline, engagement and leads to effective learning and increase success rate. There are several works in attendance management system to overcome the difficulties faced in a traditional classroom environment.

To solve the issues of traditional attendance management system an application solution has been found which will use face detection and recognition for attendance management. According to the system, there will be a high definition camera placed in a classroom. The camera will be connected to a computer system in which a GUI will be present to control the whole process. Faculty will have to enter their details, subject name and the class standards and than just to trigger on track images so that camera

starts tracking images of the students and than the system will track the image will compare the images with the dataset and will mark the attendance and this attendance will be saved in excel sheet with the student's name , roll number and the respective subject.

## II. LITERATURE SURVEY

### A. Computer Vision Based Unobtrusive classroom attendance management system:

In this paper a system is proposed which tracks the real time attendance of students sitting in class using face detection and recognition.

Authors of this paper has used a high definition camera which is being installed in a classroom. This camera is used to capture the faces of all the students present in classroom and then attendance is marked.

This paper gives us the overview about how to use the existing technology of face detection in attendance management system.

In this system, authors have used Max Margin face detection technique. And the face recognition is take place by using Inception-V3 model.

The flow of system is simple. First the trained database created through enrolment process and then this data compare with the real time data of students present in class and if data of particular student is matched then attendance is marked accordingly.

In this system they have implemented a high definition rotating camera in a classroom. Due to this there accuracy has increased. And as the camera is rotating it is able to capture the whole class.

#### **B. Smart Attendance Monitoring System: A Face Recognition Based Attendance System for classroom environment:**

In this paper a system is described which manages attendance of students in classroom with the help of face detection technique.

Authors of this paper has used correlation tracker for face detection which is present in dlib library. They have used a pose estimation technique so that wide verity of head poses can be tracked in real time.

In this system main two drawbacks of traditional system are removed by implementing the system. Those drawbacks are:

1. Traditional system takes away lot of time from lectures.

2. And it is also prone to proxies.

This system is using a specific face detection and recognition algorithm i.e Viola And Jones Algorithm. This system creates a face-log which is precise representation of face of student in the video captured by camera.

The main problem is with different poses of head in front of a real time camera. In above system Roll, YAW and Pitch these three angles are used to overcome above head poses problem. All these three angles are in between 90 to +90. During face-log generation Roll and pitch are adjusted. So the main concern in Yaw.

Yaw is calculated using the formula:

$$\text{Yaw} = \text{abs}(\arctan2(y_2 - y_1, x_2 - x_1))$$

Where  $(X_1, X_2)$  is the coordinate of nose and  $(y_1, y_2)$  are the point between eyebrows.

This system also giving attention on sharpness of image and its brightness too. As the images captured are sometimes too high-dimensional for classifier to take them directly as a input, In this system Convolution Neural Network(CNN) is used to convert the high-dimensional into low-dimensional distinct features.

### **III. METHODS AND MATERIAL**

#### **A. Face Detection :**

Face-detection algorithms detects the human faces from captured images. It is analogous to image detection in which the image of a person is matched bit by bit. The data of captured image gets matched with the image stores in pre-trained database. Any facial feature changes in the database will invalidate the matching process. Face Detection is used in video surveillance, human computer interface and image database management.

#### **B. Feature Extraction :**

Feature extraction is the process of converting high-dimensional images into low-dimensional so that it can be provided as input to classifier, where an initial set of raw variables is reduced to more manageable groups (features) for processing, while still accurately and completely describing the original data set.

When the input data to an algorithm is too large to be processed and it is suspected to be redundant then it

can be transformed into a reduced set of features. Selecting a subset of the initial present features is called feature selection. The selected features are expected to contain the relevant information from the provided data, so that further desired processes can be performed successfully by using this reduced information instead of the complete initial data.

### C. Face Recognition :

A face recognition is a technology which is able to identify or verify a person's face from a captured image or a video which will be converted into frames. There are multiple methods present in today's technological world in which facial recognition systems work. Their general mechanism is that they compare selected facial features from captured images with faces within a database.

## IV. PROPOSED SYSTEM

In this, we have proposed a system to manage the attendance of students present in classroom.

We are using a camera which is connected to our system. This camera is used to capture a small video of a classroom. Then this video gets converted into multiple frames so that faces of students can be extracted from them.

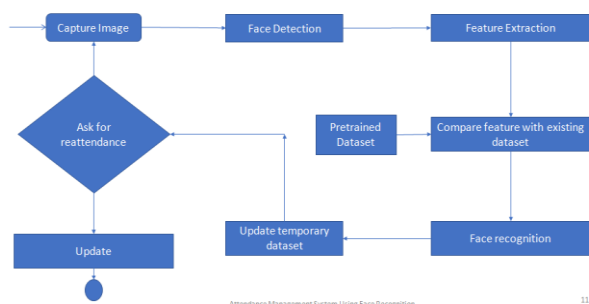


Figure 1

We are using a OPENCV library which is used for computer vision based applications. In openCV cascade classifier is used for face detection and

recognition. This cascade classifier uses haar features to process facial data.

The images captured are processed to detect faces from them. Haar features get extracted from these detected faces and used for further processing.

### A. Enrolment process:

This process is only have to be done in the starting of new academic year. When new students are taking admission in their specific year and courses, they are provided with their unique ID's. So this data is entered in the system.

Enrolment process is all about creating a training dataset for system. Students faces are captured while enrolment process in different positions. These images are provided, with their respective ID's and name of student, to the system. Then the system is trained using this data. The system extracts HAAR features from those provided images and saves these features in database with students name and ID. For this purpose it uses a inbuilt face recognizer to extract features from images and train the database accordingly.

All this database get stored in .yml file which is used as a pre-trained database for further processes.

### B. Attendance Marking:

This is the process that we are going to execute throughout the year.

To mark the attendance in real time, a camera will be implanted in a classroom. This camera captures the video of classroom. From this video students faces are detected. The faces are also get converted to HAAR features.

Then this data is compared with the pre-trained database which is already present in system. This comparison is done to recognize the faces of students. If the face of student present in classroom matches

with the pre-trained database then the attendance of that student is marked in system.

In our system we are providing log in for admin so that only admin can handle the whole process enrolment.

There are partitions for different branches. In that there are also partitions for particular year of study in each branch. The attendance of students is stored in database according to their respective branch and year.

Same Options are present for enrolment process.

## V. RESULTS AND DISCUSSION

### A. FINDINGS:

In this we are using a simple process for face detection and recognition. We are using a cascade classifier to process all images. The system is not using any particular algorithm for face detection and recognition.

While developing this system we came to know that face detection system is better for attendance management than other systems.

### B. Comparison With Prior Studies:

This system uses face detection for attendance management.

In previous systems, different methods of biometric like finger print is used. But when we talk about implementing an attendance management system based on biometric, then face detection is the best choice.

Because, face detection is far better than finger print system in all manners like time, etc. Face detection also gives solution to many problems as while using finger print for attendance student can mark the attendance and leave the class. But in face detection system student has to be present in class as student actually doesn't know when his/her attendance is being marked.

### C. LIMITATIONS:

The system is working fine in its current stage. But there are some limitations in our systems like :

1. If there are twins present in the class then there will be a problem in differentiating them.
2. The system is bounded by the quality of the camera used for image capturing. With better resolution camera the result of the system will be better.
3. In this stage the system can be fooled by a 3D face of a student. In further development more features of faces can be added in it to resolve this problem.

## VI. CONCLUSION

To solve the issues of traditional attendance management system an application solution has been found which will use face detection and recognition for attendance management. According to the system, there will be a high definition camera placed in a classroom. The camera will be connected to a computer system in which a GUI will be present to control the whole process. Faculty will have to enter their details, subject name and the class standards and then just to trigger on track images so that camera starts tracking images of the students and then the system will track the image will compare the images with the dataset and will mark the attendance and this attendance will be saved in excel sheet with the student's name, roll number and the respective subject.

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