# Attendance Management Using Automatic Face Tracking System

**Shruti Ramesh Babu, Subhashree Navaneethan, S. Prabakaran**

***Abstract--- In present education system, attendance plays a significant role in performance, morale and productivity. The conventional methods are highly time consuming and subject to various kinds of errors. This paper presents an approach for efficient face tracking and matching for an automatic attendance monitoring system using technologies such as object detection, face recognition and convolutional neural networks.***

***Index Terms--- Object Detection, Convolutional Neural Networks, Face Recognition, Attendance Monitoring.***

## 1. INTRODUCTION

Attendance maintenance is an important task in all the institutions to check the performance of students. Observational proofs have demonstrated that there is a noteworthy relationship between student's attendances and their scholarly performance thus requiring the staff to maintain a legitimate record for the same. In most teaching organizations, attendance is taken manually utilizing techniques such as sign in attendance sheets, roll call, etc. This manual attendance record followed presently isn't effective and is subject to human errors and malpractices such as impersonation. It also consumes lecture hours that might otherwise be used for teaching.

In recent years, various methods have been proposed to resolve this issue. In 2014, Amir Abas [1] proposed a system consisting of RFID data logger and data analysis using ASP.net. Zhongyun Jiang [2] in 2016, devised a smart attendance management system using Internet of Things, radio frequency and wireless sensor network technology to capture the trajectory of student activities. In the same year, Jun Lio [3] created an attendance system using a mobile device and a web application. Other methods using technologies such as fingerprint scanner, iris scanner, etc. have also been put into practice.

However, these biometric and non-biometric methods have limitations such as proxies, accessibility, portability, cost, etc.

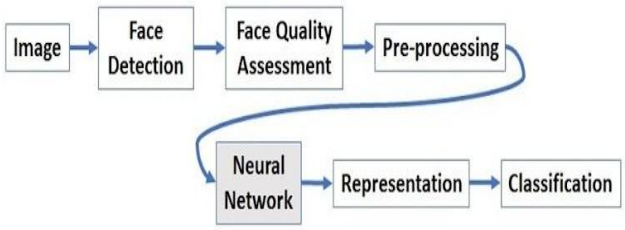
More recently in 2018, Shubhobrata Bhattacharya [4], proposed a system using video tracking and face detection methods for smart attendance monitoring. The main issue with this system is that the video feed will need to run continuously for the entire duration of the lecture. This leads to higher computational complexity and power.

This leads to a proposal of an automatic attendance system based on technologies such as facial recognition, object detection and convolutional neural networks. The idea is to take a picture of the entire class when the teacher or professor is ready to take the roll call for the day. Every student has a unique facial structure and features that eliminates the issue of impersonations. Object detection eliminates the requirement of every pupil to individually mark his or her attendance thus saving considerable lecture hours.

The organization of the paper is as follows: Section II presents the existing framework while Section III presents the proposed framework. Various technologies and steps involved with the system are explained. Section IV forms the conclusion of the paper.

## 2. PRESENT SYSTEM

Presently, the most advanced existing system is based on video tracking and face detection techniques for a smart attendance monitoring system as proposed by Shubhobrata Bhattacharya and her associates. The system is based on a video sequence as an input parameter on which various techniques have been applied such as face detection, feature extraction, normalization of the face features and quality score assignment for each frame in the video sequence.




Face tracking method has been used to eliminate redundant detection of faces in the subsequent frames of the video. The traditional Viola and Jones method has been used for the detection of faces. The limitation observed in this method is the requirement of excessive time for training the data. Few days of training will be mandatory for a large dataset. The face image captured is then extracted for features and processed through a Convolutional Neural Network (CNN) to obtain a low-dimensional feature set that can be directly fed into the classifier.

The parameters that have been considered for detection include pose estimation which includes determining head pose using three angles: Roll, Yaw, Pitch, sharpness using the variance of an image Laplacian, image size by calculating the position of the eye corners and brightness by calculating the mean of all the intensities of various channels present in the image. These prove to be an efficient solution for issues concerning face recognition such as illumination and pose variation.

**Revised Version Manuscript Received on 14 February, 2019.**

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However, the system fails to provide solution for issues such as occlusion, high computational complexity and the total power consumption.

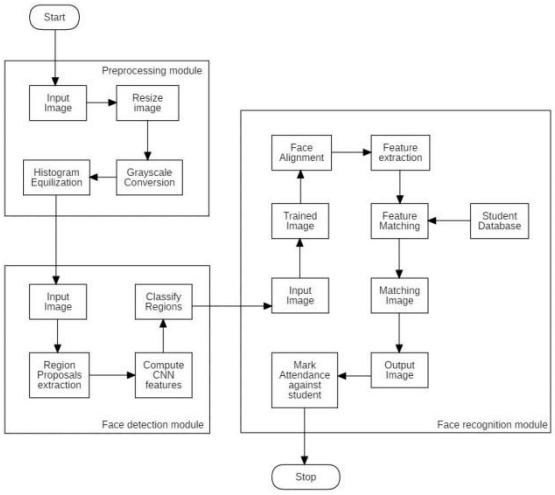
## 3. PROPOSED SYSTEM

The proposed system consists of two modules: Object detection module for classifying faces in the input image using Convolutional Neural Networks (CNN) as well as the Face detection module for matching faces.

### *A. Object detection*

Object detection is carried out using Convolutional Neural Networks. A conventional CNN uses the concept of region of interest (RoI) to classify the presence of an object within that region.

The input image of this module is captured through a camera installed at an elevation in a specified instinct, precisely through a switch that enables capture when pressed, and is fed to the neural network. The classified regions are then taken as input in the face recognition module.




### *B. Face recognition*

The detected faces from the object detection module are extracted for features using deep neural networks (dnn) library provided in opencv. It is further divided into two modules:

1) Training the model

The images in the database are divided into train and test data. The images in the train set are processed and encoded for recognition purposes.

2) Recognizing faces

The test set is used to recognize the faces. These images are different from those in the training set. A bounding box is drawn around the detected face. The code further recognizes the face in the bounding box and labels it accordingly.

## 4. RESULTS AND ANALYSIS

The output has been generated successfully for a number of test images. The generated output has produced correct results for the provided test images. But, it has failed to recognize a person whose face is angled in such a way that half of the features are not seen. Further improvements can be made by using more powerful neural networks in order to take care of this particular drawback.

## 5. CONCLUSION

The proposed system has less computational complexity and training time as compared to the existing system and therefore shall prove to be an efficient solution for the issue at hand. However, the system can be improvised further in factors such as occlusion and time complexity.

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