



# Real-Time Smart Attendance System using Face Recognition Techniques

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**Abstract:** Attendance is a ritual followed in every class every day. In the present academic system, regular class attendance of students' plays a significant role in performance assessment and quality monitoring. The conventional methods practiced in most of the institutions are by calling names or signing on papers, which is highly time-consuming and insecure. The management of the attendance can be a great burden on the teachers if it is done by hand. With the advent of technology the manual attendance system can be applied with help of computer vision. Computer vision plays a major part in recognizing facial parts of students for putting up automated attendance without use of paper and pen. This attendance is managed properly and for long-time with help of automation. The attendance can be accessed by teachers, students and parents from anywhere anytime. Image Processing with deep learning is applied to easier assessment of attendance which is time-consuming and cost saving. The System has add-on function of temperature check and Hand sanitization to deal to covid situation.

**Keywords:** Face recognition, Face detection, Naive-Bayes, Machine Learning.

## I. INTRODUCTION

Attendance is a ritual followed in every class every day. In the present academic system, regular class attendance of students' plays a significant role in performance assessment and quality monitoring. The conventional methods practiced in most of the institutions are by calling names or signing on papers, which is highly time-consuming and insecure. The management of the attendance can be a great burden on the teachers if it is done by hand. With the advent of technology the manual attendance system can be applied with help of computer vision. Computer vision plays a major part in recognizing facial parts of students for putting up automated attendance without use of paper and pen. This attendance is managed properly and for long time with help of automation. The attendance can be accessed by teachers, students and parents from anywhere anytime. Face recognition has arisen as a smart solution to discourse many present day needs for empathy and the confirmation of identity claims. Face acknowledgment is a vital field for authentication purpose particularly in the case of student's attendance. This project is intended at applying a digitized system for attendance recording. The current system of tracking attendance via records is difficult to manage. The System has add-on function of temperature check and Hand sanitization to deal to covid-19 situation.

## II. LITERATURE SURVEY

### A. Face Recognition using Dimensions and Distances.

The system proposes a face recognition-based mobile attendance management which is flexible and can be used anytime anywhere. The system performs in real time with a smart user-friendly device which helps to reduce the cost of equipment to be used in the system. User end consists of Teachers, Students as well Parents which gives monitoring of attendance in real time. This also saves time and money used for attendance in a regular manual system. Main objective in this system is recognition of faces for attendance. Facial Recognition can be done using two methods first is Appearance based and other is feature based. Feature based recognizes features of faces such as nose, eyes etc. while Appearance is based on dimension and distances. In this system authors have used filtering, based on Euclidean distances calculated by Eigenfaces, Fisher faces, and LBP (Local Binary Pattern). The system fails when the distance between face and camera is increased, thus showing the limitations. [5]

**B. Facial Recognition with Feature Extraction.**

This system encourages use of feature detection for facial recognition. Attendance is a ritual in the classroom which consumes time and money on equipment used for taking attendance. The system proposes attendance to be taken from a video capture during regular class so that students are not disturbed, the video first goes through a process of face detection, and then feature extraction. Pose estimation of student, image size, resolution, brightness are also considered as part of research. Deep Learning is applied after a quality assessment of face recognition to apply the attendance to the student. This system sometimes fails to recognize the face depending on more light or darkness in the room.[6]

**C. Strategy of Face recognition with EigenFace, PCA**

There are different strategies accessible for face recognition like Eigen face, PCA and LDA hybrid algorithm. The proposed automated attendance system using face recognition is a great model for marking the attendance of students in a classroom. This system also assists in overcoming the chances of proxies and fake attendance. In the modern world, a large number of systems using biometrics are available. However, the facial recognition turns out to be a viable option because of its high accuracy along with minimum human intervention. This system is aimed at providing a significant level of security. Hence, a highly pro-efficient attendance system for classroom attendance needs to be developed which can perform recognition on multiple faces at one instance. Also, there is no requirement of any special hardware for its implementation. A camera, a PC and database servers are sufficient for constructing the smart attendance system.[7]

**D. Mahalanobis method for classification of extracted facial feature**

The use of reconstruction algorithms from 2D images to 3D forms that are used as a database in face recognition. In this study, a study of facial recognition using an approach to the development of 2D to 3D image reconstruction models using Convolutional Neural Network (CNN) and the use of PCA are used as the feature extraction method. The CNN method is used to produce a 3D face image from a 2D face image. The PCA method used as a feature extraction method and the Mahalanobis method used as a classification method on the proposed face recognition-based attendance system can work well. The proposed method can produce a face recognition that has a high accuracy of up to 98%.[8].

**E. Multi-scale feature extraction for single face recognition.**

Single sample face recognition has always been a hot but difficult issue in face recognition. The existing methods solve this issue from selecting robust features or generating virtual samples. By considering selecting robust features and generating virtual samples simultaneously, the paper proposes a multi-scale support vector transformation (MSSVT) based method to generate multi-scale virtual samples for single image recognition. The methods to solve problems are divided into two categories. One is to look for and select features that are robust to the number of samples, from the point of view of feature selection, such as PCA and 2DPCA. But when each person has only one face to be trained, the feature information extracted from the feature extraction algorithm will also be very limited, resulting in a bad recognition performance. The other is to generate multiple virtual samples from the point of view of the extended sample, thus reducing the impact of the sample size.[10]

**F. Face recognition method based on sparse representation and feature fusion.**

The authors propose a multi-feature fusion face recognition method based on sparse representation. The core idea is to find the sparseness through training, and then use the sparse coefficient and training samples to represent the test samples, and then the optimal sparse solution is obtained by solving the  $l_1$ -norm

problem. The recognition results of feature fusion methods are better than any single feature algorithm under the condition of non-occlusion or occlusion. When there are less than 10 pictures of each category of people in the training sample and the occlusion type is not controllable, our algorithm can still obtain a high recognition rate. [11]

### III. SYSTEM ARCHITECTURE

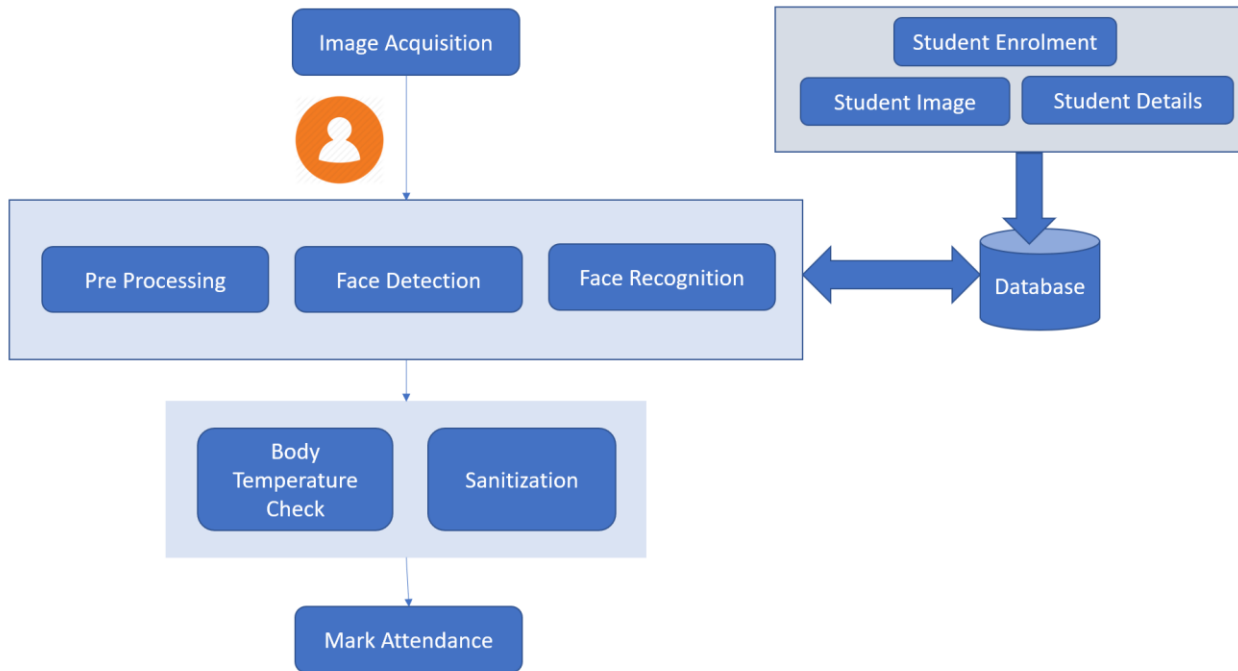


Fig. 1 System Architecture

### IV. MODULES

Smart Attendance system is developed to enable automated attendance of students. To carry out the task of automated attendance modules can be defined in the following ways:

1. **Enrolment** The students who are new to the course or school are enrolled in this step. The step take care to note students basics details such as name , phone number, enrolment Number, Class, and Section are given to student and stored in the database. This information form the details of student. Separate pictures of the student's face appearing in the camera window are captured .Pictures along with student information is stored in the student database. Face Recognition is performed on all the images of students present in database

2. **Image Acquisition** In smart attendance system ,attendance is marked when student is present in the class. Camera is used to acquire images of students in class. High pixel good camera is used to get high quality and high accuracy images. The face of students are captured who are present in the class.

3. **Image processing** Images captured through camera are used for image processing. Image pro-cessing consists of three steps namely Image Pre-processing, Face Detection ,Face Recognition.

- a) **Pre-processing:** The images are cleaned and noise is removed to obtain clarity in images.

- b) **Face Detection:** Face detection is done based on landmark present on persons face. Viola and Jones algorithm is applied on preset 68 landmarks on persons face. Face bounding box detection and constrained local model is used for face tracking and face landmark search. After Face detection , image is passed to next phase.

- c) **Face Recognition:** Deep learning is implemented for face recognition. The image captured through camera and students enrolled images from database are matched to give result of attendance. The deep learning is engaged for its speed , ease of use and not limiting itself over changes in face.

4. **Attendance marking** Face recognition successfully allows to judge the presence of student in class and mark his attendance. Intrusion of using camera at start and end of class might allow to evaluate the students presence throughout class and also reduce proxies.



5. Report : Report is made which can be used of evaluation of students attendance in class these reports are collectively made with of marked attendance and database. Further performance evaluation can be done for whole student management system

## V. CONCLUSION

Smart Attendance System is a complex task which contains many sub-tasks in it. The study of attendance system using facial recognition as major factor used for counting the presence of student in class. The system is perfect solution for manual attendance used decade back. It saves time as well equipment cost used for prior. Different methods used for facial recognition are studied. Use of statistical method to determine the facial features. Whereas other use feature extraction as major for face recognition. Feature extraction with classification method when applied gives more accurate result.

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