Smart Attendance Marking System Using Facial Recognition

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Abstract- *Attendance marking during an ongoing class, can become a quite tedious and burdensome work, which consumes a lot of time. Due to large number of pupils in a class, a lecturer, rather than focusing on teaching patterns, may sometimes be wasting more time on marking attendance. It is also difficult for teachers to identify students, who are missing the classes for a long of time. A manual attendance marking system has been a great problem for both students as well as the lecturers. Sometimes a student, actually present in the class, may get marked absent, due to lecturers' faults. Also, a number of -times, students get marked absent despite of being present. In a past few years, the need of automated systems has rapidly increased in every field. This made the automation of attendance marking also important. The use of standard biometrics has completely changed the scenario of automated attendance marking system. Our focus through this paper, is to propose a system, more efficient than the existing systems, using Facial Recognition.*

Keywords- Biometrics, Facial Recognition, Attendance Management,

I. INTRODUCTION

Facial Recognition Technologies, now-a-days are found to be a major application in almost every field. Even in education field, these technologies are setting their roots. The increasing number of students getting enrolled every year, has made the management of attendance of students a very hectic task. Thus, managing the attendance manually is a huge challenge for the institutes. Therefore, an automated attendance marking and management system can majorly benefit in simplifying the process. Hence, in this paper we are trying to implement facial recognition system for the marking as well as management of attendance[1].

Now-a-days facial recognition has found numerous applications in various fields like automated surveillance, Closed Circuit Television (CCTV) to get a track of missing citizens as well as for monitoring terrorist activities or anti-social activities gong on in ever nook and corner of the country, forensic applications and face reconstruction[3]. There are many problems with the existing facial recognition systems available. These problems are various, like variety in facial expressions of individuals, light intensity, pose size. Also factors like existence of objects between, change in hairstyles, beard style. One more major problem is the age factor, which changes the appearances of one time-to-time. Developing a Face Recognition Model for Attendance Management System, eliminating all these difficulties is very challenging[5].

II. PRINCIPAL COMPONENT ANALYSIS (PCA)

PCA, or Principal Component Analysis, is the base algorithm we use, for analyzing face recognition issues. PCA is also called as Eigen Face Projection. Firstly, the database images of the faces need to be multivariate dataset. Through data compression, data dimensions are reduced in PCA technique[2]. This is done to display the most effective low dimensional structure of the picture's face. This process helps in discarding all unnecessary and not important data or facial details, and make the image very precise and reduces till every inessential detail is removed from the image[4].

The Principal Components of a face are specific sets of its features. Principal Components are also called as Eigen Faces. Through the PCA technique, we derive or extract the main features out of a face image. In real life practical uses of PCA, a test image is compared to database images for face features. By this data, further process of minimalizing the details will occur[6].

Algorithm

- Training set databases or images are prepared with NXN resolution.
- Images are converted to Column Vector.
- Then, the vector needs to be normalized to find the unique features of image.
- Then, the average face vector is calculated.
- To find the Eigen vectors, co-variance vectors are calculated.
- 'K' best Eigen faces based on facial patterns are selected.
- Each group of 'K' vectors are used to represent the database as the collection of those 'K' images.
- The training dataset or the training image are represented as weighing vectors.

III. PROPOSED METHODOLOGY

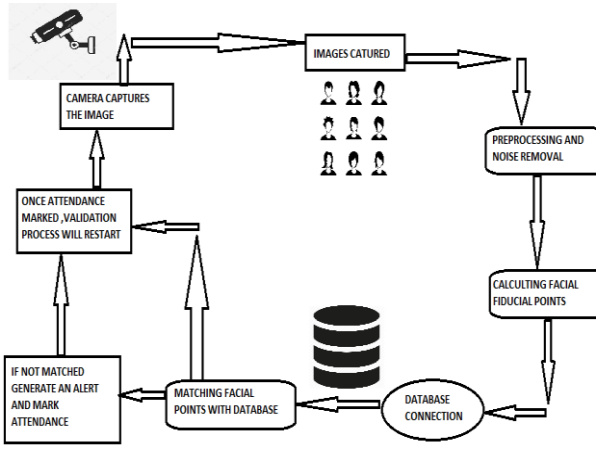

Fig 1 Proposed Automated Attendance System Architecture

Proposed System Architecture:

i. Capturing the Image
ii. Pre-processing
iii. Eigen Vector Generation
iv. Face Recognition
v. Face Database Generation
vi. Attendance Marking

i). Capturing the Image

Images of the students in the class are captured through high-end web cameras providing 1280x720 resolution. These images are then transferred to the server for further processing[8].

ii). Pre-processing

Firstly, images are cropped according to the region of interest. Then the images are resized to desirable size. Thereafter the images, after resizing, are converted to greyscale from RGB. This is also called as greyscale conversion. Finally the image is histogram equalized[9].

iii). Eigen Vector Generation

A large set of images is normalized for Eigen Face Generation. Then it is resampled to similar resolution. This step is used to generate Eigen Faces for training set images and test images.

iv). Face Recognition

This is the next step after face detection. First, the acquired images are cropped to the region of interest, and then these images are compared to the images existing on the database. This process will be done for each image one by one. After recognizing the faces, further process of marking attendance will be done.

v). Face Database Generation

In the original database, 10 images of each person are there. And there are 10 persons for which we are working (For testing purpose). Thus, the then aquired images will be compared with the images already existing on the database. Thus, the recognized faces will be marked.

vi). Automatic Marking of Attendance

After the recognition of the faces, and comparing to the existing images on the database, a list is prepared for people recognized. Then, these people are marked present on the database[10].

IV. RESUTS AND DISCUSSION

The above screenshot describes the following:

- **Start** – The database containing face data is loaded into the workspace. In this step only, the Eigen Faces of the training sets are generated.

- **Capturing the Image** – The images are captured, and processed to be compared. It undergoes various techniques of pre-processing.

- **Face Recognition –** Thus, the main part of the process comes. Now the Eigen faces will be compared to the ones on the database already. These images, after recognition, will generate a list of all people present in the classroom.

- **Update the Attendance –** Finally, the attendance will be marked on the basis of the list of the results of the face recognition process. Thereafter, the people are marked present on the database.

IV. CONCLUSION

Thus, this will be a secure and reliable system which will efficiently replace the existing systems for attendance marking in institutes. This system will easily overcome the demerits of existing attendance systems, like manual marking of attendance, and biometric based attendance marking

systems. They have demerits like a lot of time wasting in attendance. This Smart Attendance Management System based on Facial Recognition will totally eliminate the demerits of existing marking systems.

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