Automated Attendance Management and Reporting System using Face Recognition

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Abstract - The Uniqueness or individuality of a private is his face. during this project face of a personal is used for the aim of attendance making automatically. Attendance of the scholar is extremely important for each college, universities and faculty. Conventional methodology for taking attendance is by calling the name or roll number of the scholar and thus the attendance is recorded. Time consumption for this purpose may be a crucial point of concern. Assume that the duration for one subject is around hour or 1 hour & to record attendance takes 5 to 10 minutes. For each tutor this is often consumption of your time. To remain away from these losses, an automatic process is used during this project which is based on image processing. During this project face detection and face recognition is used. Face detection is employed to locate the position of face region and face recognition is employed for marking the understudy's attendance. The database of all the scholars within the class is stored and when the face of the individual student matches with one among the faces stored within the database then the attendance is recorded. The attendance maintaining system is difficult process if it's done manually. The smart and automatic attendance system for managing the attendance are often implemented using the varied ways of biometrics. Face recognition is one among them. By using this technique, the difficulty of faux attendance and proxies are often solved. Within the previous face recognition-based attendance system, there have been some disadvantages like intensity of sunshine problem and head pose problem. Therefore, to beat these issues, various techniques like illumination invariant, Viola and Jones algorithm, Principle component analysis are used. the main steps during this system are detecting the faces and recognizing them. After these, the comparison of detected faces are often done by cross checking with the database of student's faces. This smart system are going to be an efficient thanks to maintain the attendance and records of scholars. In a classroom with large number of students, it is a very tedious and time-consuming task to take the attendance manually. Therefore, we can implement an effective system which will mark the attendance of students automatically by recognizing their faces. The process of this face recognition system is divided into various steps, but the important steps are detection of face and recognition of face. Firstly, to mark the attendance of students, the image of students' faces will be required. This image can be snapped from the camera device, which will be placed in the classroom at a suitable location from where the whole classroom can be covered. This image will act as input to the system. For the effective face detection, the image needs to be enhanced by using some image processing techniques like grayscale conversion of image and histogram equalization. To identify the students sitting on the last rows neatly, the histogram equalization of image needs to be done.

Keywords - Biometrics, Face recognition, Smart Attendance.

I. INTRODUCTION

Attendance is prime important for both the teacher and student of a tutorial organization. So, it's vital to stay record of the attendance. the matter arises once we believe the normal process of taking attendance in school room. Calling name or roll number of the scholar for attendance is not only a haul of sometime consumption but also it needs energy. So, an automatic attendance system can solve all above problems. There are some automatic attendances making system which are currently employed by much institution. one among such system is biometric technique. Although it is automatic and a step before traditional method it fails to satisfy the time constraint. the scholar possesses to attend in queue for giving attendance, which is time taking. This project introduces an involuntary attendance marking system, destitute of any quite interference with the normal teaching procedure. The system are often also implemented during exam sessions or in other teaching activities where attendance is

extremely essential. this technique eliminates classical student identification like calling name of the scholar, or checking respective identification cards of the scholar, which can not only interfere with the continued teaching process but can also be stressful for college kids during examination sessions. Face detection is defined as finding the position of the face of a private. In other word it is often defined as locating the face region during a picture. After detecting the face of human its countenance is extracted and has big choice of application like countenance recognition, face recognition, observation systems, human PC interface then forth.

Detecting face during a picture of single person is simple but once we consider a gaggle image of an image containing multiple faces, the task becomes difficult. For the appliance of face recognition, detection of face is extremely important and thus the initiative. After detecting face, the face recognition algorithm can only be functional. Face detection itself involves some complexities as an example surroundings, postures, enlightenment etc. There are some existing methodologies for detection of face. several them are complexion based, characteristic or feature based (feature like mouth, nose, and eyes) and neural network based. Among the above techniques, the skin-based procedure is well thought-out as simplest one. The approach premeditated and applied during this thesis is that the complexion-based face detection method. To recognize the faces is that the next task to be done after detecting faces of scholars from image. For face recognition, there are various techniques available like Eigen face, PCA and LDA hybrid algorithm, etc. we are getting to utilize Eigen face technique along side principle component analysis. within the Eigen face, when faces are detected, they're cropped from image. Each student's face is cropped and therefore the various features are extracted from them like distance between eyes, nose, outline of face, etc. using these faces as eigen features, the scholar are recognized and by comparing them with the face database and their attendance is marked. A database of faces must be created for the aim of comparison. By enrolling the scholars thereto database, we will maintain the information of the scholars like roll number, student's name, and his or her photo for the identification.

The goal is to implement the system for a selected face and distinguish it from an outsized number of stored faces with some real-time variations also. The Eigenface approach uses Principal Component Analysis (PCA) algorithm for the recognition of the photographs. It gives us efficient because of find the lower dimensional space. This has motivated researchers to develop computational models to spot the faces, which are relatively simple and straightforward to implement. The important fact which is taken under consideration is that although these face images have high dimensionality, they span very low dimensional space.

II. RELATEDWORKS

By doing the literature survey on the papers on face recognition, [1] we come to know that, there are various techniques and algorithms which are used for face recognition. In the recent ten years, a lot of algorithms are developed for face recognition. [2] Most of these algorithms like Neural Networks, work only for the single image of a system. But we cannot apply this single image system in classroom attendance system as we need to recognize the multiple faces. [3] The AdaBoost Algorithm is the most efficient algorithm for multiple face recognition. [6] In 1970's a system was created with 21 subjective markers like hair color and lip thickness. This system was created by Goldstein, Harmon and Lesk. In the literature survey finished the face recognition, we realized that it's two-step process face detection and face recognition. In the face detection, when image is captured, the image area is assessed into regions like "face" and "non face". In [5], the different approaches for face detection are holistic approach, feature based approach, and appearance based. In Holistic approach, the entire face region is considered as input to face detection system. In feature-based approach, the features of face such as nose and eyes are segmented and then taken as input in face detection system. For face recognition, we need to use different algorithms, like PCA and Eigen face techniques which use the concept of region of interest [2]. machines techniques are used. In [9] the Illumination Invariant algorithm is used for improving the light intensity problem of surroundings. The Eigen face technique is very sensitive to the head orientation; therefore, the camera and scanner support should be implemented for more flexibility.

III. PROPOSEDSYSTEM

In the proposed system, the module added with a camera module takes a photograph of the students filled in the classroom, and with the help of face recognition, It recognizes the presence of students in the classroom in the particular interval of time, by recognising faces of the students, the attendance can be marked for each students based on their availability in the classroom. Without any wastage of time and manpower, the work can be done with a great accuracy, with the help of Machine Learning and Face Recognition. When the camera takes the picture of all students, that picture is enhanced for further processing. In the enhancement, the picture is first transformed in grayscale image, and then it will be equalized using histogram technique. After enhancement, the picture will be given for detecting the faces of students which will be done by face detection algorithm.

The Proposed Attendance System Mainly Consists of Four Phases; **Image Acquisition**, **Face Detection**, **Feature Extraction, Face Recognition**.

The Working of The System Is Depicted as Follows:

Image Acquisition: The System consists of a camera that captures the images of the classroom and sends It to the image pre-processing. Then that image is sends for face detection.

Face Detection: This process separates the facial area from the rest of the background space of the given image. The faces which are stored in the database are used for this process.

Feature Extraction: Feature Extraction is completed For Distinguishing Faces of various Student. In this system, eyes, nose and mouth of a face are extracted. Feature Extraction is useful in face detection and recognition.

Face Recognition: The Facial Image Is now compared with the stored image. If the image is matched with the trained image then the face is recognized. Then for that particular student the attendance is marked.

IV. SYSTEM ARCHITECTURE
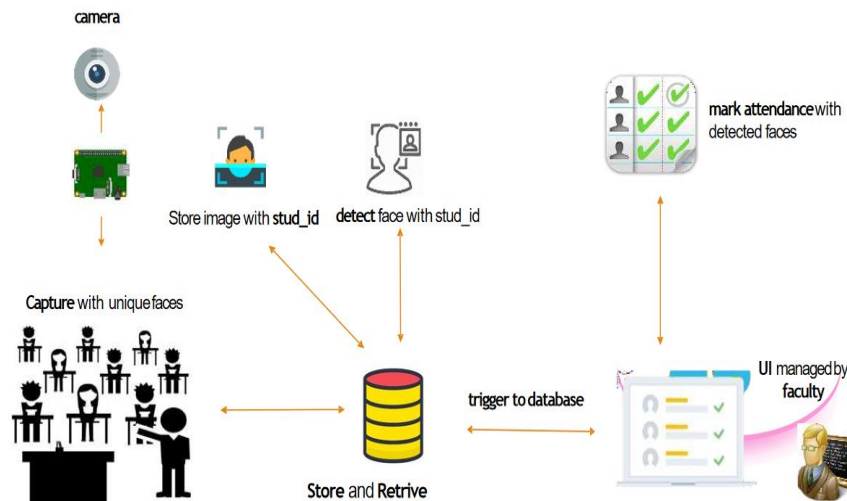
V. MATHEMATICAL APPROACH

Let I1, I2… Im be the 'M' set of train images. The Average face of set can be defined as

Individual face difference from the average face is given by

$$\text{'A'} = (1/M) * \sum_{N=1}^{M} (I_N)$$

When it's subjected to principal component analysis (PCA), the massive set of vectors seeks a group of M orthogonal vectors Un, which best describes the distribution of knowledge.

$$\Phi_i = I_i - A$$

$$\lambda_K = (1/M) \sum_{N=1}^{M} [(U_K)^T * \Phi_N]^2$$

The kth vector Uk is chosen such that
The vector U k and the scalar λk are the eigen vectors and eigen values respectively of the covariance matrix

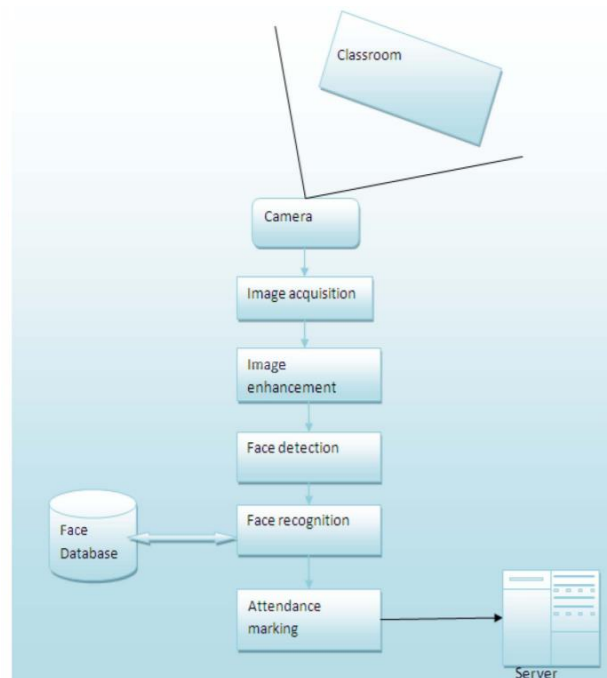$$C = (1/M) \sum_{N=1}^{M} (\Phi)(\Phi)'$$

$$C = B * B'$$

Where the matrix:

$$B = [\Phi_1 \Phi_2 \ldots \Phi_M]$$

VI.   DIAGRAM

VII.   RESULT

An attendance system for a session, hour or laboratory session by which teaching staff or Non-teaching assistant can mark the individual student's attendance. It saves time and energy, especially if it's a lecture with huge number of scholars. Automated Attendance System has been envisioned for the aim of reducing the drawbacks within the traditional (manual) system. This attendance system demonstrates the utilization of image processing techniques in classroom. this technique can't only merely help within the attendance system, but also improve the reputation of an establishment.

VIII.   CONCLUSION

The smart and automated attendance system can be proven as an efficient system for classroom attendance. By using this system, the chances of fake attendance and proxies can be reduced. There are a lot of Biometrics Systems which can be used for managing attendance, but the face recognition has the best performance. So, we would like to implement a reliable and efficient attendance system for classroom attendance which may work for multiple face recognition at just one occasion. We found the solution for light intensity problem and head pose problem for which we can use the Illumination Invariant algorithm. Also, to implement this system, no specialized hardware is required. A camera device and a standalone Computer Server and database servers are sufficient for constructing the smart attendance and Reporting System.

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