AUTOMATIC ATTENDANCE MANAGEMENT SYSTEM USING FACE DETECTION

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Abstract—**This paper is about the biometric attendance management. The automatic attendance management will replace the manual method, which takes a lot of time consuming and difficult to maintain. There are many biometric processes [10], in that face recognition is the best method. In this paper we are going to describe the attendance without human interference. In this method the camera is fixed in the classroom and it will capture the image, the faces are detected and then it is recognized with the database and finally the attendance is marked. If the attendance is marked as absent the message about the student's absent is send to their parents. There are various methods for comparing the faces. The Eigen face is the one of the method. Eigen faces is set of Eigen vectors which are used in computer vision problem of face recognition.**

Keywords— **Biometric, Face Detection, Face Recognition, Eigen Faces, Cropping, Data base**

I. INTRODUCTION

Maintenance of student attendance is the most difficult task in various institutions. Every institution has its own method of taking attendance such as using attendance sheet or by using some biometric methods. But these methods consumes a lot of time. Mostly student attendance is taken with the help of attendance sheet given to the faculty members. This consumes a lot of work and time. We do not know whether the authenticated student is responding or not. Calculation of consolidated attendance is another major task which may cause manual errors. In some other cases the attendance sheet may become lost or stolen by some of the students. To overcome such troubles we are in need of automated attendance management system [3].

There are many biometric methods available in which the basic concept is same. One of them is the finger print identification. In this method first the finger prints of the individuals are collected and stored in the database of finger print sensor. For this first we have to collect the finger print of each individual. This is done only one time or when a new entry has to be added in the database. Then the obtained finger prints are compared with the images in database. if the two finger prints are same the attendance is marked as present. But this method has some of the disadvantages. They are for this method the students have to wait in queue which ultimately consumes a lot of work. If once the finger is not kept correctly or if the finger print is not recognized properly then the attendance will be marked as absent. So this method is not most efficient.

The other biometric method available is eye ball detection. In this method eyeball sensor is used. It senses the blinking rate of eye ball and it also senses the location of iris. In this method first the eye ball or iris of each individual is stored in the database. Usually the eye ball is not same for all persons. It has some difference. The obtained image of eye ball is then compared with the eye ball in the database. If it is same then the attendance is marked. But practically it is not possible. As there are large number of students in the class eye ball detection of each individual is not possible.

These disadvantages are overcome with the help of automated attendance management which does not consumes time and the data is not lost until we erase the data [1]. This method is most efficient in these day.
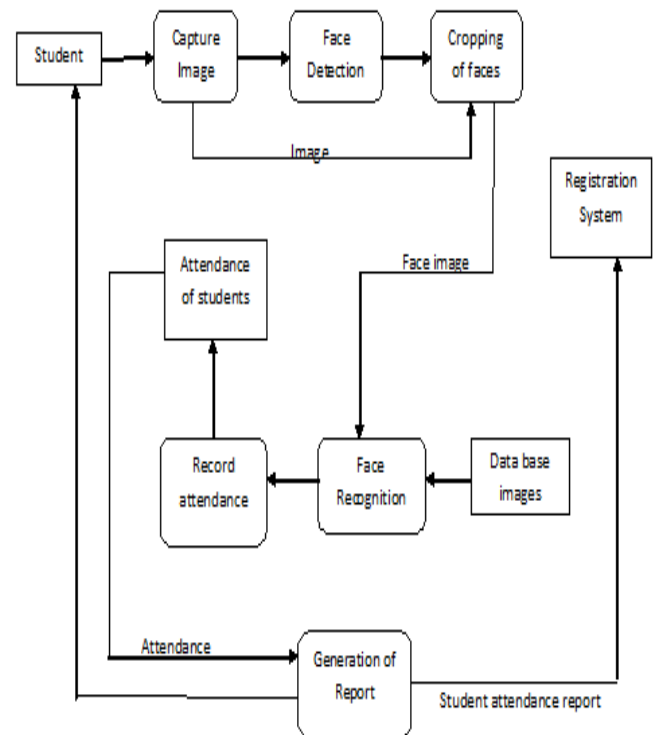
II. PROPOSED SYSTEM

Figure.1 Block Diagram of Proposed System

Background Subtraction:

Background subtraction is one of the most common method in all detection techniques. Generally the background of a place remains static. Hence the background is subtracted only once in a set of image. For the purpose of accurate face detection we go for background subtraction [7]. Then this is checked for images under different conditions. Then the accuracy of detection under different conditions is tested.

Background subtraction is done for both the gray scale image as well as binary image. But most commonly the image is converted to gray scale[12] and then the background is subtracted[6]. This is done to get good accuracy in detecting faces.

Face detection and cropping:

The image after background subtraction is used for face detection. In face detection the face of images are marked with the help of rectangle or circle. The face detected after background subtraction is accurate as compared to the face detected from an image which is not background subtracted.

The detected face is then cropped. Finally all the face of individuals are detected and cropped from the image. Each cropped image is taken for the comparison of images in database

Face recognition:

Face recognition is used to identify the detected faces. There are many methods available for face detection. But the eigen value method is the more suitable method [2]. This method is more suitable because of its speed. Hence here we are going to eigen value method to recognize the faces[13].

Eigen faces:

The acceptable method for face recognition is the Eigen face approach due to its speed, simplicity and learning capability[5]. The eigen face is one that decomposes the face images into a small set of characteristic feature, which are the principle components of the initial training set of face image. Each discrete face can be represented precisely in terms of a linear combination of the eigen faces. All the faces can be approximated by using the best eigen faces.

Calculation of Eigen weight:

Let us consider the image face as I(x,y) which is a two-dimensional N x N array. The size of the image is 256 x 256 which is the vector of dimension 65,536 .The faces are being similar in overall configuration, which are not randomly distributed in the huge image space[4]. The images are described by a relatively low dimensional subspace.

Let λ be the eigen value associated with the eigenvector X. It is a property of a matrix. The vector magnitude is changed not the direction when the matrix act on it.

$$BX = \lambda X$$

To calculate of eigen values and eigen vectors

$$(B - \lambda I) = 0$$

Where I is the n x n Identity matrix.
The nontrivial solution occurs if and only if

$$det(B - \lambda I) = 0$$

Where det () denotes determinant.

There are n solutions or n roots of the characteristic polynomial if B is nxn. Thus B satisfies the equation if there are n eigen values. Where i=1, 2, 3….n. Assume that the training sets of images are $\Gamma_1, \Gamma_2, ... \Gamma_m$ with each image is I (x, y). Let m be the number of training images and p be x × y then convert each and every image into set of vectors and new full-size matrix (m ×p).

To find the mean face by:

$$\Psi = \frac{1}{m} \sum_{i=1}^{m} \Gamma_i$$

To calculate the mean-subtracted face

$$\phi_i = \Gamma_i - \Psi$$

where i=1,2,….m
B=[$\Phi_1, \Phi_2, ... \Phi_m$] is the mean-subtracted matrix vector with its size Amp. The vector matrix is reduced by implementing the matrix transformations

$$C_{mn} = B_{mp} \times B_{pn}^T$$

Where T is the transpose matrix and C is the covariance matrix. By using Jacobi method find the eigenvectors, Vmm and eigen values from C matrix. By comparing other method the accuracy and reliability of Jacobi's method is high[8]. The linear combination of training set image is determined by these vectors to form eigenfaces,U_k is given by

$$U_K = \sum_{n=1}^{m} \phi_n V_{kn}$$

Where k=1,2,....m
The face vectors of each face based on the eigen face is:

$$W_K = U_K^T(\Gamma - \Psi)$$

Where k=1,2,...m
The weight form of the vector is

$$\Omega^T = [w_1 w_2 ...... w_m]$$

By using its feature, vector and previous eigen faces the face can be reconstructed as

$$\Gamma = \Psi + \Phi_f$$

Where,

$$\Phi_f = \sum_{l=1} w_l U_l$$

III. RESULTS AND CONCLUSION

TABLE I. RESULTS OF ALGORITHM TECHNIQUES

Algorithm	Percentage Results		
	Veil	Unveil	Beard
Face Detection	45%	93%	79%
Face Recognition	10%	87%	65%

Using this method we can replace all the old methods. Efficient and automatic attendance management is introduced in paper. This method requires only simple hardware for installation. The management of attendance in this method is more simple and the attendance is taken more accurately. One difficult task in this system is face recognition. We are working towards it

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