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Group Attendance Management System Using Face Detection

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ABSTRACT: The topic described in this paper is the group attendance management system. The advantage of automatic attendance taking will eliminate the traditional attendance marking systems which are time consuming. Apart from other available biometric processes, the face recognition is the most suitable method. The paper describes about the automatic group attendance marking system without human involvement. The method describes about capturing of facial images of people with the help of a camera, detected images are compared with stored images in database for recognition and attendance is marked. If the images match, present is marked else absent is marked. A facial image is taken for each individual and a corresponding dataset will be available which stores 21 images taken from different angles. These stored images will be compared with the image taken for comparison. To identify the human face Haar classifier is used and for recognizing faces for attendance marking a LBP (Local Binary pattern) recognizer is employed. The future enhancement is to identify the images of identical twins and we are working towards it.

KEYWORDS: Biometric, Face Detection, Face Recognition, Database, LBP recognizer, HaarClassifier

I. INTRODUCTION

Student attendance is one of the most difficult tasks in the institutions. Every institution has their own process of taking attendance. It may include the regular pen and paper mode of attendance taking which consumes lot of time and lot of effort is needed. While using the traditional method of attendance taking if the student does not respond correctly then a dilemma will take place and which requires a cross check to mark the correct attendance. Moreover manual method of attendance taking is prone to errors.

In order to avoid these problems we need biometric attendance management system [5]. There are biometric methods available such as fingerprint detection, eyeball detection, etc. Biometric methods are adopted because each human has different biometric characteristics and every individual is unique. The problem associated with the fingerprint detection method is that the students have to wait in queue for their attendance marking. If the student does not place the finger properly then it is prone to bad attendance marking. In this method, the fingerprint taken is compared with the stored image in database. If the fingerprint matches then the attendance will be marked else it will be marked as absent. This method also on the other hand consumes a lot of time. Eyeball detection requires an eyeball sensor. For this a high quality camera is needed which is much expensive.

To avoid these problem another biometric method face detection is used for attendance marking. This is much more time effective and efficient than other biometric methods. The attendance marking is done with the help of detecting faces. The human faces are detected with the help of Haar classifier and the faces are recognized with the help of LBP face recognizer. The images taken are compared with stored images in database and if the images match then the attendance is marked as present else it is marked as absent. This is time efficient and the data is not lost until it is being deleted [5]. This is the most efficient method [1].



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II. RELATED WORK

The first author [1] 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. The authors [2] concentrate on the faults of traditional systems of attendance marking and adopt for an alternative method which is attendance marking system using face detection. Here it integrates Eigen Face projection also known as PCA (Principal Component analysis) and Matlab GUI making it more efficient. PCA technique reduces dimension of data and this dimensional reduction discards information which is not useful and decomposes this facial images to orthogonal components known as Eigen Faces [2]. Face recognition technique involves the comparison of the captured image with the stored image in database using Euclidian distance taken at different angles and at different light intensities. Faces are identified by using Eigen Face Method. The matching similarity of test face and recognized face must have a threshold value equal to 0.4. If similarity score is less than threshold value of 0.3 face is not recognized and the attendance is not marked. The second author [3] various algorithms are proposed for face detection such as face geometry based methods, feature invariant methods etc. Viola-jones detection algorithm is used here [3]. This algorithm gives better results in different lightning conditions. The pre-processing step involves with histogram equations of the extracted face image and is resized to 100*100 [3]. The third author [4] implemented the system using PCA, LDA, LBA and Eigen values also used the PCA algorithm but she included a repeatedly capturing mode by calculating Eigen values and Eigen vectors. Stefano Arca introduced a model by calculating facial fiducially points using Gabor filters.

III. PROPOSED SYSTEM

The proposed system uses Haar classifier for object detection and an LBP face recognizer for face detection and comparison. The facial features are extracted rectangular in shape. The extracted faces are then stored in the database for the comparison. The first approach is to take the facial image of the individual. For each individual a set of 21 images are generated. The images are stored as grey scale. These images are stored in the folder for the image comparison. While taking the attendance, the group image is being taken from which the individual image has to be extracted. These extracted faces are compared with the stored images in database.

The image has to be extracted from the background. The background remains static so we have to subtract the background and extract the correct facial image. For this we use background subtraction Hence the background is subtracted only once in a set of image [1]. For proper face extraction we go for background subtraction [7].

A. Background Subtraction

It is the one of the most common techniques we use. The images will have a background which has to be eliminated for the correct facial image extraction. Generally the background of a place remains static [1]. The captured images are checked under different conditions for the accurate image to be extracted for the matching of images.

Background images is done for both the gray scale image as well as binary image [1]. But most commonly the image is converted to gray scale[8] and then the background is subtracted[6]. The background subtraction is done for good accuracy. More the accuracy more accurate will be the results.

B. Face extraction

The faces have to be extracted from the group. Here we use rectangular face extraction. The faces are marked in rectangular and are extracted and stored. The stored facial images are then compared for the facial matching. The images taken are stored as gray scale [8] images. The gray scale images are chosen so that it requires only less memory for the image storage. For every individual a set of 21 images are taken and are stored which are taken at different angles. When a student is registered the details are stored in the database. These images are then taken for the image matching for identifying the individual.

C. Face detection

The face detection is the most important phase. The faces has to be detected from the group of people. The faces are extracted as rectangular outline. The detected faces are recognized with the help of LBP face recognizer. The human face is detected with the help of Haar classifier. If the recognized faces are matched with the stored images in database then the student is marked as present and if the image taken in group do not match with the stored images in database then it is marked as absent.

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When an individual register in the system, a set of 21 images is captured at different angles and are stored. If the captured image from the group matches with the stored image in database then the attendance is marked as present else it is marked as absent. When an unregistered individual comes in the group corresponding to that individual the rectangular face will be marked as unknown.

Privileges are also proposed in our system. The admin has the highest privilege and the staffs have privilege lower than the admin. The admin can view the attendance at any time and can generate the report. The admin has the privilege to add, manage, update, delete the details of students or staffs. The staffs on the other hand can only view their respective subject attendance and can update their personal information.

IV. SIMULATION RESULTS

The below shown figures are the simulation results that we have obtained.

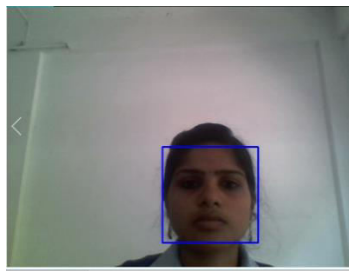


Fig.4.1. Single face extraction when a student register

This is the first phase. When a student register, in order to get the facial images for the simulation a rectangular box is drawn where the student has to give the images at different head nodes. This is done for the facial extraction of images that a student can probably node the head.



Fig.4.2. Dataset of 21 images

As the student registers, the images that are taken at different node positions are noted and are stored in the dataset. The dataset contains all the images that the student has made during the facial extraction for 100ms. The images contain the respective registration id that the student has provided during the registration for saving their images.

anjitha	14433002	Computer Science and Engineering	Semester 8	Female
divya	14433009	Computer Science and Engineering	Semester 8	Female
lekshmi	14433014	Computer Science and Engineering	Semester 8	Female

Fig.4.3. Database generated

When a student register, the information provided are stored in the database. This is done for the information retrieval and check whenever needed. The database consists of the name of the student, their roll number which is their identification number, the branch and the semester they belongs and their gender.

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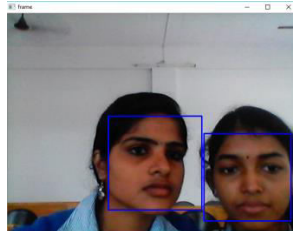


Fig.4.4. Group attendance taking

Once the student has registered, the group attendance can be taken. If the student is not registered it will be marked as unknown. The above figure shows the group attendance marking system. In the group attendance marking system, if the student is being registered, then corresponding to the number of students' rectangular box will be generated for the facial extraction.

A screenshot of a web application interface for generating an attendance sheet. It includes input fields for Date (2018-04-11), Subject (compiler design), and Semester (Semester 8). Below these is a table with columns for Name, Register Number, and Status.

Name	Register Number	Status
shifa	25	ABSENT
anjiltha	14433002	ABSENT
divya	14433009	ABSENT
lekshmi	14433014	PRESENT

Fig.4.5. Attendance sheet generation

Once the facial images of students in group has been extracted, the images are trained for the facial comparison. The images taken are compared with the stored images in database. If the images match it denotes that the student is present and a present is marked else the student is absent and an attendance report will be generated as shown in the above figure.



Fig.4.5. Admin privilege

The above page is the admin page. Admin has the highest privilege and is able to head all the information. The admin can view all the attendance at any time of all the subjects and he can only add and delete the students. The student updates and staff updates can be also monitored. The admin schedules the subjects for the day.

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Fig.4.6. Staff privilege

Staff has a privilege less than that of the admin. Staff can edit their profile and can view only their respective subject attendance. Staff cannot neither make any modifications to the student details nor they can manage the schedule.

V. CONCLUSION AND FUTURE WORK

An efficient method has been introduced here. One of the secure methods for taking attendance is being discussed here. It eliminates the error caused by manual errors. Among the biometric methods available face detection is the most efficient one. It is very cost efficient and time efficient. This can make a good revolution in the schooling attendance management. The difficulties faced are in low light intensity the simulation becomes challenging. The identification of identical twins is also a challenge and we are working towards it.

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