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Automatic Attendance Management System

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Abstract: Automatic face recognition technologies have gained more reputation in this modern scenario. These are used in several security purposes, as a single face recognition model at a time. We can implement a new system for marking attendance by introducing this method for multi face recognition. Principal component analysis is used for detecting faces with high accuracy. But during enrollment, we require an efficient database which stores all faces of the organization. The goal is to implement the system (model) for a person's face and distinguish it from a large number of stored faces with some real-time variations as well. The Eigenface approach uses Principal Component Analysis (PCA) algorithm for the recognition of the images. It gives us an efficient way to find the lower dimensional space.

Keywords: Principal Component Analysis(PCA), Multi face recognition, Eigen faces,

I.   INTRODUCTION

In present scenario we are using the manual attendance system, in which supervisor will look over the attendance. In this system, there will be more strain, waste of time and chance of proxy attendance. We can overcome the above mentioned limitations by using Automatic Attendance Management System. In which we will use the multi facial recognition technology for the purpose of attendance. We use certain non changeable factors in human as a parameter for recognition of face. We include Principal component analysis for more accuracy. This method is very suitable for calculation of attendance in schools, colleges, other organizations. We require a large database for allotting attendance to more number of people. We use the special key factors for calculating the unique identity of a person. This unique identity will be more useful in recognizing the perfect match and allotting attendance to matched person. Here we are trying to develop a system to mark attendance automatically by using image processing technique. An efficient face recognition algorithm has to be developed which can recognize students efficiently. Also, for image processing, we have to have effective platform to test our algorithm. MATLAB gives the best set of libraries or toolboxes for image processing programs. Also, this software gives a user-friendly interface to define functions and create graphical user interface.

II.   PROPOSED SYSTEM

The present system of attendance marking i.e., manually calling out the roll call by the faculty has quite satisfactorily served the purpose. With the change in the educational system with the introduction of new technologies in the classroom, such as a virtual classroom, the traditional way of taking attendance may not be viable anymore. Even with the rising number, of course, of study offered by universities, processing of attendance manually could be time consuming. Hence, in our project we aim at creating a system to take attendance using facial recognition technology in classrooms and creating an efficient database to record them.
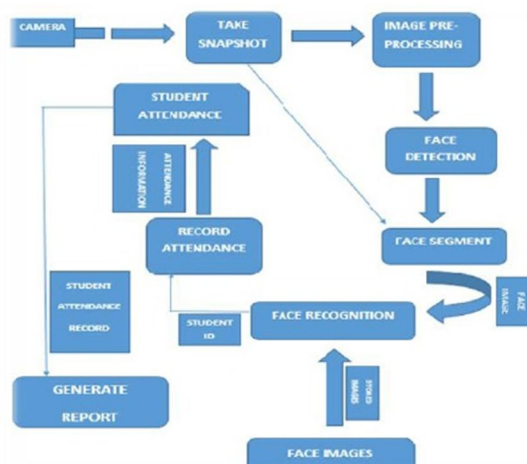

Fig 2.1 Proposed System

The block diagram in fig 2.1 describes the proposed system for Face Recognition based Classroom attendance system. The system requires a camera installed in the classroom in a position where it could capture all the students in the classroom and thus capture their images effectively. This image is processed to get the desired results. The working is explained in brief below:

A. Capturing Camera

A camera is installed in a classroom to capture the face of the student. The camera has to be placed such that it captures the face of all the students effectively. This camera has to be interfaced to a computer system for further processing either through a wired or a wireless network. In our prototype we use the inbuilt camera of the laptop.

B. Image Processing

The facial recognition algorithm is applied to the captured image. The image is cropped and stored for processing. The module recognizes the images of the students face, which have been registered manually with their names and ID codes in the database. We use MATLAB for all the image processing and acquisition operations. The whole process requires the following steps:

1) *Train Database:* Initially we take a facial image of the enrolled students. In our system we have taken ten images each. This data is later used in the facial recognition algorithm. It is done using Image Acquisition Toolbox of the MATLAB. All the cropped image of the face is resized to a 200 X 300 image. The database size may increase based on number of faces need to be recognised at a time. The train database we designed is as shown in fig 2.2.

Fig 2.2 Train database.

2) *Face Detection and Cropping:* The captured image of the classroom is initially scanned to detect faces. This is done using Computer Vision Toolbox by the function vision. Cascade Object Detector(). This function work on basis of Viola-Jones algorithm. This algorithm focusses more on speed and reliability. The detected faces are cropped and resized to a 200 X 300 image, same as the train database.

3) *Face Recognition:* For recognition, the feature locations are refined and the face is normalized with eyes and month in fixed locations. Images from the face tracker are used to train a frontal Eigen space, and the leading three eigenvectors are retained. Since the face images have been warped into frontal views a single eigen space is enough. Face recognition is then performed using the Eigen face approach with additional temporal information added. The projection coefficients of all images of each person are modelled as a Gaussian distribution and the face is classified based on the probability of a match. We use PCA technique for calculation of Euclidean distance, Which plays key role in face recognition.

4) *Attendance Recording:* We use Excel spreadsheet to store the recorded attendance for easy-to-use output format, which is also the software which is familiar to the majority of the institution staff. This is done using Spreadsheet Link EX toolbox. If a student is recognized, the corresponding cell is updated with 'Present', else a blank. Using the formatting in the Excel, we can effectively retrieve the information effectively.

III.   RESULT AND ANALYSIS

In this paper, the proposed technique is applied on our own student database using MATLAB 2018b software. The input image that we have taken is as shown in fig 3.1

Fig 3.1 Input image.

Which will be converted into matrix format using MATLAB toolbox. Now by using BB technique as shown in fig 3.2, we identify faces and they will be cropped into individual facial images as shown in fig3.3

262	234	51	51
350	208	51	51
453	211	53	53
559	216	52	52
449	436	59	59
631	233	59	59
559	49	53	53
307	404	55	55
138	187	56	56
172	408	60	60
766	178	75	75

Fig 3.2 BB(boundary box) matrix.

Fig 3.3 Cropped facial images.

These cropped images are also stored in form of matrix only now using PCA and Eigen vector format. We distinguish the individual faces and perfect match is obtained as shown in fig 3.4 and index number of the perfect matched image is obtained from the train database. Name of the student is obtained from the index name as shown in fig 3.5. We mention a particular index range for corresponding student. Based on the index number only the attendance is allotted to the corresponding student. The Excel based attendance output is as shown in the fig 3.6.

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We can change the format of the Excel sheet columns and rows while declaring the student details earlier in the proposed system.
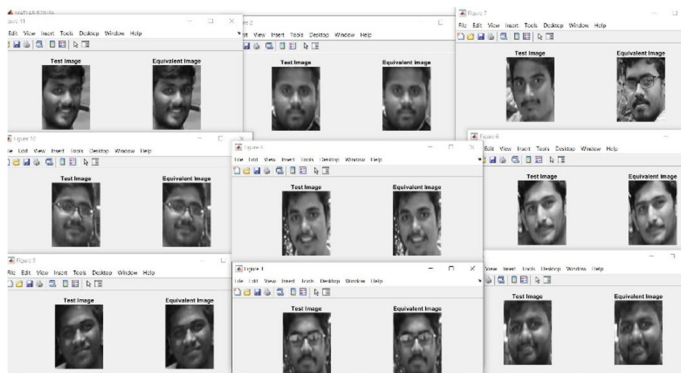

Fig 3.4 Perfectly Matched Facial output.

```
Matched image is :65.jpg
R.Vinay 16331A04E8 is present
Matched image is :14.jpg
P.Ravi Teja 16331A04E4 is present
Matched image is :67.jpg
V.Vishal 16331A04H4 is present
Matched image is :70.jpg
S.Lakshmi Narayana  16331A04F0 is present
Matched image is :31.jpg
P.Niteesh 16331A04C5 is present
Matched image is :5.jpg
P.Ravi Teja 16331A04E4 is present
Matched image is :59.jpg
R.Jayanth 16331A04E8 is present
Matched image is :58.jpg
P. Mohan Krishna 16331A04C2 is present
Matched image is :48.jpg
S.Veerababu 16331A04F1 is present
Matched image is :23.jpg
S.Dileep 16331A04G0 is present
Matched image is :55.jpg
P. Mohan Krishna 16331A04C2 is present
>> |
```

Fig 3.5 Recognised index numbers and Student Names.

	1	2	3
1	student name	Reg.no	Att.Status
2	Pamu Vamsi	16331A04C1	
3	P.MohanKrishna	16331A04C2	present
4	S.Dileep	16331A04C3	present
5	P.Ravi Teja	16331A04C4	present
6	P.Niteesh	16331A04C5	present
7	S.Veerababu	16331A04C6	present
8	R.Sandeep	16331A04C7	present
9	T.Vamsi	16331A04C8	present
10	S.Achyut	16331A04C9	
11	S.Lakshmi Narayana	16331A04D0	present
12	R.Yaswanth	16331A04D1	
13	P.Sudheer	16331A04D2	
14	P.Nagesh	16331A04D3	
15	R.Vinay	16331A04D4	present
16	Anwar Hussain	16331A04D6	
17	T.Manohar	16331A04D7	
18	V.SaiVishal	16331A04D8	present
19	S.Jayanth	16331A04D9	
20			

Fig 3.6 Excel format attendance.

IV. ADVANTAGES AND APPLICATIONS

The advantages of the above proposed system is as shown

1) *Maintains Overall Records:* An automated face recognition attendance system maintains the overall presence record of the students in the institution. Leaves taken by the students, date of absent each data is stored in the system.

2) *Get Rid of Pen & Paper System:* The newest technology helps in replacing the older paper register method efficiently. It also saves money that the organization uses to spend on the paper.

3) *Easy Integration:* Integrated Biometric facial systems are also easy to program into any computer system. Usually they will work with existing software that one has in their place.

4) *Proxy Attendance is Eliminated:* Attendance is taken automatically by the camera placed in the classroom therefore there will be no chances of proxy attendances.

5) *Saves Time:* In traditional attendance marking system Lecturer calls each student's name with respect to their ids which is a very much time-consuming job this system restores the time consumed for calling attendance by automatically marking attendance.

6) *Less Mistakes:* here will be chances of making mistakes while manually marking attendances by lecturers, while taking attendance automatically there will not be any chances of mistakes since the system is computer based.

V. DRAWBACKS

We see the system have lot of advantages of the system. But as in most systems some drawbacks have been observed in the system.

A. Sensitive to Light If the ambient lighting in the training images and the images taken during the processing varies, there is a high possibility in face recognition incorrectly. Hence, we need to keep in mind the lighting conditions of the classroom during the process of collecting the database of the students.

B. The proposed system has an accuracy of 80% only, which can be increased by using machine learning process with some additional techniques.

C. As we give unique eigen value to each student the accuracy of system increases but complexity decreases.

D. While giving input of a stranger more possibility to show error as it tries to match the image vector with consisted data vectors.

VI. CONCLUSION

In this proposed system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record students' attendance. It saves time and effort, especially if it is a lecture with huge number of students. Automated Attendance System has been envisioned for the purpose of reducing the drawbacks in the traditional (manual) system. This attendance system demonstrates the use of image processing techniques in classroom. This system helps in globalisation of classroom methods. This system can also be implemented in secure places where we need to monitor illegal activists.

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