

Automated Attendance System Using Face Recognition

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Abstract: 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 in that face recognition is the best method, going to describe the attendance without human interference. 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 students absent is send to their parents. There are various methods for comparing the faces. The Eigen face is the one of the method .Eigen face is set of Eigen vectors which are used in computer vision problem of face recognition.

Keywords: Automatic attendance, Eigen matrices, faces detection and face recognition.

1.Introduction: Automated attendance system is the advancement that has taken place in the field of automation replacing traditional marking attendance system. Face detection and recognition is an essential field in many applications, one which is Attendance Management System. This system includes detection of human face through a high definition camera where detection of images is done using a well-known algorithm called Eigen matrices Algorithms. Feature Extraction is a method of capturing visual content of images for

indexing & retrieval. Primitive or low level image features can be either general features, such as extraction of color, texture and shape or domain specific features. An automated attendance system which is developed using web cam consists of Image capture, face detection, database development, pre-processing, feature extraction, post-processing stages.

2.Attendance System: The attendance system of the student can be maintained in two different forms namely,

- Manual Attendance System (MAS)
- Automated Attendance System (AAS)

2.1 Manual Attendance System(MAS):

Manual Student Attendance Management system is a process where a teacher concerned with the particular subject need to call the students name and mark the attendance manually. Manual attendance may be considered as a time-consuming process or sometimes it happens for the teacher to miss someone or students may answer multiple times on the absence of their friends.

2.2 Automated Attendance System (AAS):

Automated Attendance System (AAS) is a process to automatically estimate the presence or the absence of the student in the classroom by using Digital Image Processing. It is also possible to recognize whether the student is sleeping or awake during the lecture and it can also be implemented in the exam sessions to ensure the presence of the student.

3. System Implementation:

3.1 Video Acquisition: The video is record with Raspberry Camera module connected in class room such that the region of interest captures all the student faces. The camera is connected

to the controller board and will transmit the video via wireless connection using wifi dongle to the Mat lab for processing.

3.2 Image Acquisition: Image is acquired from a high definition camera that is connected above the white board.

3.3 Image Conversion: A frame will be selected from the video. The selected image will be in RGB format that will be converted into grey-scale image for further processing.

3.4 Face Detection: The faces will be detected by Viola-Jones Algorithm. The Mat lab provides an inbuilt system object from Computer Vision Toolbox *vision.Cascade Object Detector* for face detection application.

3.5 Pre-processing Image: The features will be extracted from the cropped detected faces after pre-processing of images. The pre-processing step will include the contrast improvement using function *imadjust*, background removal using *strel* function, and converting the grey-scale image into black and white image with removal of small objects from binary image with *bwareaopen* function

3.6 Features Extraction: The features will be extracted from the processed image.

Total six features will be extracted, three features nose, mouth and eyes each with two algorithms LBP and HOG and will be stored in the database for face recognition

3.7 Face Recognition: The features extracted from the image will be compared with the stored features in database with the help of SVM. If the system recognizes the features, corresponding name with the features stored will be marked will present attendance in the database of students detailed.



Figure1: Face Detection

4. System Description: The system consists of a camera that captures the images of the classroom and sends it to the image enhancement module. After enhancement the image comes in the Face Detection and Recognition modules and then the attendance is marked on the database server. This is shown in the experimental setup in Figure2. At the time of enrollment templates of face images of individual students are stored in the Face database. Here all the faces are detected from the input

image and the algorithm compares them one by one with the face database. If any face is recognized the attendance is marked on the server from where anyone can access and use it for different purposes. This system uses a protocol for attendance. A time table module is also attached with the system which automatically gets the subject, class, date and time. Teachers come in the class and just press a button to start the attendance process and the system automatically gets the attendance without even the intensions of students and teacher. In this way a lot of time is saved and this is highly secure process no one can mark the attendance of other. Attendance is maintained on the server so anyone can access it for it purposes like administration, parents and students themselves.

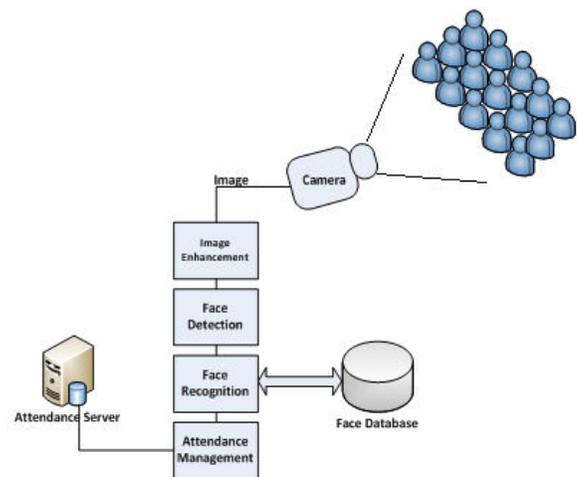


Figure 2: Experimental setup

5. Existing system: Attendances of every student are being maintained by our college and university. Empirical evidences have shown that

there is a significant correlation between student’s attendances and their academic performances. The manual attendance record system is not efficient and requires are time to arrange record and to calculate the average attendance of each student.

6. Proposed System: The face of the student needs to be captured in such a manner that all the feature of the students' face needs to be detected, even the seating and the posture of the student need to be recognized.

7. Modules:

- Login
- Admin
- Hod
- Faculty
- Students

8. Result & Discussion: The main working principle of the project is that, the video captured data is converted into image to detect and recognize it. Further the recognized image of the student is provided with attendance, else the system marks the database as absent.

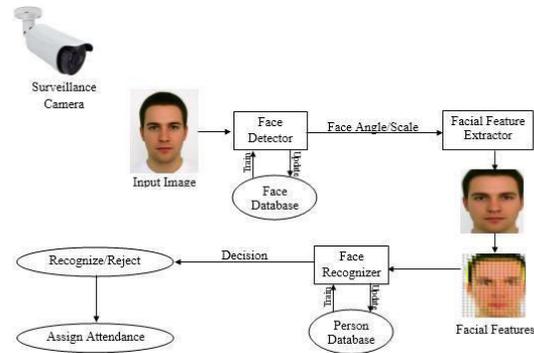


Figure 3: Result

9. EIGENVECTORS AND EIGENVALUES: “Eigen” is a German word meaning “proper” or “own”. An eigenvector of a matrix is a vector such that, if multiplied with the matrix, the result is always an integer multiple of that vector. This integer value is the corresponding eigenvalue of the eigenvector. This relationship can be described by the equation $M \times u = c \times u$, where u is an eigenvector of the matrix M and c is the corresponding eigenvalue. Eigenfaces are the set of eigenvectors which used in computer vision problem for human face recognition. They can be simply defined as the eigenvectors which represent one of the dimensions of face image space. All eigenvectors have an eigenvalue associated to it and the eigenvectors with the largest eigenvalues provide more information on the face variation than the ones with smaller eigenvalues.

10. Conclusion: Thus, the aim of this paper is to capture the video of the students, convert it into frames, relate it with the database to ensure their presence or absence, mark attendance to the particular student to maintain the record. The Automated Classroom Attendance System helps in increasing the accuracy and speed ultimately achieve the high-precision real-time attendance to meet the need for automatic classroom evaluation.

11. Future Enhancement : Automated Attendance System can be implemented in larger areas like in a seminar hall where it helps in sensing the presence of many people. Sometimes the poor lighting condition of the classroom may affect image quality which indirectly degrades system performance, this can be overcome in the latter stage by improving the quality of the video or by using some algorithms.

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