Automatic attendance system by using face recognition

Navesh Sallawar[1], Shubham yende[2], Vaibhav padgilwar[3], Vishal kale[4] , parag gorlewar[5] Gaurav Varma[6].

[123456]*B.E. Dept. Of Electronics and telecommunication, JCOET Yavatmal, Maharashtra, India.*

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Abstract - *Students attendance in the classroom is very important task and if taken manually wastes a lot of time. There are many automatic methods available for this purpose i.e. biometric attendance. All these methods also waste time because students have to make a queue to touch their thumb on the scanning device. This work describes the efficient algorithm that automatically marks the attendance without human intervention. This attendance is recorded by using a camera attached in front of classroom that is continuously capturing images of students, detect the faces in images and compare the detected faces with the database and mark the attendance. The paper review the related work in the field of attendance system then describes the system architecture, software algorithm and results.*

Key Words: Face recognition, local binary pattern, texture base face detection, Image processing, Illumination .

1. INTRODUCTION

In the recent years, Image processing which deals with extracting useful information from a digital image plays a unique role in the advent of technological advancements. It focuses on two tasks improvement of pictorial information for human interpretation processing of image data for storage, transmission and representation for autonomous machine perception. Also people have started to use image capturing devices never as before with the advent of smart phones and closed circuit television. Since the application of image processing is vast, extensive work and research have been carrying out in utilizing its potential to and to make new innovative applications. Facial recognition has been the earliest of the application derived from this technology, which is one of the most fool proof methods in human detection. Face is a typical multidimensional structure and needs good computational analysis for recognition. Biometrics methods have been used for the same purpose since a long time now. Although it is effective, it is still not completely reliable for purpose of detecting a person. Attendances of every student are being maintained by every school, college and university. Empirical evidences have shown that there is a significant correlation between students' attendances and their academic performances. There was also a claim stated that the students who have poor attendance records will generally link to poor retention. Therefore, faculty has to maintain proper record for the attendance. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requirement of a system that will solve the problem of student record arrangement and student average attendance calculation. One alternative to make student attendance system automatic is provided by facial recognition.

2. SYSTEM DISCRIPTION

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 enrolment 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. Camera takes the images continuously to detect and recognize all the students in the classroom. In order to avoid the false detection we are using the skin classification technique [19]. Using this technique enhance the efficiency and accuracy of the detection process. In this process first the skin is classified and then only skin pixels remains and all other pixels in the image are set to black, this greatly enhance the accuracy of face detection process .Two databases are displayed in the experimental setup Figure 2. Face Database is the collection of face images and extracted features at the time of enrollment and the second attendance database contains the information about the teachers and students and also use to mark attendance
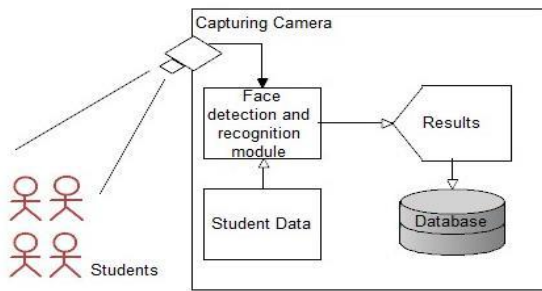
Fig -1: Experimental set up

2.1 Technical Requirement

2.1.1 Hardware Requirements
- .A standalone computer needs to be installed in the office room where the system is to be deployed.
- Camera must be positioned in the office room to obtain the snapshots. Optimum
- Resolution: 512 by 512 pixels.
- Secondary memory to store all the images and database

2.1.2 Software requirements
- MATLAB Version 8.5.0(R2015a) or higher
- Windows XP(Service Pack 2) or higher

3. SYSTEM ALGORITHM
This section describes the software algorithm for the system.
The algorithm consists of the following steps
- Image acquisition
- Histogram normalization
- Noise removal
- Skin classification
- Face detection
- Face recognition
- Attendance

In the first step image is captured from the camera. There are illumination effects in the captured image because of different lighting conditions and some noise which is to be removed before going to the next steps. Histogram normalization is used for contrast enhancement in the spatial domain. Median filter is used for removal of noise in the
image. There are other techniques like FFT and low pass filter for noise removal and smoothing of the images but median filter gives good results.

3.1 Image Acquisition
Image is acquire from the camera that is connect above the board. A camera capture image after every two minutes

and send this image to the computer for processing as shown in fig 2

Fig -2: input image

3.2 Histogram Normalization
Color image is converted to grace scale image for increasing contrast. As shown in fig 3

Fig -2: Histogram Normalization

3.3 Noise Filtering
in this system use the median filter for the removal of noise and other filter like FFT ,low pass filter this also remove the noise in the input image

3.4 Skin Classification
it is use for the increasing the efficiency of the face detection algorithm its related with binary image use the thresholding of skin colors

3.5 Face Detection
In this stage faces are detected by marking the rectangle on the faces of the student as shown in fig 4.
After the detection of faces from the next step is cropping of each detected face.
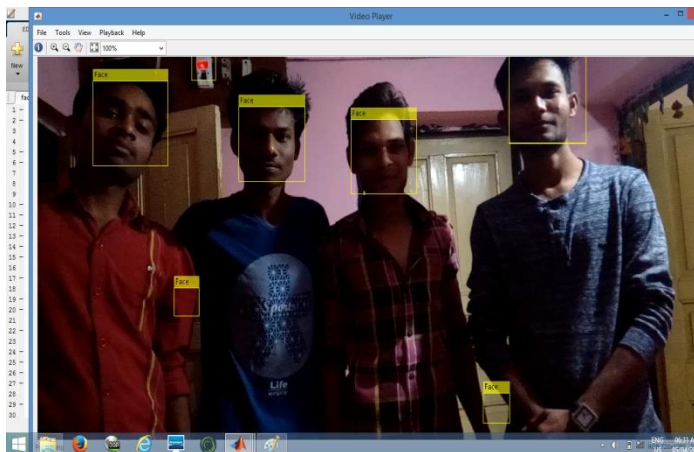
Fig -4: Face Detection

Initially face detection algorithm tested on variety of images algorithm was applied to detect face in real time video is shown in fig 5.
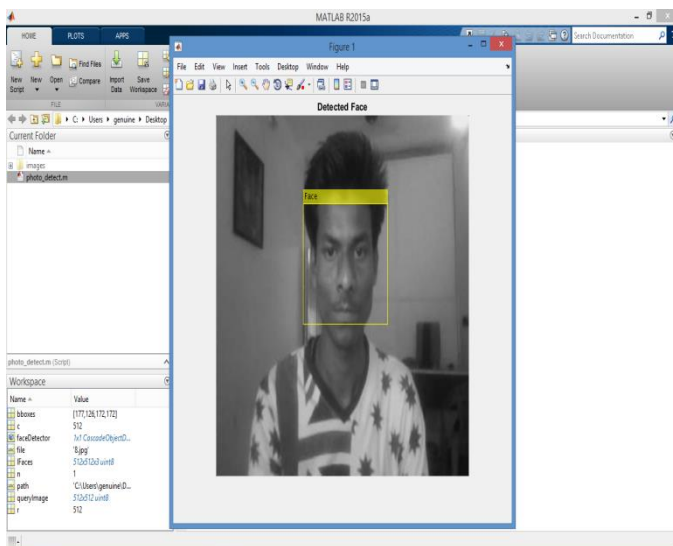

Fig -5: Real time face detection

The algorithm use the technique of increasing the speed of algorithm each crop image is assign to a separate thread for the recognition purposes as shown in fig 6.
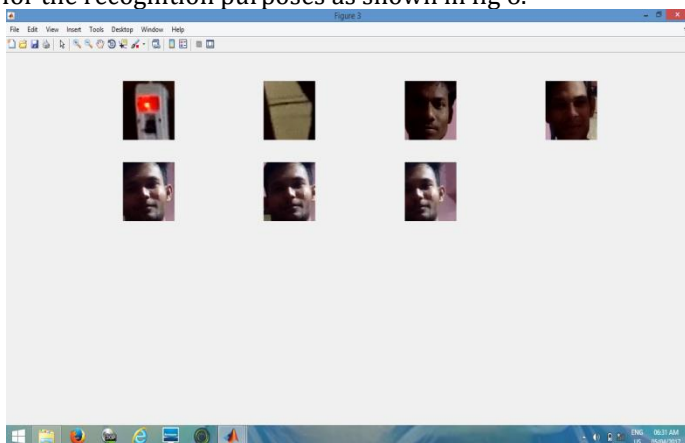

Fig -6: cropped faces

3.5 Face and recognition and attendance

After the face detection next step is face recognition this can be done by cropping the detected face and compare with the database. In this way face of   student. Verified one by one and attendance is marked on the computer screen as shown in fig 7
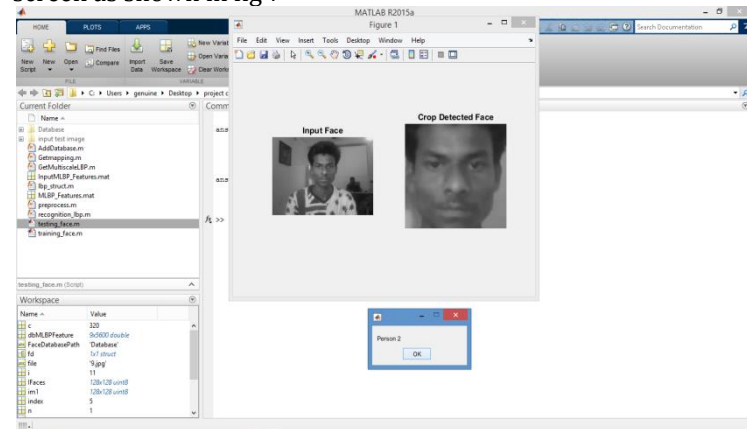

Fig -7: face recognition and attendance
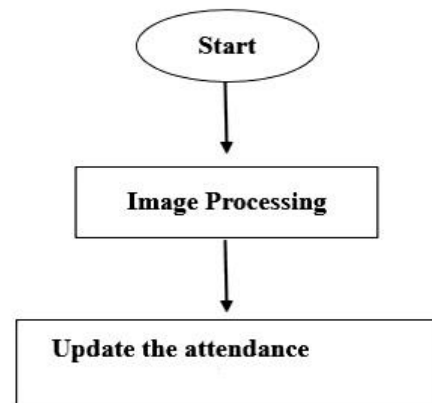
4. SYSTEM FLOW CHART

Fig -8: System flowchart

5. ADVANTAGES

* It saves there time and efforts.
* The software stores the faces that are detected and automatically marks attendance.
* The system is convenient and secure for the user.
* The software can be used for security purposes in organization and secured zones.

6. DISADVATNATGES

* It can only detect face from a limited distance
* The system don't recognized properly in poor light so may give false results.

7. CONCLUSION

In this system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant an record student's attendance. It saves time and effort, especially if it is a lecture with huge number of students. The complete system is implemented in MATLAB. This attendance system shows the use of facial recognition techniques for the purpose of student attendance and for the further process this record of student can be used in exam related issues.

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