Indo-Iranian Journal of Scientific Research (IIJSR)
Peer-Reviewed Quarterly International Journal, Volume 2, Issue 2, Pages 105-113, April-June 2018

Attendance Monitoring Using Face Recognition with Message Alert

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Article Received: 30 December 2017 *Article Accepted: 29 March 2018* *Article Published: 31 May 2018*

ABSTRACT

Face recognition technology is the least intrusive and fastest bio-metric technology invented so for. The accurate recognition of a person is the sole aim of a face recognition system and this identification may be used for further processing. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. Here, the camera detects and recognizes the persons while them entering the door and then sends their personal information to the host to generate a 3D Facial Model. The proposed system will update the attendance once the students face is match with the template database. This paper describes the working of the face recognition system that will be deployed as an Automated Attendance System in a classroom environment.

Keywords: Image Processing, Face Recognition, Biometrics, Face detection, Student Attendance System, Database.

1. INTRODUCTION

Maintaining the attendance is very important in all the institutes for checking the presence of students. Every institute has its own method in this regard. The conventional way of checking on attendance in classroom is calling or making a sign, which is laborious and troublesome and waste a lot of time. So in our proposed classroom attendance system, we use face recognition technique to check on attendance. This paper covers the topics on face detection, face recognition and our new system, the details of processing of classroom image including detection, morphological filter, segmentation, extracting features, classification, experiment. A group image of the class will be captured and detected faces are segmented from the captured image. The segmented faces are then compared with a predefined database of all the students of the class. A message will be sent to absentees through SMS using a GSM module.

2. SYSTEM DESCRIPTION (METHODOLOGY)

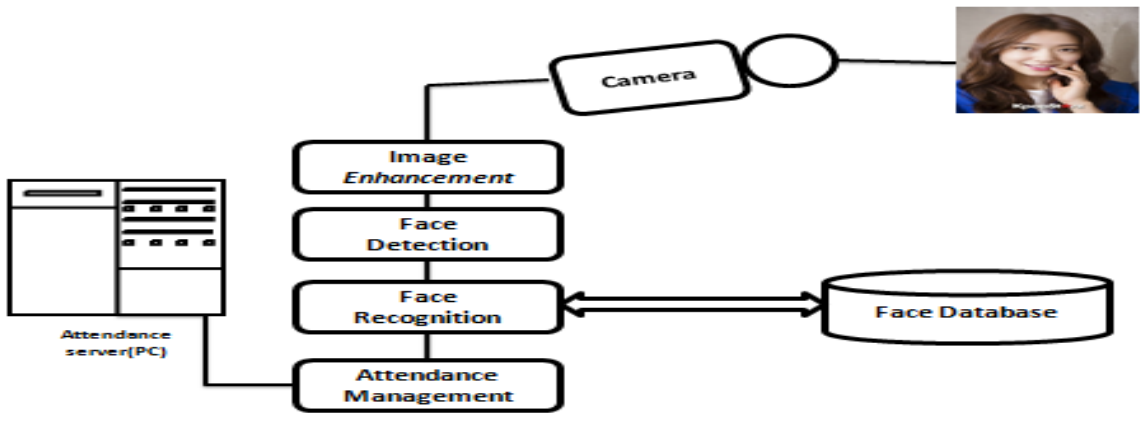

Fig 1: Experimental setup

 ISSN: 2581-4362

The system consists of a camera that captures the images of the students 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 Fig.1 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. In this way a lot of time is saved and this is highly securing process no one can mark the attendance of others.

3. SOFTWARE SETUP

The name MATLAB is expanded as Matrix Laboratory. MATLAB is a high performance language for technical computing. It integrates computation, visualization, and programming environment. It has sophisticated data structures, contains built-in editing and debugging tools, and supports object oriented programming. These factors make MATLAB an excellent tool for teaching and research .There are tool boxes in MATLAB for signal processing, image processing, symbolic computation, control theory, simulation, optimization, and several other applied sciences. The software part of this system is implemented using MATLAB version R2013a.

3.1. STEP OF VIOLA-JONES DETECTOR

1. Calculating the integral image- summed area table necessary for quick calculation.
2. Haar-like Features- simple rectangular features that achieve just above random.

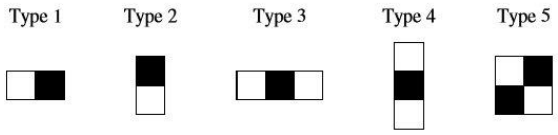

Fig 2: Different features

3. AdaBoost learning algorithm- creates a small set of only the best features to create more efficient classifiers.

4. PROPOSED SYSTEM

Face recognition biometrics is the science of programming a computer to recognize a human face. When a person is enrolled in a face recognition system, a video camera takes a series of snapshots of the face and then represents it by a unique holistic code. When someone has their face verified by the computer, it captures their current appearance and compares it with the facial codes already stored in the system. The faces match, the person receives authorization; otherwise, the person will not be identified. The existing face recognition system identifies only static face images that almost exactly match with one of the images stored in the database.

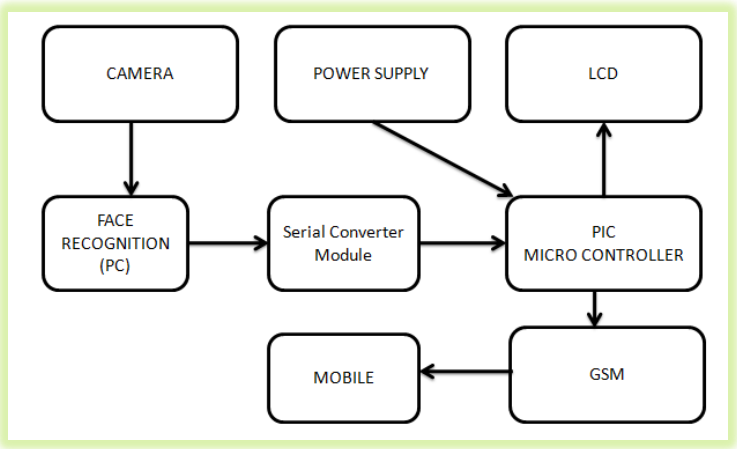

Fig 3: Block Diagram of Attendance Monitoring

Fig 4: Image capturing

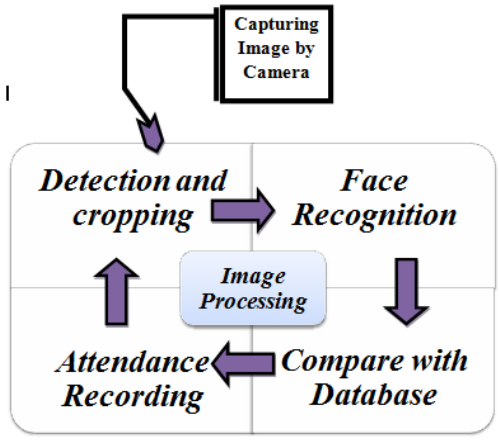

Fig 5: Image processing

Fig 6: Detecting the face

ISSN: 2581-4362

Face Segmentation

The main objective here is to eliminate the foreign objects other than faces, which are detected. The detected faces are segmented from the image and are pre-processed and stored for recognition. The segmented image will be converted to gray scale for efficient recognition.

Face Recognition

The face recognition is the most important part of this system. It is an automatic method of identifying or verifying a person from a digital image or a video frame. It is done by comparing the extracted features from the captured image with the images that are previously stored in the predefined database. The recognition process is implemented using PCA algorithm.

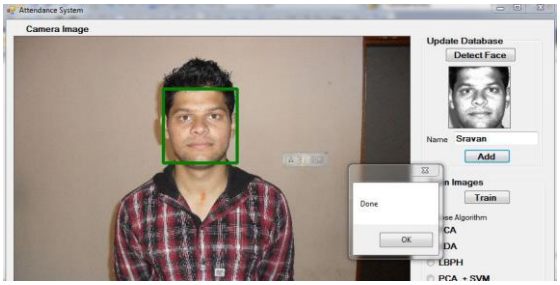

Fig 7: Extraction and Updating Database

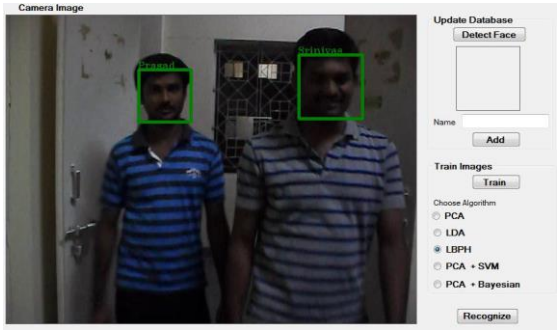

Fig 8: Recognizing the faces

Identification of absentees and sending a SMS

The absentees are those who are present in the data base but not in the captured image. An automatic SMS notification will be sent to the mobile numbers of the absentees.

5. HARDWARE SETUP

Camera

The camera used here is a PC web camera that captures the images of students for both database creation and test images.

Display Unit

The LCD is used as a display unit in the system to display the results. A 16x2 display and 4 data pins are being used. The operating voltage of LCD is 5V.

Fig 9: Display unit

Fig 10: GSM Module

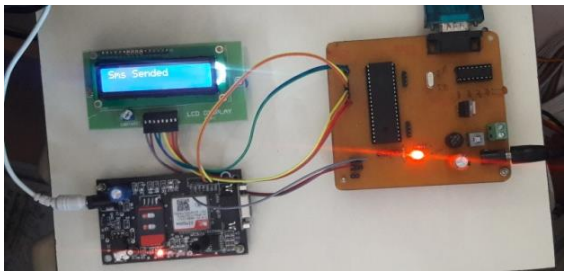

Fig 11: Attendance system using GSM

Fig 12: PIC Microcontroller

PIC16F877A MICRO CONTROLLER

There are a wide variety of microcontrollers available to implement various tasks, among them the 8051 and PIC are the mostly used. The 8051 is probably the most popular 8 bit microcontrollers ever. Many different I/O features

are integrated around the 8051 core to create a microcontroller which needs only very little extra hardware to do most of the jobs. The main disadvantage of the standard 8051 core is that there's only one 16 bit pointer register available. Moving a block of data is a very tedious job which takes far too much data moving overhead. It also does not have an internal Analog to Digital Converter (ADC).

6. RESULT AND ANALYSIS

The developed programme was checked with our own model and it involves the following steps.

1. Creating the database by incorporating the individual student's details (Name and ID) and their images in the work station for recognition
2. The faces are detected by the Viola-Jones algorithm. Real time capture images are compare with the database and recognize the faces.
3. By capturing and comparing the faces the program recognises the absentees face and mark the attendance in the excel sheet.

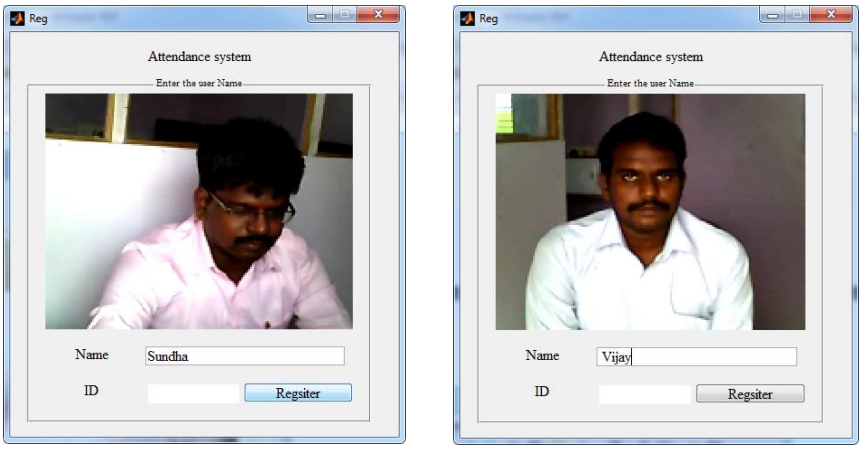

Fig 13: Process involved in STEP-I

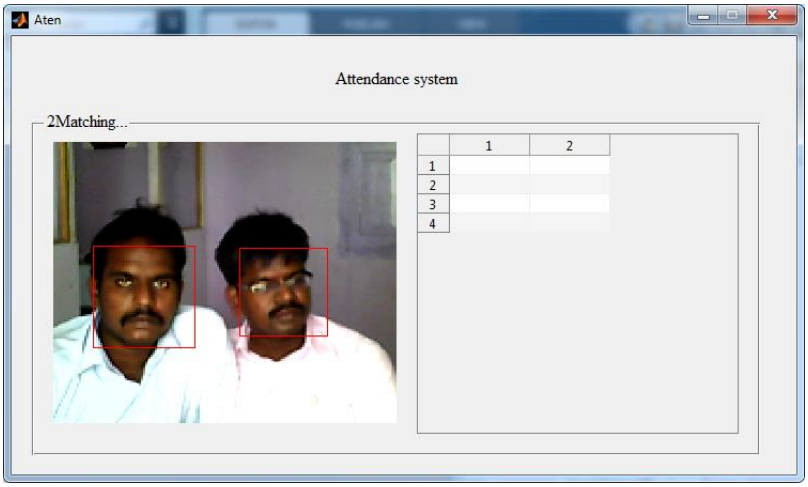

Fig 14: Process involved in STEP-II

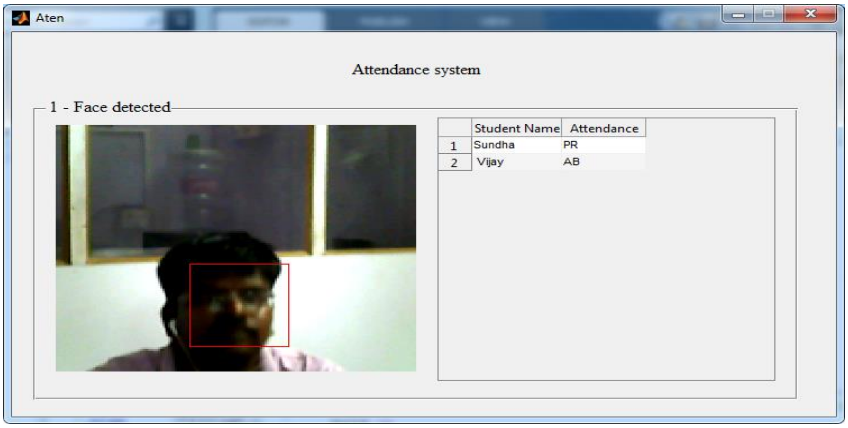

Fig 15: Process involved in STEP-III

7. CONCLUSION

In this paper, we have engineered an automated attendance system for lecturers to record student's attendance during lecturing and laboratory sections using face detecting concept. Automated attendance system based on image processing techniques has been envisioned for the purpose of reducing the drawbacks in the traditional (manual) systems. Here, the camera detects and recognizes the student who ever enter the door and sends their personal information to the host to generate 3D Facial Model, the proposed system will update the attendance once the students face is match with the template database. In addition to this the system is programmed in such a way that it will send the absentees information to the corresponding student house through message. This system can improve the goodwill of any institution.

ACKNOWLEDGEMENT

This work was supported in part by Department of Science & Technology (DST), FIST Program at Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India.

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