

Class Room Attendance System Using Facial Recognition System

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Abstract – The face is the identity of a person. The methods to exploit this physical feature have seen a great change since the advent of image processing techniques. The accurate recognition of a person is the sole aim of a face recognition system and this identification maybe used for further processing. Traditional face recognition systems employ methods to identify a face from the given input but the results are not usually accurate and precise as desired. The system described in this paper aims to deviate from such traditional systems and introduce a new approach to identify a student using a face recognition system i.e. the generation of a 3D Facial Model. 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; Pattern Recognition; Identification.

I. INTRODUCTION

With the rapid development in the field of pattern recognition and its uses in different areas e.g. signature recognition, facial recognition, arises the importance of the utilization of this technology in different areas in large organizations. This is mainly because these applications help the top-management take decisions that improve the performance and effectiveness of the organization. On the other hand, for an organization to be effective, it needs accurate and fast means of recording the performance of the people inside this organization.

Biometric recognition has the potential to become an irreplaceable part of many identification systems used for evaluating the performance of those people working within the organization. Although biometric technologies are being applied in many fields it has not yet delivered its promise of guaranteeing automatic human recognition.

Face recognition is a technique of biometric recognition. It is considered to be one of the most successful applications of image analysis and processing; that is the main reason behind the great attention it has been given in the past several years.

This attention is clearly evident in the emergence of many research conferences targeting the field of facial recognition, such as: International Conference on Audio and Video-Based Person Authentication (AVBPA) and the International Conference on Automatic Face and Gesture Recognition (AFGR).

The facial recognition process is similar to the general biometric recognition process, in the face-base biometric systems detection; alignment, feature extraction, and matching take place.

The facial recognition process can be divided into two main stages: processing before detection where face detection and alignment take place (localization and normalization), and afterwards recognition occur through feature extraction and matching steps.

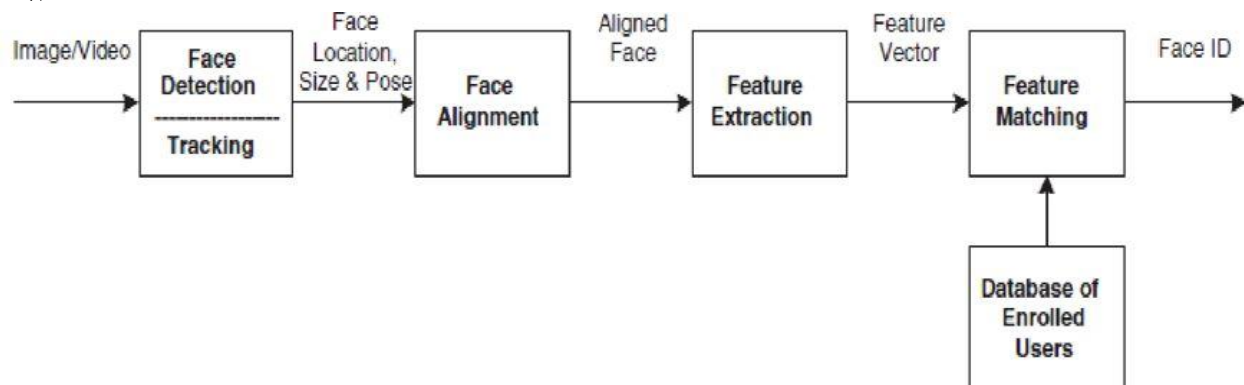


Fig 1: Face recognition processing flow

A. Face Detection

This process separates the facial area from the rest of the background image. In the case of video streams, faces can be tracked using a face tracking component.

B. Face Alignment

This process focus on finding the best localization and normalization of the face; where the detection step roughly estimates the position of the face, this step outlines the facial components, such as face outline, eyes, nose, ears and mouth. Afterwards normalization with respect to geometrical transforms such as size and pose, in addition to photometrical properties such as illumination and grey scale take place.

C. Feature Extraction

After the previous two steps, feature extraction is performed resulting in effective information that is useful for distinguishing between faces of different persons and stable with respect to the geometrical and photometrical variations.

D. Face Matching

The extracted features are compared to those stored in the database, and decisions are made according to the sufficient confidence in the match score.

Automatic face recognition techniques have been utilized in many applications over the past years.

- Human-Computer Interaction: Video Gaming, virtual reality training programs, proactive computing.
- Smart Cards and Face ID: user authentication- stored value security, drivers' license, national ID, passports, voters' registration.
- Security : TV Parental control, Device logon, application security, database security, file encryption, secure trading terminals, medical records, internet and intranet security, terrorist alert.
- Law and video surveillance: Crime stopping and suspect alert, suspect tracking and investigation, suspect background check, post event analysis, shoplifter recognition.
- Others: time attendance and monitoring.

Face identification applications are becoming more and more used, and it is expected to keep growing and become widely used in both small and large scale applications.

This research is to attempt to provide an automated attendance system that recognizes students using face recognition technology through an image/video stream to record their attendance in lectures or sections and evaluating their performance accordingly. The objective behind this research is to thoroughly study the field of pattern recognition (more specifically facial recognition) which is very important and is used in various applications like identification and detection.

II. PROBLEM DEFINITION

Every time a lecture, section or laboratory starts the lecturer or teaching Assistant delays the lecture to record students' attendance. This is a lengthy process and takes lot of time and effort, especially if it is a lecture with huge number of students. It also causes a lot of disturbance and interruption when an exam is held. Moreover the attendance sheet is subjected to damage and loss while being passed on between different students of teaching staff.

And when the number of students enrolled in a certain course is huge, the lecturers tend to call a couple of students name at random which is not fair student evaluation process either. Finally, these attendance records are used by the staff to monitor the student's attendance rates. This process could be easy and effective with a small number of students but on the other hand dealing with the records of a large number of students often leads to human error.

III. PROPOSED SYSTEM

We proposes solutions to all the above mentioned problems by providing an automated attendance system for all the students that attend a certain lecture, section, laboratory or exam at its specific time, thus saving time, effort and reducing distractions and disturbance. Another advantage concerning exams, is when the lecturer or the advisor accidentally losses an exam paper or the student lies about attending the exam, there will be a record of the students' attendance for the exam at that time, thus protecting both lecturer's and students' rights. In addition, an automated performance evaluation would provide more accurate and reliable results avoiding human error.

The main objective of the system is to provide an automated attendance system that is practical, reliable and eliminates disturbance and time loss in traditional attendance systems. A further objective is to present a system that can accurately evaluate students' performances depending on their recorded attendance rate.

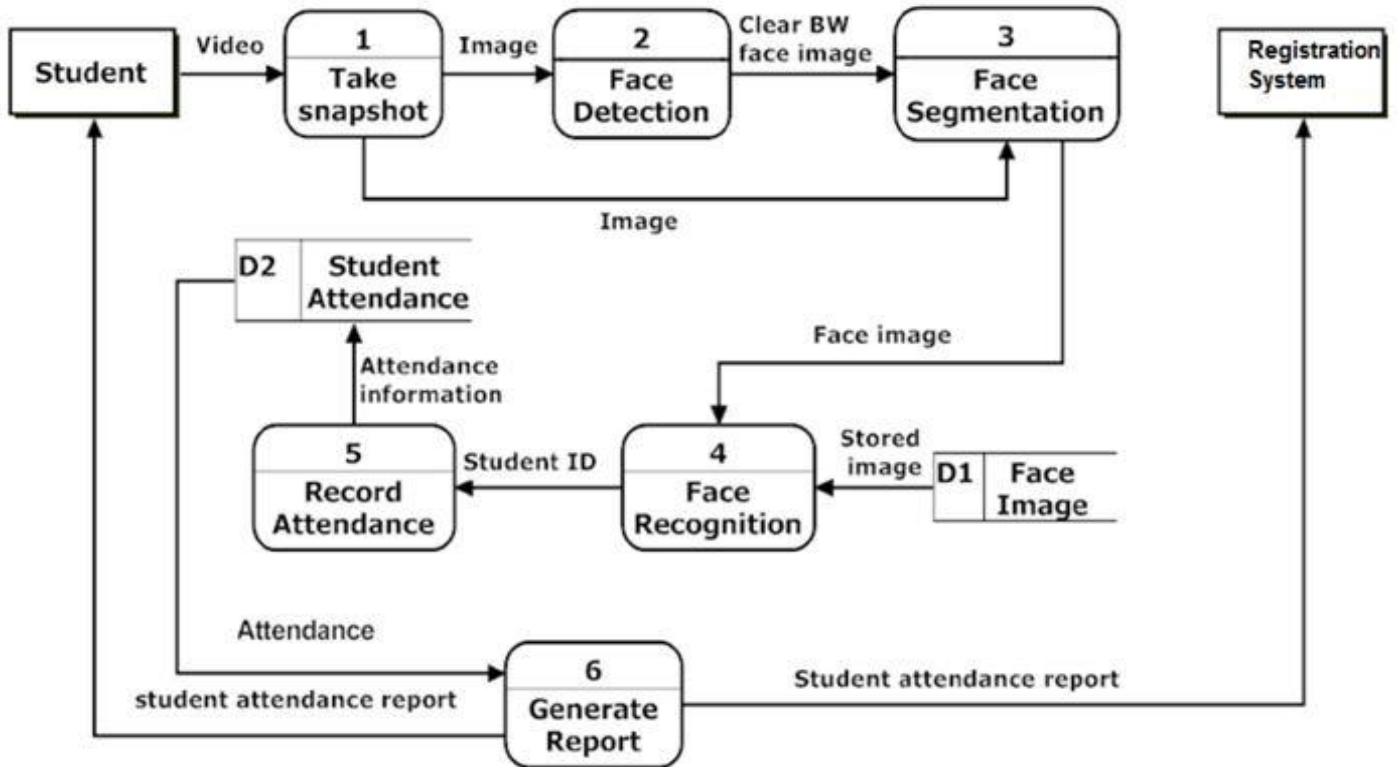


Fig 2: Steps for Automated Facial Recognition Attendance System

IV. SYSTEM REQUIREMENTS

Analyzing user requirements and needs is a vital task in any system development process. End users must be the main concern of the system designer in order to produce a valid, useful and user-satisfying system. This section examines and analyzes the requirements and needs of the possible different system end users.

A. Student requirements

The student needs to keep track of his attendance. This would require him to login using his ID and password to the system. The system will accept him if his ID and password are the same as the ones saved in the database and a page will appear according to the student's privileges which are viewing his progress, course and result.

B. Teaching Staff Requirement

The teaching staff needs an efficient and reliable automated system for recording the student's attendance during lectures, sections, labs and exams. This system should be able to calculate and process the performance of students according to their attendance rates.

The teaching staff needs to keep track of their courses and the students' attendance in these courses. This would require them to insert their ID and password to the system then the system will accept them if the ID and password entered are the same as the ones saved in the database and a page will appear according to their privileges which are viewing their student's progress, course and attendance reports.

If the information entered does not match the ones in the database an error page will appear and they will be asked to enter the ID and password again.

On the event of forgetting the password the system will display a message asking them to go to the administration department to acquire a new password or receive it on his personal email.

C. Administrator requirements

The administrator should be able to enter the all the users' (students, lecturer and teaching assistants) information and creates IDs and passwords for them to access the system. Assigns lecturers and teaching assistance to the courses when adding new lecturers to the system.

Responsible to provide a new password on the event of the users forgetting their login details. Adding new courses every semester for the students to register to.

V. IMPLEMENTATION

We have taken different techniques like color based detection and Principle Component Analysis (PCA) for face detection and for feature extraction, PCA and Linear Discriminate Analysis (LDA). For detection, Color based technique was implemented, which depends on the detection of the human skin color with all its different variations in the image. The skin area of the image is then segmented and passed to the recognition process. For recognition, PCA technique has been implemented which is a statistical approach that deals with pure mathematical matrixes not image processing like the color based technique used for detection. PCA can also be used for detection.

VI. 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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