Attendance Management System using real time face recognition

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Abstract - *This paper introduces a new method in attendance management systems using computer vision algorithms. We propose the system using real time face detection algorithms using dlib library and cognitive face , which automatically detects and takes students attending on a lecture. The system represents a tool for instructors, combining algorithms used in machine learning with adaptive methods used to track facial expressions during a longer period of time. This new system aims to more efficient than traditional methods, at the same time being nonintrusive and not interfere with the regular teaching process. This approach promises to offer accurate results and a more detailed attendance reporting system which shows student activity and attendance in a classroom.*

Key Words: Face Recognition, Face detection, machine learning, Image processing

1.INTRODUCTION

A key factor of increasing the quality of education is having more number of students attend classes regularly. Students are stimulated to attend classes using attendance points which at the end of a semester constitute a part of a students final grade. However, this presents additional work on teachers, who must ensure to correctly mark attending students, which also wastes a considerable amount of time from the teaching process. The task would get further complicated if one has to deal with large groups of students. This paper introduces a new attendance management system, without any collision with the regular teaching process. The system can be used also during exam sessions or other teaching activities where attendance is obligatory. This system eliminates classical student identification such as calling student names, or checking respective identification cards, which can interfere with the teaching process.

In this paper we aim to build an Attendance management system with the help of facial recognition owing tothe difficulty in the manual way of taking attendance. The overall objective is to develop an automated class attendance management system comprising of a desktop application working in conjunction with a mobile application to perform the following tasks:

• To detect faces real time.

• To recognize the detected faces by the use of a suitable algorithm.

• To update the class attendance register after a successful match.

• To design an architecture that constitutes the various components working harmoniously.

2.RELATED WORKS

Large portion of modern learning management systems, implement differnet type of attendance management. Moodle automates the process by using RFID or barcode scanners. Classrooms are equiped with a barcode / RFID scanner which scans and enrolls students that enter the classroom. Other LMS systems such as Angel require students to login in to a web page with a special one time temporary key so as to mark their presence on class. The problem with these approaches is that they collide with the conventional teaching process. There are few commercial solutions available to companies, that implement face recognition in work environments. Kawaguchi proposes face recognition in attendance management systems. This system aims to observe the position of every student and capture an image for modern learning management systems, implement some type of attendance management. Moodle automates the process by using RFID or barcode scanners. Classrooms are equiped with a barcode / RFID scanner which scans and enrolls students that enter the classroom. Other LMS systems such as Angel require students to login in to a web page with a special one time temporary key so as to mark their presence on class. The problem with these approaches is that they interfere with the regular teaching process. Using face recognition in time attendance management systems in not new. There are few commercial solutions available to companies, that implement face recognition in work environments. Kawaguchi proposes face recognition in attendance management systems. This system aims to observe the position of every student and capture an image for that particular student, which identifies a student later. Related systems that use life science (fingerprint recognition, iris recognition etc) to identify users square measure time management systems used in several establishments. However, putting in these systems in each schoolroom in a very university would pose an even bigger monetary burden. it'd additionally require from the university to record biometric information from all students, which might

introduce additional privacy issues. These systems also are subject to physical injury from their users. so they have further maintenance prices. the thought projected by America, removes physical access from anyone to the system.

A Survey by Muhammad Sharif1 , Farah Naz1 , Mussarat Yasmin1 , Muhammad Alyas Shahid says that they deduced Face recognition has gained a significant position among most commonly used applications of image processing furthermore availability of viable technologies in this field have contributed a great deal to it. In spite of rapid progress in this field it still has to overcome various challenges like Aging, Partial Occlusion, and Facial Expressions etc affecting the performance of the system, are covered in first part of the survey. This part also highlights the most commonly used databases, available as a standard for face recognition tests. AT & T, AR Database, FERET, ORL and Yale Database have been outlined here. While in the second part of this survey a detailed overview of some important existing methods which are used to dealing the issues of face recognition have been presented.

3.GENERAL IDEA

This projected system introduces a replacement automatic group attendance action marking sysem, which integrates pc vision and face recognition algorithms into the method of group action attendance management. The system is enforced employing a non intrusive camera put in on a classroom, that scans the space, detects and extracts all faces from the no heritable pictures. After faces are extracted, they're compared with associate existing information of student pictures and upon no-hit recognition a student group action list is generated and saved on the database. This paper addresses issues like real time face detection on environments with multiple objects, face recognition algorithms furthermore as social and pedagogical problems with the applied techniques.
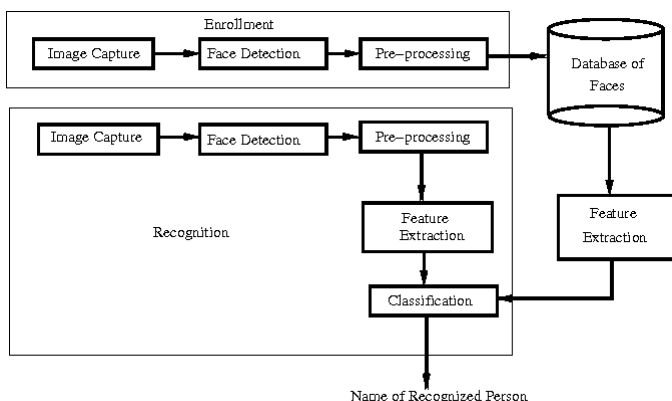
4.SYSTEM ARCHITECTURE

Fig-1: System Architecture

The system architecture consists of three modules

- Capturing the image
- Image pre-processing(Feature extraction)
- Face detection
- Face recognition

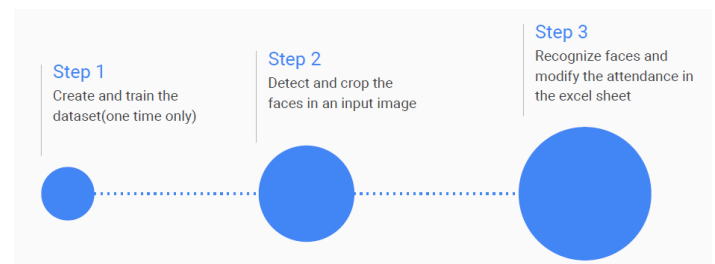The entire process is described in the flowchart shown in figure 2

Fig-2: System Architecture flowchart

The system architecture is as shown in Figure 1. The proposed automated attendance management system is based on face recognition algorithm. A image is captured at random time covering the entire classroom and then fed to the system. Face region is then extracted and pre-processed for further processing.. Face Recognition proves to be advantageous than other systems. When the student's face is recognized it is fed to post-processing. The System algorithm is discussed. The stages in the proposed Automated Attendance Management System are as shown in the Figure 1

4.1 IMAGE CAPTURE

The camera takes pictures of the entire classroom at the given intervals. The process would continue until all faces are detected successfully or unless told to stop by admin. The captured image is then sent to server using web services for processing.

4.2 FACE DETECTION

Face detection algorithms are processor intensive, so the server based tool is used. Face detection is a part of object detection but here the subject of interest are faces. Many factors affect the efficiency of face detection algorithms. Factors like pose, position, light , rotation.

The face detection process from still images can be divided into several steps. There are several face detection algorithms that can detect multiple faces. Most students face towards front of the classroom, so the system presented uses dlib library for face detection.

The classifier works by coaching a model exploitation positive face pictures and negative face pictures. A positive image is a picture that contains the required object to be

detected, in our case this object could be a face. A negative image is a picture that doesn't contain the required object. when the model is trained, it's able to establish face options, that is later hold on on a XML file. A problem long-faced throughout this method was the massive variety of false-positives: objects erroneously detected as faces. This wasn't such an enormous issue for United States, since a false-positive doesn't end in a identification throughout the popularity section. thanks to this, we have a tendency to down the detection threshold, therefore all faces may well be detected. After a face has been detected, the parallelogram intromission this face is cropped and processed later by the face recognition module. This parallelogram represents one face, and when being cropped as a picture is transferred on server. every file transferred is renamed to possess a singular ID. The face detector in action is shown in Figure 3 , faces identified are enclosed in green rectangular boxes .
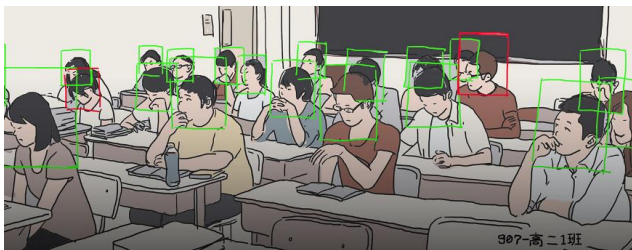

Fig-3: Typical image of a classroom

4.3 FACE RECOGNITION

Face recognition means identifying a face from a group of faces in database. Our college, during course registration captures images and stores them in a database.

Since our system is setup to capture solely frontal pictures the cause of the face in not a difficulty. once a face is captured throughout the face detection part, it's reborn into grey scale. an equivalent conversion is applied to faces on our student image information. we tend to conjointly do background subtraction on our pictures thus alternative objects don't interfere throughout the method. Another issue is that faces ar subject of modification throughout time (facial hair, eyeglasses etc). Whenever we tend to with success determine a face, a duplicate of that face is keep within the information of faces for that student. at the side of the image we tend to store the time and date once this image was taken. This way though a student step by step changes his look (e.g., grows a beard) the system continues to be capable to spot him, since it's multiple pictures of an equivalent person. On every resultant scan for a student, the popularity module starts examination pictures from this information, sorted by date in degressive order. This approach was chosen since the newest image of a student on our information is possibly to be additional almost like this captured image. Of course, a forceful modification on a student's look causes the system to not determine that

individual student. to resolve this issue, we've got enclosed a module, that lists all unidentified faces and also the teacher is in a position to manually connect a captured face with a student from the list. This image is additionally keep on our information, as associate updated image of this explicit student. This manual recognition method is performed just the once. in a very sequent scan, this student is known mechanically by our system. To speed up the face recognition method we tend to solely compare pictures captured in a very room, with the information of scholars listed for that course solely. This ensures that we tend to method solely low set of pictures offered on our server.

5. CONCLUSIONS

It can be concluded that a reliable, secure, fast and an efficient class attendance management system will be developed replacing a manual and unreliable system. This face detection and recognition system will save time, reduce the amount of work done by the administration and replace the stationery material currently in use with already existent electronic equipment.

There is no need for specialized hardware for installing the system as it only uses a computer and a camera. The camera plays a crucial role in the working of the system hence the image quality and performance of the camera in real time scenario must be tested especially if the system is operated from a live camera feed.

The system can also be used in permission based systems and secure access authentication (restricted facilities) for access management, home video surveillance systems for personal security or law enforcement.

ACKNOWLEDGEMENT

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