

IMPLEMENTATION OF CLASSROOM ATTENDANCE SYSTEM BASED ON FACE RECOGNITION IN CLASS

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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 attendance is taken in every schools, colleges and library. Traditional approach for attendance is professor calls student name & record attendance. It takes some time to record attendance. Suppose duration of class of one subject is about 50 minutes & to record attendance takes 5 to 10 minutes. For each lecture this is wastage of time. To avoid these losses, we are about use automatic process which is based on image processing. In this novel approach, we are using face detection & face recognition system. This face detection differentiates faces from non-faces and is therefore essential for *accurate attendance*. *The other strategy involves face recognition for marking the student's attendance*. The Raspberry pi module is used for face detection & recognition. The camera will be connected to the Raspberry pi module. The student database is collected. The database includes name of the students, their images & roll number. This raspberry pi module will be installed at the front side of class in such a way that we can capture entire class. Thus with the help of this system, time will be saved. With the help of this system, it is so convenient to record attendance. We can take attendance on any time.

KEYWORDS: Viola Jones algorithm, PCA, LDA, Image processing, Raspberry pi

I. INTRODUCTION

Organizations of all sizes use attendance systems to record when student or employees start and stop work, and the department where the work is performed. Some organizations also keep detailed records of attendance issues such as who calls in sick and who comes in late. An attendance system provides many benefits to organizations. There was a time when the attendance of the students and employees was marked on registers.

However, those who have been a part of the classes when attendance registers were used know how easy it was to abuse such a method of attendance and mark bogus attendances for each other. Of course, technology had to play its role in this field just as well as it has done in other fields. The attendance monitoring system was created and it changed the way attendances were marked. The attendance monitoring system has made the lives of teachers and employers easier by making attendance marking procedure a piece of cake.

When it comes to schools and universities, the attendance monitoring system is a great help for parents and teachers both. Parents are never uninformed of the dependability of their children in the class if the university is using an attendance monitoring system. The registers could easily be exploited by students and if information was mailed to the parents, there were high chances that mails could be made to disappear before parents even saw them. With the monitoring system in place, the information can easily be printed or a soft copy can be sent directly to parents in their personal email accounts.

The system started with two basic processes - Manual processes and Automatic processes. Manual processes are eliminated as the staff needed to maintain them. It is often difficult to comply with regulation, but an automated attendance system is valuable for ensuring compliance with regulations regarding proof of attendance.

II. HISTORY

Naveed Khan Balcoh proposes that 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. ErikHjelmas face detection is a necessary first-step in face recognition systems, with the purpose of localizing and extracting the face region from the background. It also has several applications in areas such as content-based image retrieval, video coding, video conferencing, crowd surveillance, and intelligent human-computer interfaces. However, it was not until recently that the face detection problem received considerable attention among researchers. The human face is a dynamic object and has a high degree of variability in its appearance, which makes face detection a difficult problem in computer vision. A wide variety of techniques have been proposed, ranging from simple edge-based algorithms to composite high-level approaches utilizing advanced pattern recognition methods.

III. METHODOLOGY

For this system we are using a two-step mechanism. First comes to be face detection then followed by face recognition. For face detection we are using Viola Jones face detection algorithm while for face recognition we are using hybrid algorithm from PCA and LDA.

1) Viola-Jones algorithm

There are three major blocks in Viola-Jones algorithm; Integral Images, Ada-Boost Algorithm and Attentional cascade. The integral image computes a value at each pixel for example (x,y) that is the sum of the pixel values above to the left of (x,y) . This is quickly computed in one pass through the image. Viola jones algorithm uses Haar like features. This is nothing but scalar product between the image & some haar like structures. Feature is selected through adaboost. Ada-Boost provides an effective learning algorithm and strong bounds on generalization performance. The overall form of the detection process is that of a degenerate decision tree, what we call a “cascade”. A positive result from the first classifier triggers the evaluation of a second classifier which has also been adjusted to achieve very high detection rates. A positive result from the second classifier triggers a third classifier, and so on. A negative outcome at any point leads to the immediate rejection of the sub-window. The cascade training process involves two types of tradeoffs. In most cases classifiers with more features will achieve higher detection rates and lower false positive rates. At the same time classifiers with more features require more time to compute. In principle one can use following stages.

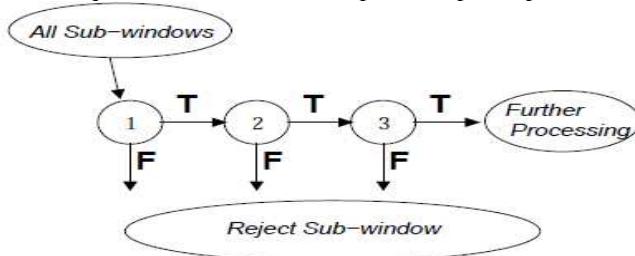


Figure 1: Cascade classifier

i) the number of classifier stages, ii) the number of features in each stage, and iii) the threshold of each stage, are traded off in order to minimize the expected number of evaluated features. Unfortunately finding this optimum is a tremendously difficult problem. In practice a very simple framework is used to produce an effective classifier which is highly efficient. Each stage in the

cascade reduces the false positive rate and decreases the detection rate. A target is selected for the minimum reduction in false positives and the maximum decrease in detection. Each stage is trained by adding features until the target detection and false positives rates are met these rates are determined by testing the detector on a validation set. Stages are added until the overall target for false positive and detection rate is met.

2) Flow chart

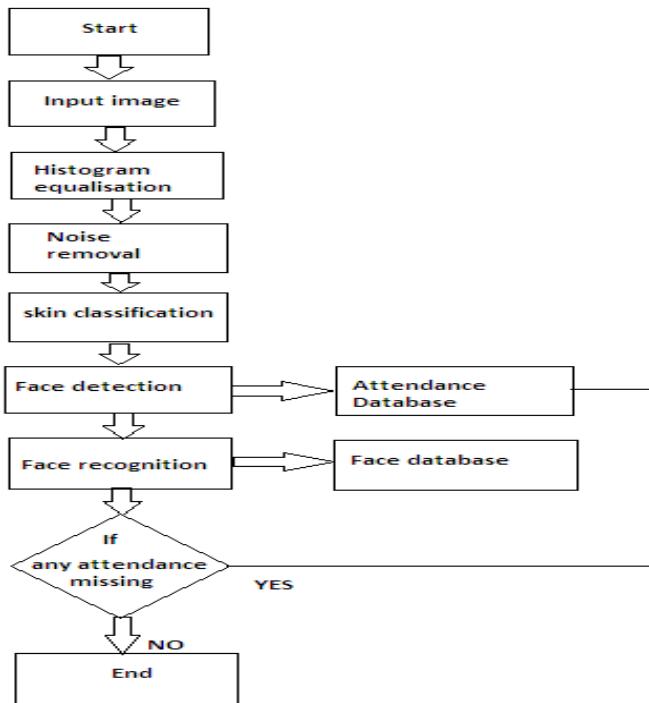


Figure 2: face detection & recognition

The flowchart is shown in fig.no.2

2.1) Histogram Normalization

Captured image sometimes have brightness or darkness in it which should be removed for good results. First the RGB image is converted to the gray scale image for enhancement. Histogram normalization is good technique for contrast enhancement in the spatial domain.

2.2) Noise Filtering

Many sources of noise may exist in the input image when captured from the camera. There are many techniques for noise removal. Low pass filtering in the frequency domain may be a good choice but this also removes some important information in the image. In our system median filtering is used for the purpose of noise removal in the histogram normalized image.

2.3) Skin classification

This is used to increase the efficiency of the face detection algorithm. Voila and Jones algorithm is used for detection..

the images of faces and then applied on the class room image for detection of multiple faces in the image.

2.4) Face Detection:

Haar classifiers have been used for detection. Initially face detection algorithm was tested on variety of images with different face positions and lighting conditions and then algorithm was applied to detect faces in real time video. Algorithm is trained for the images of faces and then applied on the class room image for detection of multiple faces in the image.

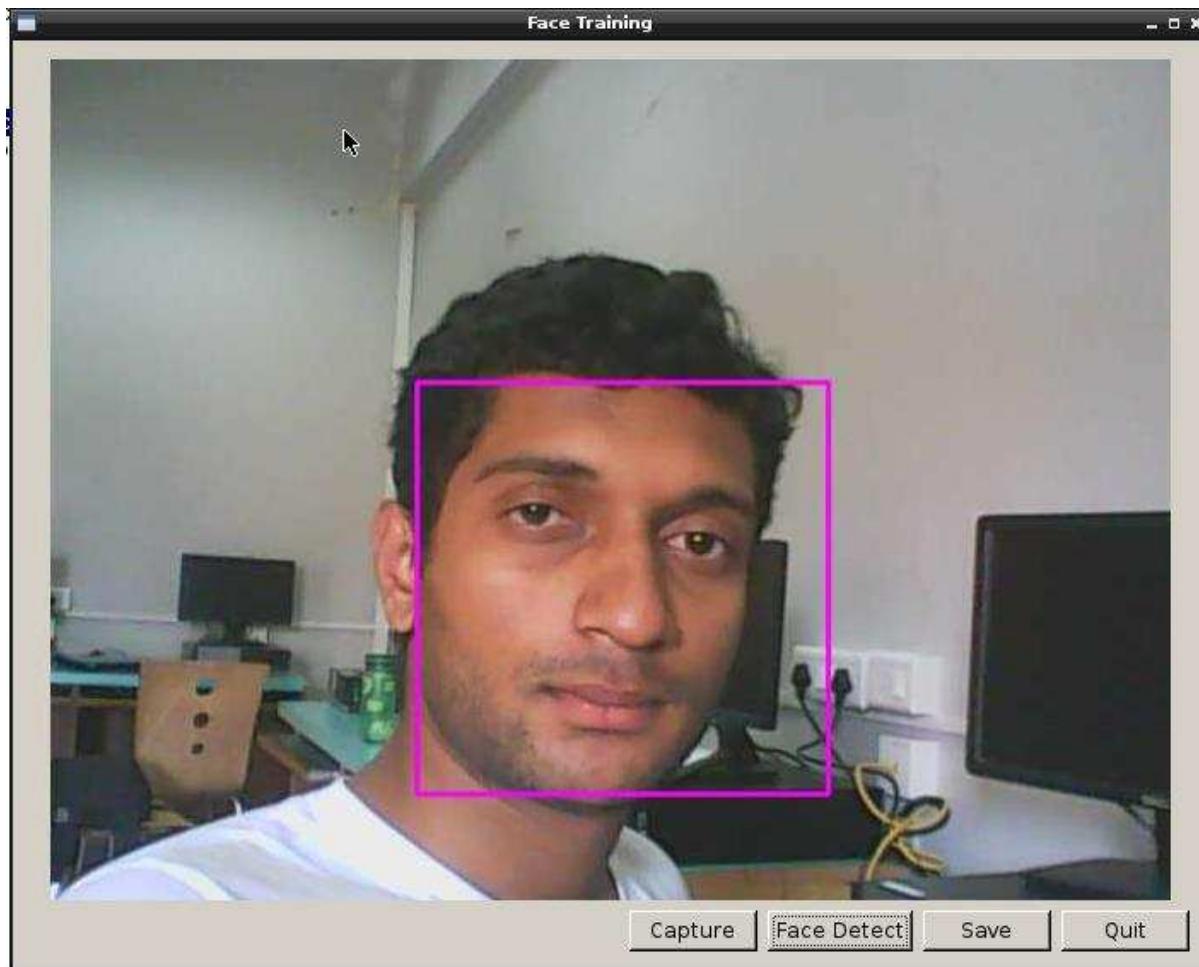


Figure 3: Face Detection

2.5) Face Recognition and Attendance

After the face detection step the next is face recognition. This can be achieved by cropping the first detected face from the image and compare it with the database. This is called the selection of region of interest. In this way faces of students are verified one by one with the face database using the Eigen Face method and attendance is marked on the server.

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. 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 intentions of students and teacher. In this way a lot of time is saved and this is highly securing process no one can mark the attendance of other. Attendance is maintained on the server so anyone can access it for its 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. Using this technique enhances the efficiency and accuracy of the detection process. In this process first the skin is classified and then only skin pixels remain and all other pixels in the image are set to black, this greatly enhances the accuracy of face detection.

process. Two databases are displayed in the experimental setup Figure. Face Database is the collection of face images and extracted features at the time of enrollment process and the second attendance database contains the information about the teachers and students and also use to mark attendance.

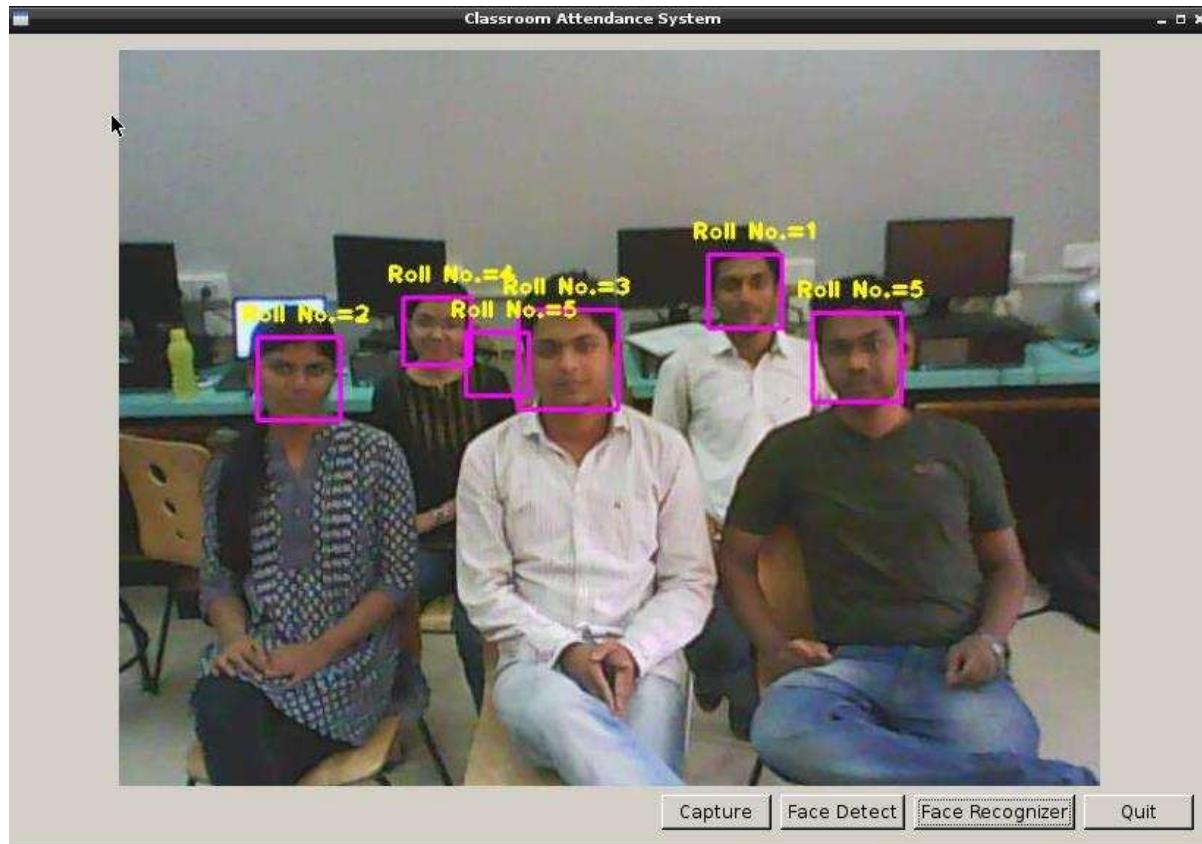


Figure 4: Face recognition System in Class

IV. FUTURE SCOPE

For security reasons, we can use detection & recognition system. To identify culprits on bus stations, railway stations 7 other public places, we can use this system. This will be helping hand to the police. In this system, we will use GSM module. Suppose if culprit is detected, then detected signal can be transmitted using GSM module to the central control room of police station. With the help of ISDN number of GSM, culprit surviving area will be recognized

V. CONCLUSION

We come to know that there are wide range of methods such as biometric, RFID based etc. which are time consuming and non-efficient. So to overcome this above system is the better and reliable solution from every perceptive of time and security. Thus we have achieved to develop a reliable and efficient attendance system to implement an image processing algorithm to detect faces in classroom and to recognize the faces accurately to mark the attendance.

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