Attendance System using Face Recognition

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Abstract*: In this digital era, face recognition system performs an important role in every sector. Face recognition is one of the most commonly used biometrics in day today life. It can be used for security, authentication, identification, verification and many more advantages as such. In spite of having low accuracy when compared to iris recognition and fingerprint recognition, it is being widely used due to its contactless and non-invasive process being advanced. Furthermore, face recognition system can be used for attendance marking in schools, colleges and offices, etc. This system sets a goal of fulfilment of building a class attendance system which uses the concept of face recognition as existing manual attendance system is time consuming and very difficult to maintain. And there may be high chances of proxy attendance from students. Thus, the need for this system increases satisfying these criteria. This system consists of four phases- database creation, face detection, face preprocessing, face recognition and attendance updation. Once the Face detection and recognition is performed, the image is converted to black and white format using Haar-Cascade classifier and then further converted to values using Local Binary Pattern Histogram algorithm respectively. Faces are usually detected and recognized from live streaming image of the classroom. Attendance will be mailed to the respective faculty at the end of the session.

***Keywords*: Attendance, face recognition.**

1. Introduction

Traditional method of attendance marking in many schools and colleges becomes very monotonous and annoying task for a faculty to do. It is also an extra task to the teacher/lecturer who needs to mark attendance manually calling students name which is time consuming performing the entire session. Therefore, an inefficient task to do. There are some chances of proxy attendance. Hence, many institutes started using many other techniques for marking attendance like use of Radio Frequency Identification (RFID), iris recognition, fingerprint recognition, and so on. However, these systems are queue based. Face recognition has set a physical characteristic feature, which can be easily procurable and is unobtrusive. The system of recognition consists of two categories: verification and face identification. Face verification is a 1:1 matching process, it compares face image against the template face images and whereas is a 1: N problems that compares a query face images.

It aims to build an attendance system which is based on face recognition techniques. Face of an individual student will be considered for marking attendance. Nowadays, face recognition is widely been used and acquires more popularity. In this paper, we proposed a system which detects the faces of students by capturing images of the students while new student data entry and attendance will be marked automatically if the detected face is found in the database.

2. Literature Review

[1] Face recognition has set an important physical characteristic feature, which can be easily acquirable and is unobtrusive. Face recognition-based systems are relatively unaware to various facial expression.

[2] The system aims to build a attendance system which is based on face recognition techniques. Here face of an individual will be recognized for marking attendance. In this paper, we proposed a system which detects the faces of students from live streaming video of classroom and attendance will be marked if the detected face is found in the database. This new system will consume less time than compared to traditional manual methods.

[3] Traditional method of attendance marking is a tiring task in many schools and colleges. Therefore, many institutes started using many other techniques for recording attendance like use of Radio Frequency Identification (RFID). The introduction of proposed model of an automated attendance system is evaluated using RFID. The model mainly gives attention on how face recognition incorporated with Radio Frequency Identification (RFID) detects the authorized students and keeps count of students getting in and out of the classroom. The system keeps the authentic record of every registered student who enters and leaves the classroom.

[4] Authors have designed and implemented an attendance system which uses the concept of iris biometrics. Initially, the attendees register their details using unique iris template. While taking the attendance, the system automatically took class attendance by capturing and storing the eye image of each attendee and recognizes their unique iris patterns, and identifies for a match in the already created database.

[5] Authors proposed an attendance system using facial recognition. The algorithms Viola-Jones and Histogram of Oriented Gradients (HOG) were featured along with Support this system. Numerous real time scenarios such as scaling, illumination and conclusions was considered by the authors.

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Quantitative analysis was performed on the basis of Peak Signal to Noise Ratio (PSNR) values and was designed and implemented in MATLAB GUI.

[6] Authors yield the best facial recognition algorithm (Eigenface and Fisher face) provided by the Open CV 2.4.8 by comparing the Receiver Operating Characteristics (ROC) curve and then was implemented in the face attendance system. ROC curve stated that, Eigenface achieves efficient results than Fisher face. The overall system accuracy using Eigenface algorithm varies from 70% to 90%.

[7] Authors proposed a student attendance system in classroom using face recognition technique by combining the two Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT). These algorithms were used to abstract the qualities of student's face by applying Radial Basis Function (RBF) for classifying the facial objects. Therefore, it achieves an accuracy rate of 82%.

[8] This creates a rectangle box around the faces in an image. It consists of three parameters to consider- scale Factor, min Neighbors and min Size. Scale Factor features how much Neighbors specifies the number of neighbors each candidate rectangle box must consist. Higher values normally detect less no. of faces but detects high quality of an image. Min Size specifies the minimum object size of an image. Initially set as renege, which is (30,30).

[9] Face recognition process can be divided into three steps, prepare training data, train face recognizer and prediction. Students will be assigned with an integer label for each of them where they belong to. Face recognizer algorithm used here is Local Binary Pattern Histogram. In the beginning, the list of local binary patterns (LBP) of entire face is formed.

[10] The users can communicate with the existing system using a GUI. Then, users yield with three different options such as, student registration, faculty registration, and marking attendance. The students are required to enter necessary details in the student registration form provided. As one clicks on the register button, the web cam initiates automatically. Hence starts the detection of faces. Then it automatically clicks photos until CRTL+Q is pressed. These images are pre-processed and stored in training images folder.

3. Implementation

System Implementation is the stage where the theoretical design is usually converted into a working system, the new system may be totally new, replacing an existing manual, or automated system. The system is implemented using MATLAB and data set.

Fig. 1 shows the data flow diagram for Attendance System Using Face Recognition. User can give input details in the form of image or captured. The image actualization capture RGB image. Next Image Segmentation is done for the particular captured image. The image obtained is extracted using the color features. This extracted RGB image is then converted into grayscale image.
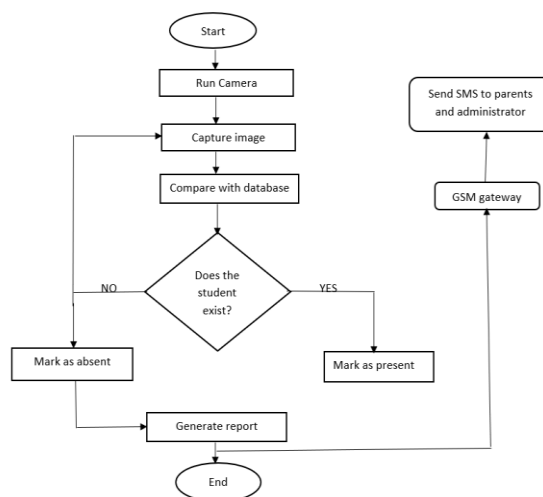

Fig. 1. Data flow diagram for attendance system using face recognition

4. Results

The main working principle of the project is that, the image captured data is used to detect and recognize it. Further, the recognized image of the student is used to give attendance, else the system marks the database as absent. Meanwhile, the teachers can have access to the attendance system to check the list of students present or absent.

5. Conclusion

In this paper, the aim is to capture the image of the students, convert it into histogram then LBP, further store in training data set. While the attendance is listed it matches the features of each student to stored decimal values in training data set. Relate it with the database to ensure their presence or absence, mark attendance of a particular student to maintain the record. The Automated Classroom Attendance System helps in increasing the accuracy rate and speed ultimately to achieve the high-precision real-time attendance to meet the need for automatic classroom evaluation.

6. Future Work

Automated Attendance System can be established in larger areas like in a seminar hall where it helps in taking a count of no. of people present. Sometimes the poor lighting condition of the classroom may disturb the image quality which definitely degrades system performance, we aim to overcome it the latter stage by improvising the quality of the photo or by using some better algorithms.

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