AUTOMATIC ATTENDANCE SYSTEM USING FACE RECOGNITION

Mr. P. Sathiyanarayanan
Assistant Professor

V. Sathiyanarayanan
UG Scholar

R. Karthick
UG Scholar

R. Gokulnath
UG Scholar

S. Yogesh Kumar
UG Scholar

Department of Computer Science and Engineering
Manakula Vinayagar Institute of Technology, Kalitheerthalkuppam, Puducherry-605107

ABSTRACT: Nowadays, as computers are powerful enough for implementing complex algorithms, there are numerous applications that people utilize computers to run. In which, facial recognition is one of the most active fields of applications. In fact, computers can not only automatically identify who a person is, but also operate 24/7, which human beings cannot endure. This leads to the replacement of people by computers in some repetitive and real-time applications. In this work, we apply facial recognition into an attendance checking system that uses faces of registered people to check their attendance. This system has a GUI, which allows user-to-system interaction and attendance marking will be easy through recognizing the face of the student with the help of the recognition algorithm and mark the attendance. Cascade classifier is using to detect face. The Local Binary Pattern Histogram algorithms for this technology using face recognition, this system saves time more time and also monitor students and they can verify their attendance status with the help of the Register Number.

Keywords- Face Recognition, HAAR Cascade classifier, LBPH, PCA.

1.INTRODUCTION

To check the performance of students in all colleges and institutions, among this system, the maintenance and monitoring of an attendance system are very much essential. Every person who will enter a room or building must go through several authentication processes first, that later this information will be used to monitor every single activity in the room for a security purpose. The biometric-based authentication technique becomes one of the most promising methods. Nevertheless, the biometric authentication method used is still lacking and takes relatively more time.

The traditional method of marking attendance is very time consuming and consists of a lot of complicated work, and strength is more. Automation of Attendance System has the strength over the traditional method as it saves a lot of time, and it can also be used for security purposes. This method also helps us to find fake attendance and to prevent it. The monitoring of student attendance in classrooms is sophisticated when we use the face recognition method. The attendance marking system with face recognition, image processing using the stream, and keeping the attendance in the excel. There are no efforts for the user side. This system makes active with intrusive nature is absent this system.

2.EXISTING WORK

The current biometric methods begin to evolve into one of the promising authentication methods compared to conventional authentication methods. The conventional authentication process is done by writing the name, address, and signature, or assigning someone by giving access to a physical or virtual realm using a password, PIN (Personal identification number), smart card, plastic card, token, key, etc. Password and PIN are difficult to remember and in several cases, those are easy to steal or suspect. One of the biometric authentication methods is by using face recognition method.

Research on face recognition process has been done for a quite long time and continue to be developed until now. According to Viola and Jones, there are 3 important keys for object detection in machine learning. The first one is the image representation that able to create object features being detected in a short period of time. The second one is the algorithm based on AdaBoost that select important features in an object. The last one is to build a classifier according to a cascade that can override the background object in a short period of time.

In 2003, Viola and Jones resumed their research based on their past research in 2001 about face detection not in an upright position but at an angle of 60o. They used a decision tree for the face detection and got satisfactory results.

Lienhart and Maydt conducted a research based on the research conducted by Viola and Jones before. They included Haar-like features to the detector and obtained a 10% error reduction compared to the previous research and after the optimization, the error reduction increased up to 12.5%. One of the deficiencies that still existed in face detection method is the heavy computation during the classifier training. This problem was overcome by Minh-Tri Pham and Tat-Jen Cham who conducted a research to reduce the time required for training using statistical principles. The results obtained were quite significant in reducing the required computational time.

Face recognition approach by encoding face microstructure using learning based encoding method was conducted by Cao et al. They used unguided learning methods to learn an encoder from the training sample, which automatically gets a better trade-off between discriminatory power and invariant. Furthermore, a PCA (Principal component analysis) is used to obtain a compact face descriptor. The results of the research were able to recognize the face up to 84.45%. According to the researchers described above, this research would develop a prototype a face recognition system that can be used in real time. This research would be divided into two stages. First, the face detection process is done by using skin color detection algorithm and Haar Cascade. Later, the eye position identification will be done as one of the feature extraction processes. The face recognition and classification process were simulated using the LBPH (Local Binary Patterns Histograms) algorithm.

3.PROPOSED WORK

The system proposed based on face recognition. When a student comes across the camera module, then his/her image/photo will be captured and recognize with validation. When recognition and validation is succeeded, then his/her attendance will mark automatically. This proposed work is based on the following block diagram in which the attendance of the particular student is marked as present when his face is matched.

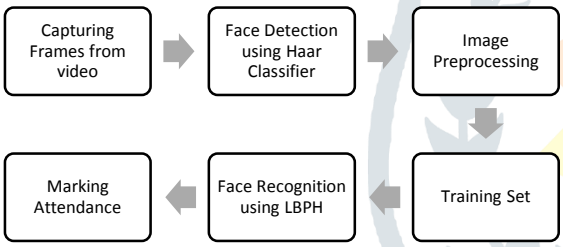

Fig.1: Block Diagram

1. Capturing frames from video

The camera will be placed at the entrance of the classroom to get student's face images correctly. The camera has 30fps in which these frames are taken and used for further processing.

2.Face Detection using Haar Classifier

In this phase, it implements face detection of the person, which helps in determining the captured image with the location and sizes of student
faces. The copy will be obtained from detected faces using Haar cascade classifier.

3.Image Preprocessing

In this there is a preprocessing requirement to enhance the input image to improve the quality of the picture. We convert input image to greyscale image using color to the grey image conversion technique.

4.Training Set

When comparing the faces, which are to be recognized with the same face in the trained dataset is the recognition process. Supply algorithm faces in the training set to tell which the person belongs. When recognizing face by algorithm, it uses the training set to make recognition.

5.Face Recognition using LBPH

The vital part of this system is face recognition. Face recognition is an automatic method of identifying and verifying a person from images and videos from the camera. For this, we use LBPH, which is the Histogram pattern algorithm, which is an efficient algorithm for face recognition.

6.Marking Attendance

Attendance will be marked as present in attendance when only if a face from the specific registered folder is matched. That in which it collects the list of all students who were present today in the class, and the rest of the students belongs to the class will be marked as absent.

A. Face Detection using Haar cascade classifier

The Scientist Paul Viola and Michael Jones are proposed the effective object detection method Haar cascade classifier. This is an applied machine learning and in-depth learning-based approach. From the many cascade algorithm, a cascade method analyzes from the positive and negative images. Then it will use in other images to detect objects. Here, without faces to explain the classifier, face detection algorithms will be applied. Here there is a need for a lot of positive and negative face frames in the video.

There is different type of haar cascading feature, which analyzes the function in the existing image. From this, the image of crop image into the 24X24 window in each operation subtracts the sum of white region pixels with the number of black region pixels in it. Therefore, there will be an integer value as the output. It also determines the validation of the features in it.

B. Face recognizer using LBPH

Here the Face recognizer using LBPH (Local Binary Histogram Pattern) such that for an input image, the algorithm generates a new number of histograms and compares it with the generated histograms, and thus, it returns the labels of the histogram associated with it and associated. And hence the histogram faces recognize, a 3X3 window moves it by one image. Almost at each move of each local part of an image, the center pixel will be compared with its neighbor pixels on the image. One is denoted by neighbor pixel quantity is less, or it equals the center pixel, and also 0 is meant for others. Then, the picture under 3X3 window, read values 0 or 1 in clockwise order and will have a binary pattern like for the 11000011. The pattern is in local to some area of the image in it. We will have a list of local binary models after performing the recognized on the whole picture.

The face recognition process was performed using LPBH algorithm because of its smaller computation load, thus it is relatively fast and can be used for the real-time recognition process. The LBPH concept is to not look the whole image as a high dimensional vector but to only review the local features of the important objects.

The extracted object features only have low dimensions, for example in face recognition case, it will only review the face, eye, and mouth features. The process was necessary thus in the next process there would be no too far

result difference because of the detected facial size, due to the different distances between the face and the camera and difference variations of the environmental light intensity during capturing the image. The feature extraction was performed using LBPH algorithm. The detected face would be compared to all faces in the database to find the most similar face to the detected face. The database was stored using CSV file format to show the names and directories of the faces that exist in the database.

C. System Flow Diagram Algorithm

Step 1: Input image is captured as frames from video.
Step 2: To convert the color image to grey scale
Step 3: Face Detection is done using Haar Cascade classifier
Step 4: Face recognition is done using LBPH
Step 5: Face is compared with the trained image
Step 6: If the student is matched with the database
Step 7: If it matches the student in the database attendance marked on "PRESENT" the datasheet.
Step 8: If it is not matches with the student database then the attendance is marked on "ABSENT" the datasheet
Step 9: Generate report
Step 10: Update attendance
Step 11: Continue step 6
Step 12: Stop

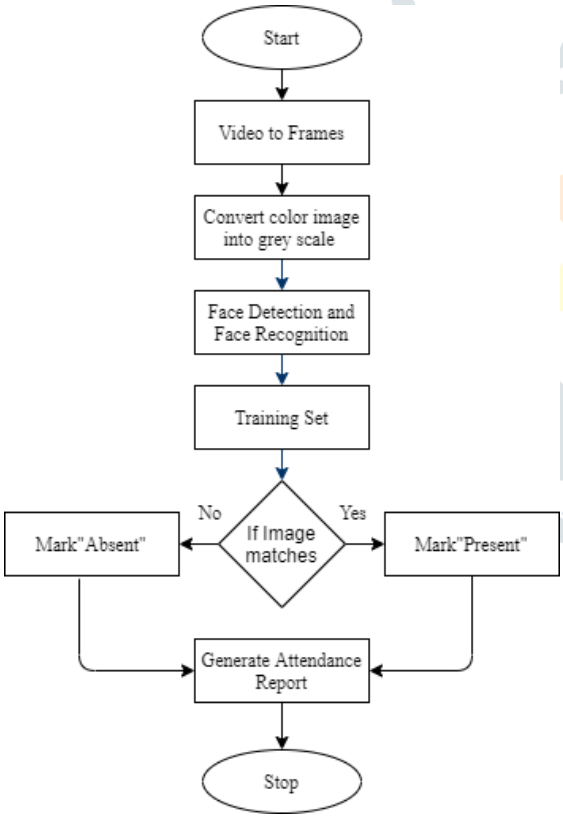

Fig.2: Flow Diagram.

These systems save the time and effects of the attendance system. It is a good accuracy. The proposed method is the update the presence marking on the students. The system used for the school, colleges, and library.

4.CONCLUSION

We have implemented an automatic attendance management system using face recognition for students' attendance. It helps in reducing the time and effort of staff, especially in the case of a large number of students present and the attendance to be marked. The whole system is implemented using the python programming language. Some facial recognition techniques used in order for the purpose of marking attendance to the students. And the record of the student is maintained correctly. It can also be used in any exam issues.

In this project, some further work is to be added, such that the attendance percentage is mailed to the parents or guardian. For this purpose, we use the GSM module. So that parents are the guardians who get SMS alert regarding the attendance of the student.

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