ATTENDANCE MANAGEMENT SYSTEM BY FACIAL RECOGNITION

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Abstract - Nowadays, attendance tracking plays a major role in companies, colleges and schools. The traditional way of keeping record of the attendance is more taxing, and it becomes more difficult for a large group. To prevent this some automated system is required. There are many automated system currently available to solve this problem. Most of these systems are not accurate and precise. The proposed system is an Android app, and the face detection is done using Haar Cascades. The proposed system can be used by any institute for attendance management.

Key Words: Raspberry Pi, Servo motor, Viola Jones, Arduino, IR

1.INTRODUCTION

Attendance plays a major role nowadays, to keep the record of number of students or employee's present in the respective institutes is necessary for the required discipline and keeping track of their performance. Conventional way of taking attendance in schools is by calling of names by teacher, students responding on their roll numbers and putting 'A' or 'P' on log book accordingly. The conventional way of taking attendance is bothersome to say the least, the teacher first has to manually do all the work, calling and then writing then the teacher will now put the data in the system manually again and again each day. And the conventional way simply cannot be used in a company. The conventional way of taking attendance is too taxing. So to overcome this difficulty automated attendance systems were introduced, the automated systems can update data automatically without much effort. Automated systems a number of techniques to detect a person, the most commonly used are, bio metric detection (fingerprint), face detection, iris recognition, RFID cards. Each and every technique has its own limitations. The proposed system uses face detection techniques for attendance management. Face detection and recognition is a technology that is used to identify a person present in a digital image or video. The image is taken and then processed using different techniques available for face detection, some of the techniques are Viola Jones algorithm, Ada-Boost. Now after the detection of face is completed, the recognition of the person present in the image is done by face recognition techniques some of them are Haar cascades, Hog features and some other recognition techniques. Now, after the face is recognized it is compared to an image that is stored in the database beforehand and after the comparison is done, the system will tell whether the said person is present in the database or not, if the image of the said person is available it will update the information in database. In this paper, face detection and recognition techniques are used for

to develop an attendance management system, in the form of an android app. The android app is used to update the attendance and add new data to the database. It is developed in the android studio, it will work on any android device. The system is lite so no high end specifications are required.

2. LITERATURE SURVEY

In [1] paper, the author applies Viola-Jones algorithm for face detection, and alignment and free partial face recognition algorithm for face recognition. The proposed after face detection and face recognition compares the data received with the data in database and after that it updates excel sheet. The advantages of using the Viola-Jones algorithm are discussed in the paper.

[2] uses Eigenface and Fisherface algorithm for the face recognition provides by OpenCV 2.4.8 by comparing ROC(Receiver Operating Characteristics) curve. The authors implement and develop face recognition algorithm provided by OpenCV 2.4.8.

The authors of [3] uses Arduino to create and control the system. The system compares the face pattern analyzed with the data stored in the database, the operations are carried by Arduino Microcontroller. The system periodically updates the system, suppose a student leaves and does not return in 15 minutes the system will update the attendance and that person absent.

3. PROPOSED SYSTEM

Recognition of faces are much more complicated than detecting. For the facial recognition general structure of face should be defined. Humans doesn't have much difference in their facial general structure. We all have noses, chins ,mouths, eyes and forehead. All of these result in facial structure.
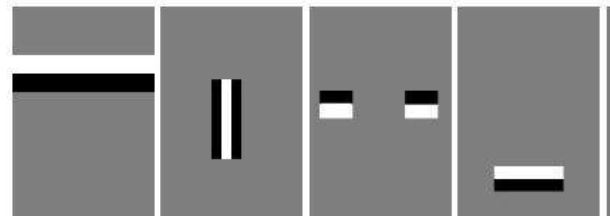

Fig -1: General Structure of Human face

By combining all the features, we can get the general human face structure.

Template matching is a technique used for the purpose of roughly matching whether the given picture matches the

template image, which is why it is precisely used here, as we need to roughly check whether some feature matches to some part of the picture.

An oversimplification of the Viola-Jones method (also called Haar cascades) is that it checks whether the image does not contain a face rather than checking whether contains it as elimination is simpler and faster, this is called cascading process.

Fig -2: Combinations of Structures

Face detection is simpler than face recognition as in face detection we only check whether a face is present in the image, but in face detection we have to determine to whom does the face belong to.

OpenCV provides uses methods of face recognition: Eigenfaces, Fisherfaces and Local Binary Patterns Histograms (LBPH).

The above mentioned methods perform the recognition by comparing the given image with a set of faces that are stored in the database, i.e. these are known to us. The Eigenfaces and Fisherfaces determine a mathematical description of the most dominant features of the set of faces present in the database, however the LBPH takes analyses the faces in the set independently and separately.

3.1 Eigenfaces and Fisherfaces

The vector is designed on an orthogonal base. From the combination of the elements of it we can easily determine that is vector space and vice versa. The very vector can be broken down into the elements of basis.
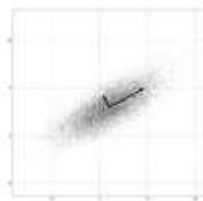

Fig -3: GaussianScatterPCA

The images are nothing but a sequential series of numbers where each number shows some level of intensity. Then instead of taking images why can't we go with the method of vectors, for example say an image of 200 by 200 pixels can be simplified into a vector of size 40000(200*200). Vector space is a place where vectors resides and with the method of treating the images as data samples we can perform a principle known as Principal Components Analysis and with the help of which Eigen vectors can be obtained which make

up the basis. The eigenvectors represent features of dataset, the Eigen values used represent the facial characteristics.

3.2 Local Binary Patterns Histogram (LBPH)

The LBPH method is completely different from the method used by eigenfaces method. In eigenfaces method it considers the dataset as a whole whereas in the LBPH the individual image is analyzed independently. The LBPH method is less complex compared to other methods as the particular image is checked or analyzed individually in local dataset whenever a new image is provided in the dataset. Then the result is compared along with the result present in the dataset. The image is analyzed by characters' patterns present at the location in the image.
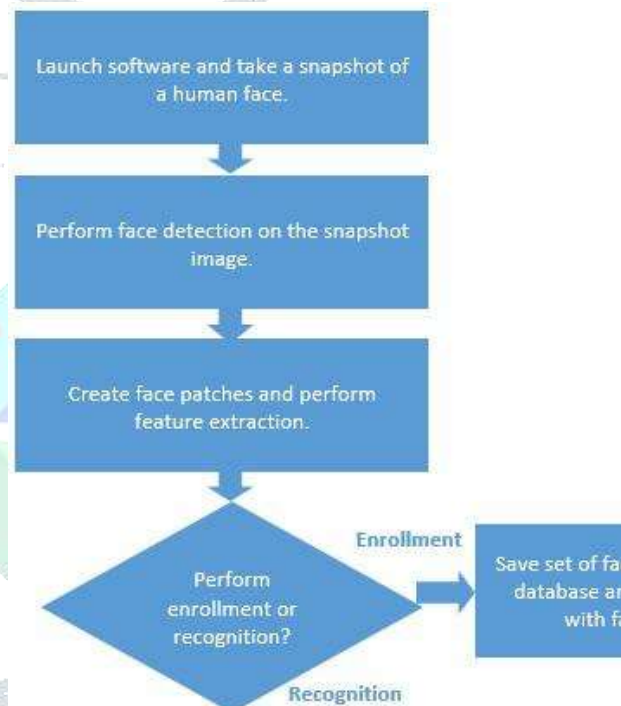
3.3 Workflow

Fig -4: Workflow

3.4 Application

This application uses opencv for the facial recognition and OpenCV4Android SDK was imported in Android Studio. Main Activity have two intents for other activities (a)Recognize (b)Training

All the files are imported to android studio. By the integrated use of files in java and xml, all the activities are generated which are further connected with each other through onclicklistners and intents. Permissions are taken from the user by adding in the manifest such as WRITE EXTERNAL STORAGE, CAMERA, READ PHONE STATE, READ EXTERNAL STORAGE.BaseLoaderCallback is the function used to recognize the faces after loading the libraries to that Activity.ScaleFactor is set to 1.1, minNeighbors to 2 and Flags to 2.

SetOnCheckedChangeListener is used to check that there is more than one face exists as it is required to distinguish the faces.

Bitmap is used to set the compression level and quantity. This app uses 100 bitmaps to ens

Fig -5: Main Activity

When Bitmap to image function is called, it converts the bitmap to image by getWidth and getHeights with channels 4.
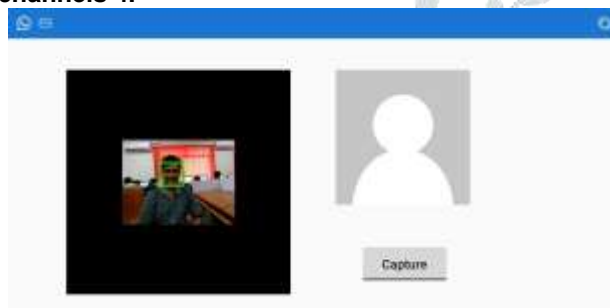

Fig -6: Training

In the training Activity Initially Cascade Classifier is used to do the template matching process where it eliminates the other parts of the pic and convert it as a cropped template to work on which can further be converted into a bitmap.mrgbs and mgray are two mats which are used to create the core rectangles along with the faceArrays.

Fig -7: Recognize

Recognition template uses the CameraBridgeViewBase. CvCameraViewListener2 interface for the recognition of faces.

Again the Cascade Classifier is used to detect the face from the camera which will again make it an image and convert it into a bitmap. Again the Bitmap is created with quantity of 100.FaceArray is created which will further be compared to the saved arrays. If values are approximately same with deviation up to 5 percent, it will be treated as found. That requests the name of the person and that is passed to review list Adapter.
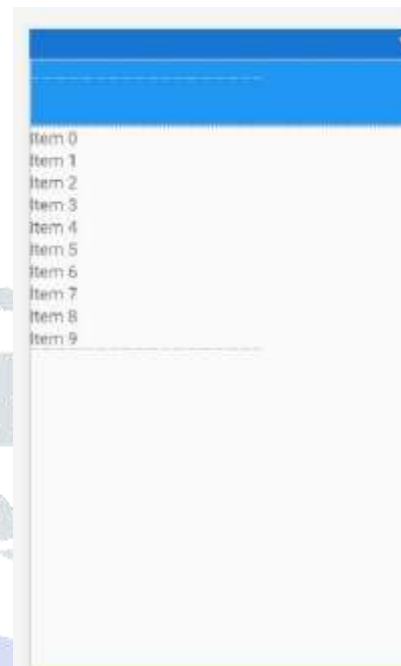

Fig -8: Activity review results

As the List is dynamic here thus, adapter is used with listview to receive the values from personRecognizer activity and display it in the listview. Names further can have marked as present with the database linked with the erp.

4. CONCLUSIONS

The designed application is uses face detection method for the attendance of any given employee or a student as per the need. The face detection method uses haar cascade algorithm which includes vector method, LBPH method etc. The designed application has an upper hand over the preexisting modes used for attendance as the application uses bio-technology which makes It harder to bypass. The application doesn't need an operator during the entire time, it just requires assistance only at the start of the course. The device decreases the probability of proxy to a minimum which is a major issue hence leading to a better and safer method of the attendance.

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REFERENCES

[1] V. Soniya Department of Information Technology, Dhanalakshmi College of Engineering, Chennai, India; R Swetha Sri ; K Swetha Titty ; R. Ramakrishnan ; S.

[2] Nazare Kanchan Jayant,Surekha Borra ,Dept of ECE, K.S. Institute of Technology, Bangalore-560062, India - Attendance management system using hybrid face recognition techniques.

[3] Adrian Rhesa Septian Siswanto Information Technology, Swiss German University, EduTown BSD City, Tangerang 15339, Indonesia; Anto Satriyo Nugroho ; Maulahikmah Galinium- Implementation of face recognition algorithm for biometrics based time attendance system.

[4] Z. Riha, V. Matyas, Biometrics Authentication systems. Faculty of Informatics Masaryk University. 2000.

[5] A K. Jain, AA Ross, K. Nandakumar, Introduction to Biometrics, [6] Springer.

[6] S. Emami, "Face Recognition using Eigenface or Fisherface" in Mastering OpenCV with Practical Computer Vision Projects. Pact Publishing, 20 1 2. ISBN 1 8495 1 7827

[7] Yunxiang Mao, Haonhan Li, Zhaozheng Yin, "Who Missed the Class? – Unifying Multi-Face Detection Tracking and Recognition in Videos", IEEE International Conference on Multimedia and Expo (ICME), pp. 1-6, July 2014.

Sivakumar ,Attendance automation using face recognition biometric authentication.