



Face Recognition based Attendance System

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I. INTRODUCTION

The face is crucial for human identity. It is the feature which best distinguishes person. Face recognition is an interesting and challenging problem, and impacts important applications in many areas such as identification for law enforcement, authentication for banking and security system access, and personal identification among others. Face recognition is an easy task for humans but its entirely different task for a computer. A very little is known about human recognition to date on How do we analyze an image and how does the brain encode it and Are inner features (eyes, nose, mouth) outer features (head shape, hairline) used for a successful face recognition? Neurophysiologist David Hubel and Torsten Wiesel has shown that our brain has specialized nerve cells responding to specific local features of a scene, such as lines, edges, angles or movement. Since we don't see the world as scattered pieces, our visual cortex must somehow combine the different sources of information into useful patterns. Automatic face recognition is all about extracting those meaningful features from an image, putting them into a useful representation and performing some classifications on them. Face recognition based on the geometric features of a face is probably the most intuitive approach to Human identification. The whole process can be divided in three major steps where the first step is to find a good database of faces with multiple images for each individual. The next step is to detect faces in the database images and use them to train the face recognizer and the last step is to test the face recognizer to recognise faces it was trained for.

STRUCTURE OF PAPER

The paper is organized as follows: In Section 1, the introduction of the paper is provided along with the structure, important terms, objectives and overall description. In Section 2 we discuss related work. In Section 3 we have the complete information about the development of security system using haar cascade and in section 4 we have Methodology and the process description.

Section 5 tells us about the future scope and concludes the paper with acknowledgement and references.

OBJECTIVE

Using Haar Cascade Classifier to recognise and detect face on webcam. The primary objective of this work is to develop a framework for face detection using Haar Feature-based Cascade Classifiers. Based on the framework developed, it will be extended for the usage in security purposes.

II. IMPLEMENTATION

Typically this process can be divided into four stages,

1. Dataset Creation

Images of students are captured using a web cam. Multiple images of single student will be acquired with varied gestures and angles. These images undergo pre-processing. The images are cropped to obtain the Region of Interest (ROI) which will be further used in recognition process. Next step is to resize the cropped images to particular pixel position. Then these images will be converted from RGB to gray scale images. And then these images will be saved as the names of respective student in a folder.

2. Face Detection

Face detection here is performed using Haar-Cascade Classifier with OpenCV. Haar Cascade algorithm needs to be trained to detect human faces before it can be used for face detection. This is called feature extraction. The haar cascade training data used is an xml file- haarcascade_frontalface_default. The haar features shown in Fig.2. will be used for feature extraction.

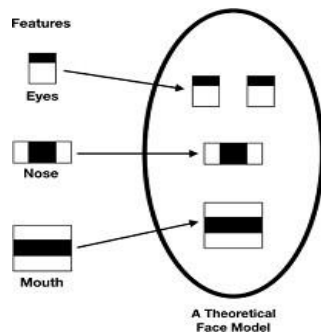


Fig.2. Haar Features

Here we are using detectMultiScale module from OpenCV. This is required to create a rectangle around the faces in an image. It has got three parameters to consider- scaleFactor, minNeighbors, minSize. scaleFactor is used to indicate how much an image must be reduced in each image scale. minNeighbors specifies how many neighbors each candidate rectangle must have. Higher values usually detects less faces but detects high quality in image. minSize specifies the minimum object size. By default it is (30,30) [8]. The parameters used in this system is scaleFactor and minNeighbors with the values 1.3 and 5 respectively.

3. Face Recognition

Face recognition process can be divided into three steps- prepare training data, train face recognizer, prediction. Here training data will be the images present in the dataset. They will be assigned with a integer label of the student it belongs to. These images are then used for face recognition. Face recognizer used in this system is Local Binary Pattern Histogram. Initially, the list of local binary patterns (LBP) of entire face is obtained. These LBPs are converted into decimal number and then histograms of all those decimal values are made. At the end, one histogram will be formed for each images in the training data. Later, during recognition process histogram of the face to be recognized is calculated and then compared with the already computed histograms and returns the best matched label associated with the student it belongs to [9].

4. Attendance Updation

After face recognition process, the recognized faces will be marked as present in the excel sheet and the rest will be marked as absent and the list of absentees will be mailed to the respective faculties. Faculties will be updated with monthly attendance sheet at the end of every month.

III. DEVLOPMENT OF SECURITY SYSTEM USING FACERECOGNITION

This security system is build to implement on a door. Where every person entered is checked and their images are taken and compared with available data. If the person is found in database, will be authorized to access otherwise access will be denied. Every image taken and their authorization whether authorized or not, will send to Google Drive with time and date of entry. From Google drive data can be getting to use to display on apps or on websites.

To build this security system we will require a Raspberry pi board, Camera,Sensors pair,Infrared Sensors pair,6x2 LCD screen,USB Cables, Ethernet jumper wires and Open CV module. The Raspberry Pi is a series of credit card-sized single-board computers. It could work on Linux. It has 40 GPIO pins, Ethernet port, 4 USB ports, micro SD card port etc.Camera takes the image and saves it in „Newface“ folder, from where it will be taken for comparison.A set of IR (infrared) sensors has been set, which detects the coming person.IR sensors pair sends signal to raspberry pi, which activates the camera and takes the image of person standing in front of it .LCD screen is used to display the messages. Ethernet wire is used make raspberry pi internet enable to send data to Google drive USB cable powers the raspberry pi.

IV. METODODLOGY:

Haarclassification is a tree-based technique where in the training phase, a statistical boosted rejection cascade is created. Boosted means that one strong classifier is created from weak classifiers (see fig. 3), and a weak classifier is one that correctlygets the classification right in at least above fifty percent of the cases. This buildup to a better classifier from many weak is done by increasing the weight (penalty) on misclassified samples so that in the next iteration of training a hypothesis that gets those falsely classified samples right is selected. Finally the convex combination of all hypotheses is computed.

Haar Cascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier.

- **Positive images** – These images contain the images which we want our classifier to identify.
- **Negative Images** – Images of everything else, which do not contain the object we want to detect.

IV. RESULTS AND DISCUSSIONS

The users can interact with the system using a GUI. Here users will be mainly provided with three different options such as, student registration, faculty registration, and mark attendance. The students are supposed to enter all the required details in the student registration form. After clicking on register button, the web cam starts automatically and window as shown in Fig.3. pops up and starts detecting the faces in the frame. Then it automatically starts clicking photos until 60 samples are collected or CTRL+Q is pressed. These images then will be pre-processed and stored in training images folder.

The faculties are supposed to register with the respective course codes along with their email-id in the faculty registration form provided. This is important because the list of absentees will be ultimately mailed to the respective faculties.

V.FUTURE SCOPE AND CONCLUSION

Security is an imperative part of any industry. This work is most particularly for criminal identification. The algorithms carried out in this paper were Viola-Jones algorithm and Linear binary pattern algorithm. The presented system will get implemented using Open CV and Raspberry pi. The recognition rate attained by this process is 90%-98%. There will be deviation in the result on account of the distance, camera resolution and lightning. Advanced processors can be put to use to reduce the processing time. By affixing more number of recognition servers to attenuate the processing time for collection of images.

This system aims to build an effective class attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces via webcam and then recognize the faces. After recognition, it will mark the attendance of the recognized student and update the attendance record.

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