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Automated Facial Recognition Attendance System Leveraging IOT Camera

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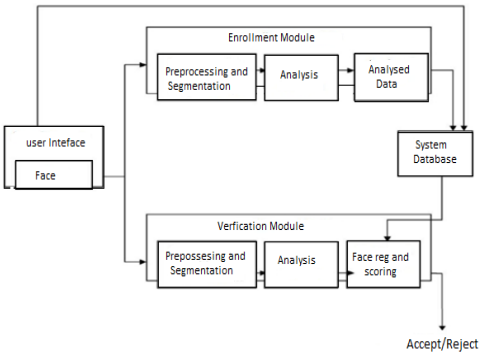
Abstract - The management of the attendance can be a great burden on the teachers if it is done by hand. To resolve this problem, smart and auto attendance management system is being utilized. But authentication is an important issue in this system. The smart attendance system is generally executed with the help of biometrics. Face recognition is one of the biometric methods to improve this system. Being a prime feature of biometric verification, facial recognition is being used enormously in several such applications, like video monitoring and CCTV footage system, an interaction between computer & humans and access systems present indoors and network security. By utilizing this framework, the problem of proxies and students being marked present even though they are not physically present can easily be solved. The main implementation steps used in this type of system are face detection and recognizing the detected face.

Key Words: **Image processing, Expressions, HAAR features, HOG features, Face Detection Method, Face Recognition Method, Features Extraction, Features Matching, Query Image, Bit- Byte Conversion Methods**.

1. INTRODUCTION

Let us take an example of application to the theory we are proposing here. Taking attendance in the schools and colleges is being a waste of time and effort for both the students and lectures as well. Now a days biometric is more usage they are finger print recognition facial recognition iris scanning recognition voice recognition signature recognition etc. One of that biometric category is face detection and recognition. Based on the image we take security safety, attendances and some time it useful for decision also. Mostly this facial detection and recognition is decrease the manual work for human. Image capturing from camera or cc camera sometime this is also a streaming video from camera. Form that offline or online data, we capture the image after that applying the face detection techniques. Face detection is detecting the face location and presence of face in images. In this face detection we mostly see the nose, hair, ears, mouth, eyes and also different pose of faces in images. So many Face detection techniques, few of them is Viola Jones Face Detection Algorithm, (LBP), After applying face detection techniques we detected the faces or objects in image and crop that image apply Face recognition technique. So many way to recognition the faces by applying Hog features, Haar features, Machine learning, deep leaning, classification techniques some other tech also used for recognition of the faces. Recognition of face we nee training data sets. Instances taking camera capture now check that image to database Images. Face recognition of different peoples based on the related images of that person image we need take images for before face recognition. In case if the image is not in data base then we store that image as new person in database. Next time same image of that new image person appear in image and recognition the face or else taking as new image and storing in database process is repeating. In this paper we selecting of the face recognition and detection giving result using MATLAB. This requires a high end specifications of a system in order get the better results. It won't run on all the small specification systems. So, this can run only small database and compare them with the face required.

1.1 METHODOLOGY



2. LITERATURE SURVEY

In [1] the author proposed an automated system for human face recognition in a real time background for a college to mark the attendance of their employees. So Smart Attendance using Real Time Face Recognition is a real world solution which comes with day to day activities of handling employees. To detect real time human face are used and a simple fast Principal Component Analysis has used to recognize the faces detected with a high accuracy rate.

In [2] the author proposed the author proposed that recognition face using hog features and pca algorithms. By applying recognition algorithm to cropped faces images from that we get similarity b/w taken image and database image. In this paper PAC algorithm used for face detection and recognition. the author shows that face recognition of facial of different person or student .from recognition attendances is upload to database using face detection and recognition of student or workers. From this manual work is decrease by human and automatically attendance system based on faces process done.

In [3] the author proposed Elastic Bunch Graph Matching is one of the well-known methods proposed for face recognition. In this work, we propose several extensions to Elastic Bunch Graph Matching and its recent variant Landmark Model Matching. We used data from the FERET database for experimentations and to compare the proposed methods. We apply Particle Swarm Optimization to improve the face graph matching procedure in Elastic Bunch Graph Matching method and demonstrate its usefulness

3. Work Flow

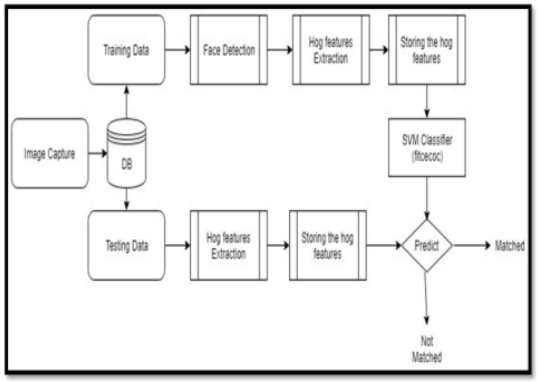


Fig-3.1 Architectural Flow Chart

3.1 Training data

For the database, we need to capture the image from the webcam or the external camera. To do so, in Matlab, we need to install the drivers from the math works website based on the type of camera we are using. Next, we need at least 500 to 1000 captures of each person for getting higher percentage of accuracy and meet the purpose we are doing in this project. We can store the data in the form of separate folders distinguishing each person from others.

3.2 Image Capture

We need some HD camera in order to get results. We can capture the images from the video stream or by capturing each and every image from the webcam manually. Doing the frame capture from the stream of video will give us results in less time but we won't be able to capture the face properly in case we lose light or something and if the face is not captured properly

3.3 Face detection

For face detecting, we can do it using the object cascading class and we use the b-box method. The detection of the face using the object cascading is bought from the most popular facial recognition model Viola Jones. In here, there are several objects are present. These are there in the form of small blocks containing them. They are taken through an image and are moved through each and every block of the image and are checked for overlapping through them. First we will convert the image from the red blue green to gray scale image. The faces from the image captured is to be collected. The captured faces are cropped into small images of resolution 112x92. It would be around 11 KB of size.

3.4 Face Recognition

The faces taken in the database are needed to loaded into our workspace. We will load the gallery images into that Now we need to split the data of each and every person into testing and training data. Let us take it in the ratio of 0.2:0.8 from the database. Now we will be extracting the HOG features of all the training individuals and store them in the form of bits and bytes. We need to fetch the cropped and gray scaled images. Now the training datasets are extracted with the HOG features and are stored with a count.

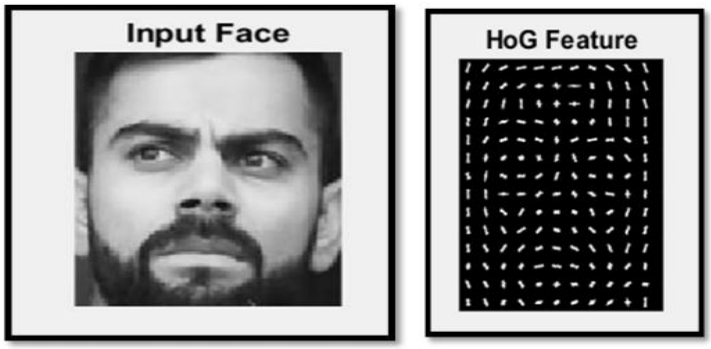


Fig-3.4.1 Hog Feature of the Input image

All the HOG features extracted are stored in the form of array index. The images in the database along with their labels are sent into features array to identify them separately (like indexing). The HOG features are sent along with the person Label to classify them and store them separately. The data is now classified using the predefined method of fitcecoc. This is completely done on the training data. Now we need take a fresh photo from webcam or any file and detect the faces, extract the HOG features and then compare that with the data classified. We need a predict method to compare an classified data with the data we need. Finally it returns a label to which the given data matches or nearly matched. To get better results we need a bigger training set.

4. Result Analysis

First in all we need to register the person into the database. To do so, we need to give name and his/her registered number to store.

4.1. Design

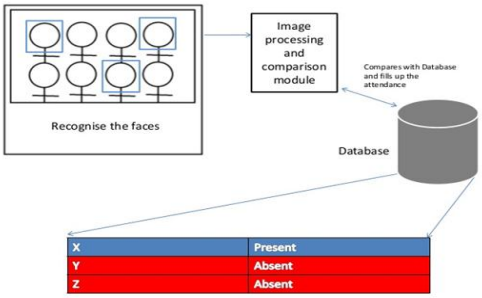


Fig-4.1.1Design

5. ALGORITHMS

5.1 LBPH Algorithm

The Local Binary Pattern Histogram(**LBPH**) **algorithm** is a simple solution on face recognition problem, which can recognize both front face and side face. ... To solve this problem, a modified **LBPH algorithm** based on pixel neighborhood gray median(MLBPH) is proposed.

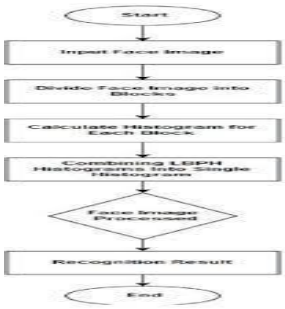


Fig-5.1.1 LBPH Algorithm Flowchart

5.2 Harr cascade algorithm

This object detection framework is to provide competitive object detection rates in real-time like detection of faces in an image. A human can do this easily, but a computer needs precise instructions and constraints. To make the task more manageable, Viola–Jones requires full view frontal upright faces. Thus in order to be detected, the entire face must point towards the camera and should not be tilted to either side. While it seems these constraints could diminish the algorithm's utility somewhat, because the detection step is most often followed by a recognition step, in practice these limits on pose are quite acceptable the characteristics of Viola–Jones algorithm which make it a good detection algorithm are:

a) Robust – very high detection rate (true-positive rate) & very low false-positive rate always.
b) Real time – For practical applications at least 2 frames per second must be processed.

6. CONCLUSION

In this system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant an record student's attendance. It saves time and effort, especially if it is a lecture with huge number of students. This attendance system shows the use of facial recognition techniques .The purpose of student attendance and for the further process this record of student can be used in extra related issue.

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