Face Recognition System

Shivam Singh
Department of SCSE
Vellore Institute of Technology,
Chennai Tamil Nadu, India

Prof. S. Graceline Jasmine
Department of SCSE
Vellore Institute of Technology,
Chennai Tamil Nadu, India

Abstract:- **In present times, face recognition has become one of the best technologies for computer vision. Face recognition is always a very difficult task in computer vision, illumination, pose, facial expression. Face recognition tracks target objects in live video images taken with a video camera. In simple words, it is a system application for automatically identifying a person from a still image or video frame. In this paper we proposed an automated face recognition system. This application based on face detection, feature extraction and recognition algorithms, which automatically detects the human face when the person in front of the camera recognizing him. We used KLT Algorithm, Viola-Jones Algorithm face detection which detect human face using Haar cascade classifier, however camera is continuously detecting the face every frame, PCA algorithm for feature selection. We apply a model combining to match the geometric characteristics of the human face.**

Keywords—Face Recognition, Face Detection, PCA.

1. INTRODUCTION

Human Face always play crucial role in application such as security system, credit and debit card verification surveillance on identify criminal public places. The main objectives of the system are to create a facial recognition system that can be emulated and eventually overcome this capacity of human. This system focuses especially on the human frontal faces. Multiple face recognition algorithms have been developed and each has its own strength. Most of the time we look at a face and are able to recognize it instant if we are already familiar with the face. This natural ability, if possible, can be justified and can be used for real-life applications. That time there are many face detection algorithms. The first one is a local face recognition system, which uses facial features of a face to intimity the face with a person. The second approach or global face recognition system use the entire face to recognize a person. The above two process have been implemented one to another way by another algorithms. The neural network and its feasible applications in the field of research.The complications of a facial features that take place over time. Unconcern of those changes can easily identify a person. So, the idea of emulate this skill is that human beings can be very rewarding.

2. RELATED WORK

2.1. Face Tracking

The objective of this algorithm is to detect object of face in real time and to keep tracking of the same object. Here we use the training samples images of other objects of your choice to be detect and track by training classifier. Face tracking is a part of face recognition system. Here we can use some system algorithms to pick out specific, distinctive details about a human's face.

2.2. Face Detection

In [1] This face detection process actually verifies the image is face image or not. Detection process actually works on Haar Cascade classifier. Object Detection using Haar feature- based classifiers is an effective object detection method proposed Paul Viola and Michael Jones. It is machine learning based approach where a cascade function is trained from images. It is used to detect objects in other images.

2.3. Haar Cascade Classifier Features

In [2] Here we calculated, the first feature selected seems to focus on the property that the region of the eyes in often darker than the region of the nose and cheeks. The second feature chosen is based on the eye is darker characteristics than the bridge of the nose. However, you do not need the same window that applies to your cheeks and other places.
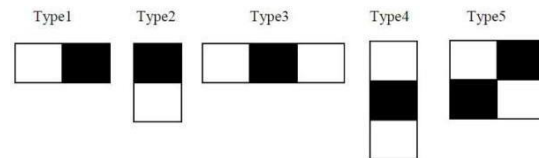

Figure 1: Haar Cascade Classifier

face recognition system that does capturing the image of face feature detection, extraction, storing and matching. But the difficulty occurs to lay the transmission lines in the places where the topography is bad. The authors proposed a system based on real-time face recognition that is reliable, secure and fast, and requires improvement in different lighting conditions.

3. PROPOSED WORK

Systems design is a process that defines architecture, components, modules, interfaces, and data requirements. Figure [2] System design can be viewed as a system theory application for product development. The face detection technology that helps locate human face in digital images and video frames. The object detection technology that deals with detecting instances of objects in digital image and videos. The proposed automated recognition system can be divided into five main modules:

3.1. Image Capture

A camera is placed away from the entrance to capture an image of the front of the student. And a further process goes for face detection.

3.2. Face Detection and Facial Features

The appropriate and effective facial detection algorithm constantly improves facial recognition. Several facial algorithms such as face-to-face geometry, construction methods, Face geometry-based methods, Feature Invariant methods,
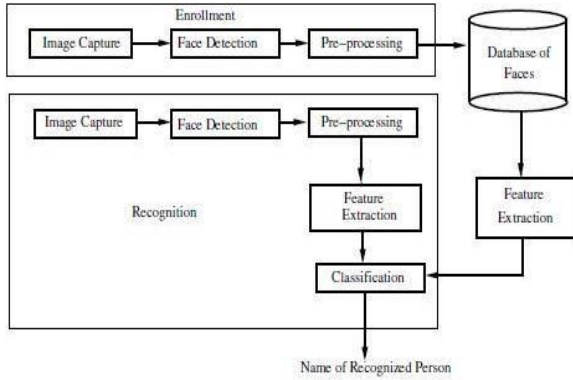

Figure 2: System Diagram

Machine learning based methods. Out of all these methods Viola and Jones proposed a framework that gives a high detection rate and is also fast. Viola-Jones detection algorithm is fast and robust. So we chose Viola-Jones face detection algorithm, which uses Integral Image and AdaBoost learning algorithm as classier. We have observed that this algorithm yields better results in a variety of lighting conditions.

3.3. Pre-Processing

Extracting the face features it is called pre-processing. This pre-processes step involves specifying the extracted facial image and transforms to 100x100. Histogram Equalization is the most commonly used Histogram Normalization technique. This improves the contrast of the image as it extends beyond the intensity of the image, making it even more clear and constraint.

3.4. Database Development

As we choose biometric based system every individual is required. This database development phase consists of an image capture of each individual and extracting the bio-metric feature, and then it is enhanced using pre-processing techniques and stored in the database.

3.5. Post-Processing

In the proposed system, after recognizing the faces of the person, the names are show into a video output. The result is generated by exporting mechanism present in the database system. These generated records can be seen in real time video. This ensures that person whose faces are not recognized correctly by the system have to check in database. And thus, giving them the ability to correct the system and make it more stable and accurate.

3.6. Proposed Algorithm

1. Capture the Person's Image.
2. Apply Face detection algorithms to detect face.
3. Use viola Jones and KLT Algorithm Extract the Region of interest in Rectangular Bounding Box.

4. Convert to gray scale, apply histogram equalization and Resize to 100x100 i.e. Apply pre-processing
   5. **if** Enrollment Phase
      then Store in Database
      else
      Apply PCA (For feature Extraction)
      end if

6. **Post-processing**

4. FEATURE SELECTION AND EXTRACTION

Throughout the past few decades there have been many face detection techniques proposed and implemented. Some of the common methods described by the researchers of the respective fields are:
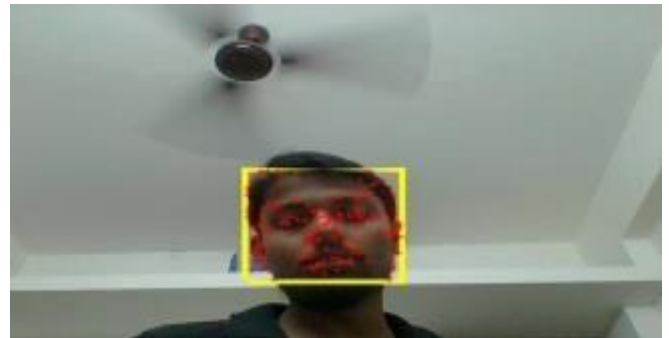

Figure 3: Extracting the face features

formulate relevant tags and categories. We can then calculate the feature vectors for each of the training images, and test image, take their dot products and return the one with the highest dot product as the match.

4.1 Principal component analysis (PCA)

In [3] Face Detector, for which several non-derived learning methods are available. These include, for example, the OpenCV based face detectors, and the Haar Cascades.Elaborate work by Viola and Jones, while later based on Gradiente's histogram. PCA is used to describe face images in terms set of base functions, or eigenfaces. Eigenface was described in early identification problems. PCA is a technique, so the process does not rely on class definition. In our implementation of eigenvalues, Euclidean distance. Multiple linear principal components analysis. However, a face picture and video are a multilinear array, this vector define a 1D vector from the face image and liner projection for the vector. I think it can help for optimization to classify the face pixels. Ever consider Use of eigenfaces for dimensional reduction of eigen values, and fisher faces for feature extraction (linear discriminant analysis). Face Detector, for which several simpler (non-deep learning) techniques are available. These include, for example, the OpenCV based face detectors, and the Haar Cascades, a seminal work by Viola

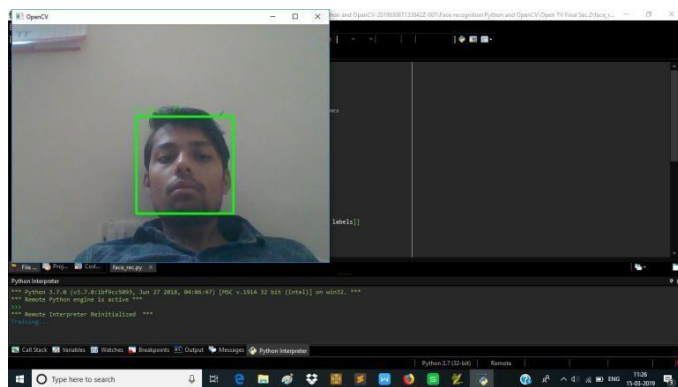and Jones, while the latter is based on the Histogram of Gradients.

Figure 4: Check the face in the data base

4.2 Neural Networks

In [4] Machine learning approaches to image recognition involve identifying and extracting important features from images and using them as input to a machine learning model. Image Rrecognition is a machine learning method, designed to mimic the way the human brain works.

5 RESULTS

With this method, the computers are taught to recognize the visual elements within by relying on large databases and noticing emerging patterns, the computers can make sense of images. If the similarity is below a threshold, you can return 'not matched' as well.
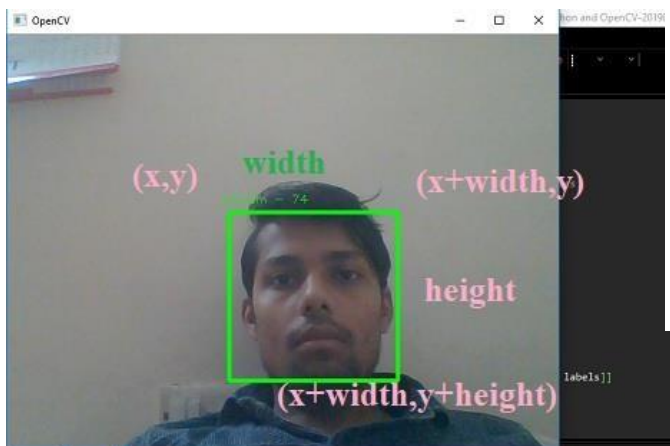
The use of neural networks for face recognition has been shown by and we can see the suggestion of a semi-supervised learning method that uses support vector machines for face recognition. The Recognition system is simple and works efficiently.

The performance of this method is compared with other existing face recognition methods and it is observed that better accuracy in recognition is achieved with the proposed method. Face Recognition using KLT algorithm [5] and Fusion of PCA and recognition plays a vital role in a wide range of applications. It is high rate accuracy applications in identifying a person is desired. This

The system has created a database by own then you do stuff with your rectangles that highlight the faces, as such:
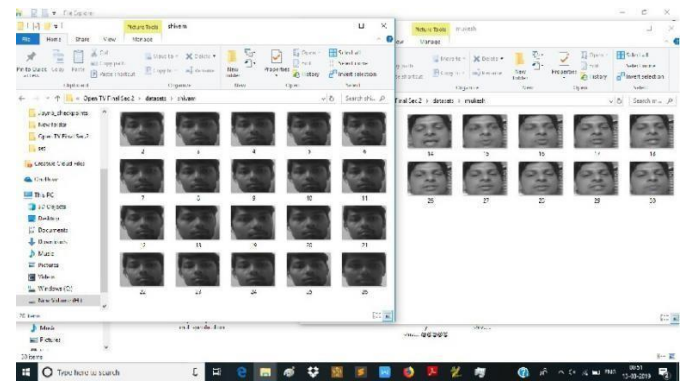

Figure 6: Training Database

Therefore, it could be said that the image of the original face can be reconstructed from the own interfaces if the proper characteristics (faces) are added in the correct proportion. Each face represents only certain features of the face, which may not be present in the original image.
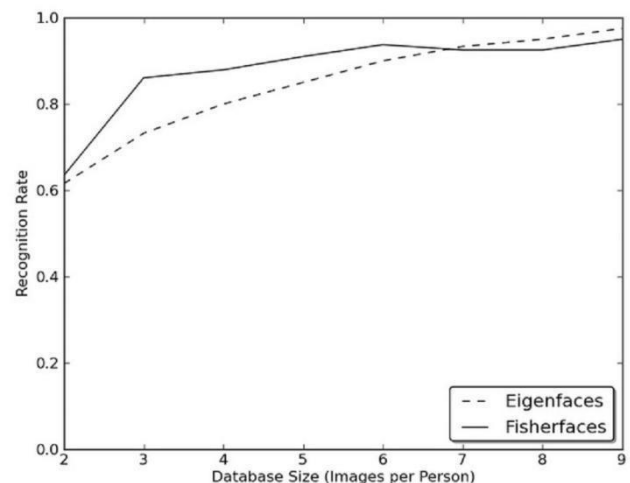

Figure 7: Database Size and Recognize Rate

✧ Demonstration of different vision systems

✧ Face detection using Haar-Cascades

database contains a distinct image. Face recognition using eigenface and LBP pattern hisrogram[8].

✧ Face recognition using Eigenface face recogniser
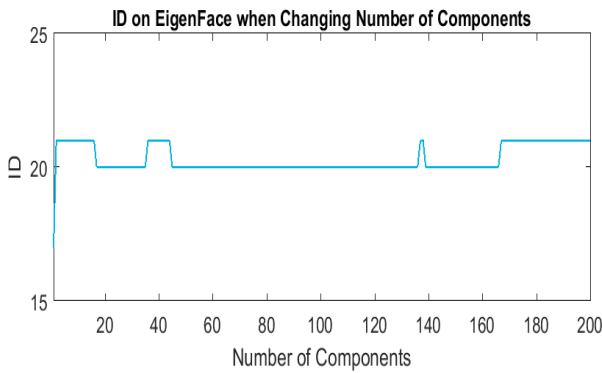✧ Face recognition using Local binary pattern histograms

Figure 8: Calculate the number of Components

6 CONCLUSIONS

In this paper, after experimenting several techniques all technique is working well face recognition. Face Recognition Systems is based on face recognition. This system can be used to identify unknown person. In real-time scenarios, PCA outperforms other algorithms. The future work is for the recognition of the algorithm. In [10], the system developed only by recognizing the 30-degree angle variations that should be improved. Gait recognition can be fused with face recognition systems. Poor lighting conditions. Our system will perform well but it is not a perfect solution.

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