Eigenface Recognition and Attendence Marking System

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Abstract- *Face recognition has been an active research area in the pattern recognition and computer vision domains. Human's day to day actions are increasingly being handled electronically, instead of face to face. Face is a complex multidimensional structure and needs good computing techniques for recognition. The main aim of Face Recognition system is to retrieve face images which are similar to a specific query face image in large face Databases. The retrieved face images can be used for many applications. In this paper we have done face recognition using Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT) and Principal Component Analysis (PCA). to varieties of test images which are rotated 15° towards right, 15° towards left, 30° towards right, 30° towards left, with low illumination and different facial expressions. Then we have developed a comparative analysis between all the three techniques based on recognition rate.*

Keywords- Matlab Based Program,Web Camera

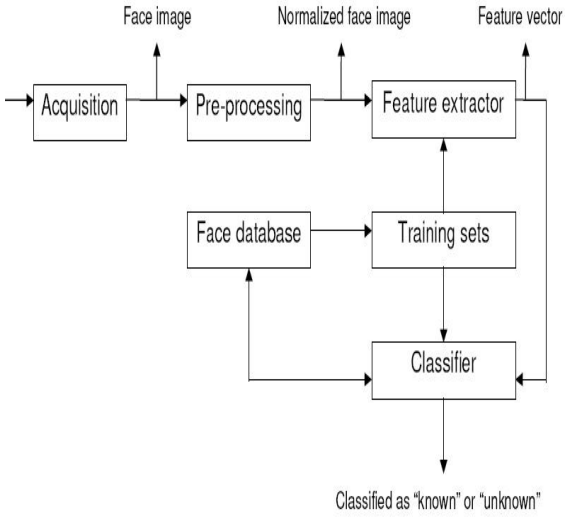
I. INTRODUCTION

The face is our primary focus of attention in social intercourse, playing a major role in conveying identity and emotion. Although the ability to infer intelligence or character from facial appearance is suspect, the human ability to recognize faces is remarkable. We can recognize thousands of faces learned throughout our lifetime and identify familiar faces at a glance even after years of separation. This skill is quite robust, despite large changes in the visual stimulus due to viewing conditions, expression, aging, and distractions such as glasses, beards or changes in hair style.

Face recognition has become an important issue in many applications such as attendance marking system,security systems, credit card verification and criminal identification. For example, the ability to model a particular face and distinguish it from a large number of stored face models would make it possible to vastly improve criminal identification. Although it is clear that people are good at face recognition, it is not at all obvious how faces are encoded or decoded by the human brain. Human face recognition has been studied for more than twenty years. Unfortunately developing a computational model of face recognition is quite difficult, because faces are complex, multi-dimensional visual stimuli. Therefore, face recognition is a very high level computer vision task, in which many early vision techniques can be involved. The first step of human face identification is to extract the relevant features from facial images. Research in the field primarily intends to generate sufficiently reasonable familiarities of human faces so that another human can correctly identify the face. Although there are three different approaches to the face recognition problem, there are two basic methods from which these three different approaches arise. The first method is based on the information theory concepts, in other words, on the principal component analysis methods. In this approach, the most relevant information that best describes aface is derived from the entire face image. Based on the Karhunen-Loeve expansion in pattern recognition, M. Kirby and L. Sirovich have shown that any particular face could be economically represented in terms of a best coordinate system that they termed "eigenfaces". These are the eigenfunctions of the averaged covariance of the ensemble of faces. Later, M. Turk and A. Pentland have proposed a face recognition method based on the eigenfaces approach. The second method is based on extracting feature vectors from the basic parts of a face such as eyes, nose, mouth, and chin. In this method, with the help of deformable templates and extensive mathematics, key information from the basic parts of a face is gathered and then converted into a feature vector. L. Yullie and S. Cohen played a great role in adapting deformable templates to contour extraction of face images.

II. PROPOSED SYSTEM

A. System Over view



Block Diagram

- **Acquisition module**

This is the entry point of the face recognitionprocess. It is the module where the face image under consideration ispresented to the system. Inother words, the user is asked to present a faceimage to the face recognition system in this module. An acquisition modulecan request a face image from several different environments: The faceimage can be an image file that is located on a magnetic disk, it can becaptured by a frame grabber or it can be scanned from paper with the help ofa scanner.

- **Pre-processing module**

In this module, by means of early visiontechniques, face images are normalized and if desired, they are enhanced toimprove the recognition performance of the system. Some or all of thefollowing pre-processing steps may beimplemented in a face recognitionsystem:

- **Image size normalization**

It is usually done to change the acquiredimage size to a default image size such as 128 x 128, on which theface recognition system operates. This is mostly encountered insystems where face images are treated as a whole like the oneproposed in this thesis.

- **Histogram equalization**

It is usually done on too dark or too brightimages inorder to enhance image quality and to improve facerecognition performance. It modifies the dynamic range (contrastrange) of the image and as a result, some important facial featuresbecome more apparent.

- **Median filtering**

For noisy images especially obtained from acamera or from a frame grabber, median filtering can clean the imagewithout loosing information.

- **High-pass filtering**

Feature extractors that are based on facialoutlines, may benefit the results that are obtained from an edgedetection scheme. High-pass filtering emphasizes the details of animage such as contours which can dramatically improve edgedetection performance.

- **Background removal**

Inorder to deal primarily with facial informationitself, face background can be removed. This is especially importantfor face recognition systems where entire information contained in theimage is used. It is obvious that, for background removal, the pre-processingmodule should be capable of determining the face outline.

- **Translational and rotational normalizations**

In some cases, it ispossible to work on a face image in which the head is somehowshifted or rotated. The head plays the key role in the determination offacial features. Especially for face recognition systems that are basedon the frontal views of faces, it may be desirable that the pre-processing module determines and if possible, normalizes the shiftsand rotations in the head position.

- **Feature extraction module**

After performing some pre-processing (ifnecessary), the normalized face image is presented to the feature extraction module in order to find the key features that are going to be used forclassification. Inother words, this module is responsible for composing afeature vector that is well enough to represent the face image.

- **Classification module**

In this module, with the help of a patternclassifier, extracted features of the face image is compared with the onesstored in a face library (or face database). After doing this comparison, faceimage is classified as either known or unknown.

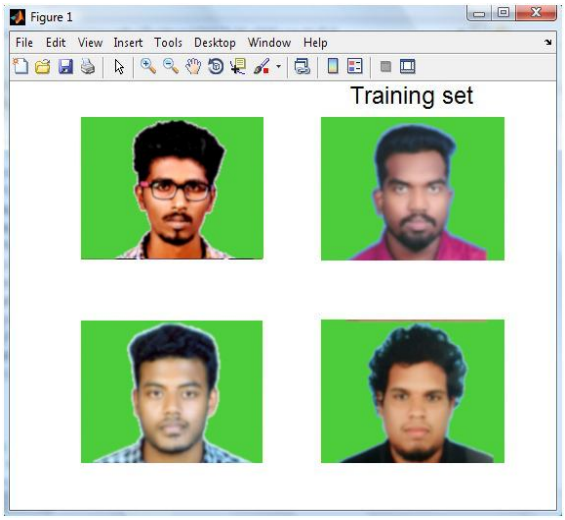
- **Training set**

Training sets are used during the "learning phase" of the facerecognition process. The feature extraction, and the classification modulesadjust their parameters inorder to achieve optimum recognition performanceby making use of training sets.

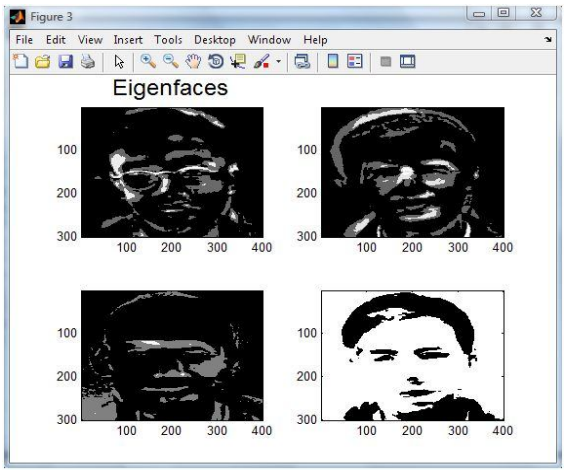
- **Face library or face database**

After being classified as "unknown", face images can be added to a library (or to a database) with their feature vectors for later comparisons. The classification module makes direct use of the face library.

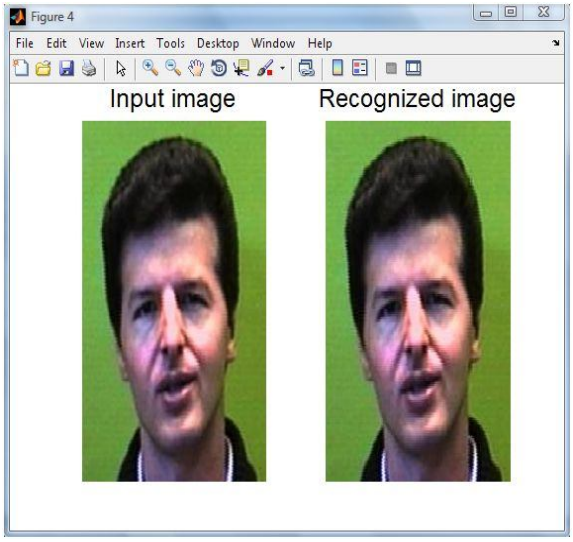
III. RESULTS

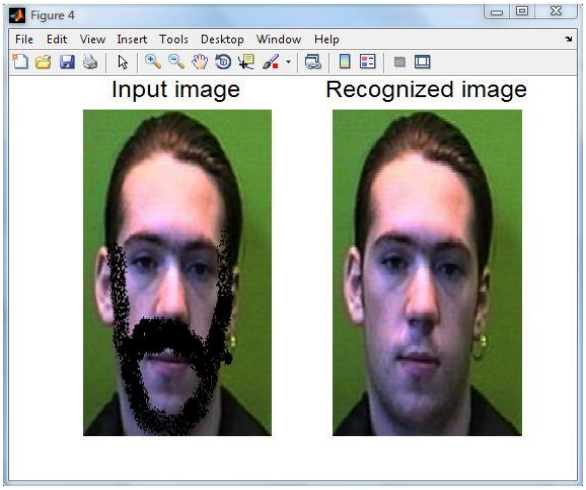


We are taking four member training set**.**



These are the eigenfaces of the four images in the training set.





IV. CONCLUSION

Face recognition is a both challenging and important recognition technique. Face recognitionapproach possesses one great advantage, which is its user-friendliness (or non-intrusiveness). In this paper, we have given an introductory survey for the face recognition technology. We have covered generic framework for face recognition, factors that may affect the performance of the recognizer, and face recognition algorithm. We hope this paper can providethe readers a better understanding about face recognition, andwe encourage the readers who are interested in this topic to goto the references for more detailed study.

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