Face Recognition Using PCA Technique

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Abstract – This paper provides the information about Face Recognition Technology which gives the much more security in the field of multimedia and information technology. To provide the protection to the data we keep the password but as we know hackers can break the password, for that we keep password as our face. Thus for accessing some network or PC by an unauthorized person is virtually impossible and it helps to protect our data. It also provides the user friendliness in human interaction with computer as there is no such physical touch. In this image is captured and stored into database in compress form. Its benefits show in retrieval and in matching. Like the applications of teleconferencing and video call, face recognition is more efficient. Most of the cameras have this application of face recognition which detects the human face and shows appropriate square box on face. In this paper there is an introductory part of this technology. This shows the generic framework and variants that are frequently use by the face recognizer. Some well known face recognition algorithms, such as PCA, Eigenfaces, will also be explained in this paper.

Key Words: *PCA Technique,* Data Flow Diagram, Principal Components Analysis (PCA)

INTRODUCTION

Now a days, its need to maintain the security of information or physical property is becoming more important because people are used to store their precious information in their mobile phones and if unfortunately their mobile phone will misplace or stolen then all their important information will be access by someone else and it also get misuse by others. As we hear about the crimes of credit card fraud, computer breaking's by hackers, etc. In most of the cases all frauds done with the help of fundamental flaw and regular information of user for accessing such as ID cards, passwords, PIN, Mother maiden name, keys, date of birth, etc. None of above information is really defining us; they are means to authenticate us. To prevent this, such applications are needed.

People want fast and accurate identification and access. Instead of pen pencil work people want all everyday action handled electronically. This growth in electronic transactions has resulted in greater demand, as it is fast and accurate user identification and authentication.

The access codes of banks accounts and computer systems often use PIN's for identification. By using proper PIN anyone can access it as there is no verification. When credit or ATM cards are stolen, an unauthorized user can often come up with the correct personal codes. Many people choose easily guessed PIN's and passwords like birthday, phone numbers, vehicle number, etc. Therefore face Recognition technology may solve this problem as the face of owner is only his face no other can access his face. The system can then compare scans to records stored in central or local database or on a smart card if it matches then system gives the access.

For security reasons face recognition is very important factor. Many applications such as security system, credit card verification and criminal identification. To find particular face and distinguish it from a large number of stored face models would make it possible to improve criminal identification.

The first step of human face identification is to extract the relevant features from facial images. It generates sufficient familiarities of human faces so that another human can correctly identified. The computer should be capable of recognizing a face with a given set of features. Certain facial characteristics are used by human beings to identify faces.

There are two basic methods from which these different approaches arise:

1. The first method is based on the Principal component analysis method. In this, the most relevant information that best describes a face is derived from entire face image. In the pattern recognition, it shows that any particular face could be economically represented in terms of a best coordinate system that they termed as Eigen face.

2. The second method is based on extracting feature vectors from the basic parts of a face such as nose, eyes, mouth, jaws, and chin. In this, with the help of extensive mathematics and deformable templates, key information from the basic parts of face is collected and converted into feature vector.

CESSITY AND OBJECTIVES

There are numbers of reason to choose face recognition technology:

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1. Other than user no one can access the information of user.
2. No issue of hacking the password.
3. Take less time to perform its operation.
4. More fast and accurate.
5. No need of physical interaction on behalf of the user.
6. Allow high enrolment and verification rates.
7. No need of an expert to interpret the comparison result.
8. Allow you to perform identification in one to many environments. E.g. identifying a terrorist in a busy airport or railway terminal.

The objectives are as follows:

1. To recognize a sample face from large set of given faces.
2. Use of Principal Component Analysis.
3. Use a simple approach for recognition and compare it with Eigen face approach.
4. Suggest which one is better. It may happen that in some cases latter may work better than former approach.

METHODOLOGY

Principal Components Analysis (PCA): It is a way to identifying patterns in data, and expressing the data in such a way as to highlight their similarities and differences. As it is very hard to find the data pattern in high dimension, therefore this methodology reduces the data without much losing its original information. It is a powerful tool for analyzing data.

The other main advantage of PCA is that as we get the patterns in data, and compress the data, i.e. by reducing the number of dimensions, without much loss of information. This technique used in image compression.

PCA works on prediction, redundancy removal, feature extraction, data compression, etc. PCA is a classical technique works in linear domain, applications having linear model are suitable such as image processing, system and control theory, communications, signal processing, etc.

There is one more method called Support Vector Machine (SVM). It is new technique for pattern recognition. SVM uses binary tree recognition strategy to tackle the face recognition problem. SVM based recognition with standard Eigen face approach using the nearest center classification.

There are component based method and two global methods for face recognition and evaluate them with respect to frequent changes in pose. In component system first locate facial components, extract them and combine them into a single feature vector. The two global systems recognize faces by classifying a single feature vector consisting of gray values of the whole face image. First it trained a single SVM classifier for each

and every face image in the database. Second consists of sets of view point specific SVM classifier and involves clustering during training.

A view based SVM face detector follows an experimental approach from the early stages of training on human face images. The approach can be as follows:
1. Investigation of face detection and pattern recognition.
2. Gathering the data.
3. Training the data.
4. Testing and Feedback.

Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face detection. One of the earliest successful systems is based on template matching techniques applied to a set of facial features, providing a sort of compressed face representation.

DATA FLOW DIAGRAM

Access Control System Based on Face Authentication Model
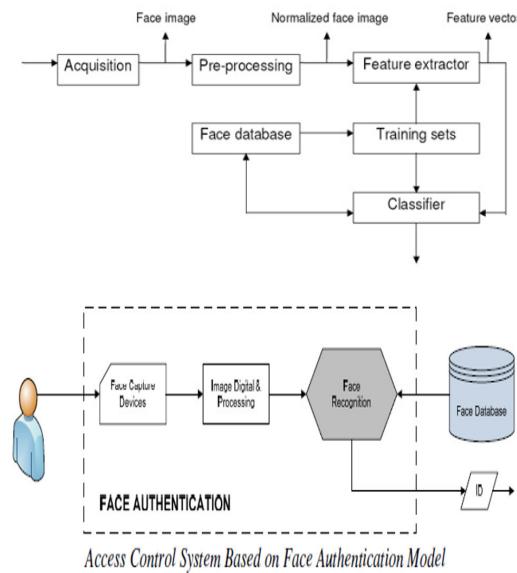
As shown in figure, first camera captures the image and trained that face image i.e. pre-processing of that image. It reduces the noise of that image and only facial part keep with coordinates with it. After that it extract the feature of that image just life eyes, nose, chin, jaws, etc. After this it compare with trained set of image to image stored in database. And according to that it classifies the image and recognize by comparing from the database.

FEATURES OF FACE RECOGNITION

There are several features of Face Recognition system:

Live face detection: It detects the face in front of camera, rather conventional system can be easily cheated by placing photo.

Simultaneous Multiple Face processing: It performs fast and accurate detection of multiple faces in live video

streams and still images. All faces on the current frame are detected.

Face image quality determination: Quality threshold can be used during face enrolment to ensure that only the best quality face image will be stored into database.

Multiple Samples of the same face: It contains multiple faces with different posses of same person thus allowing improving matching quality.

Identification Capability: It identifies the face by matching the faces from database.

RESULT
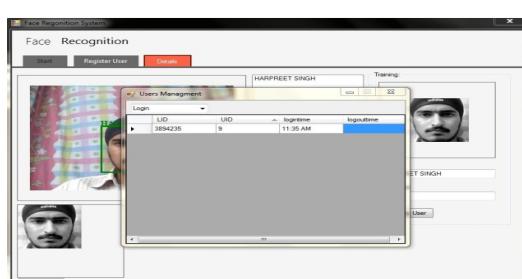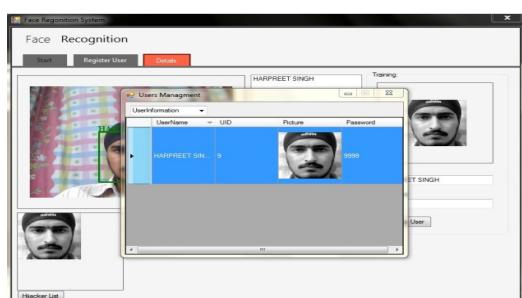
CONCLUSION

In this paper we have done with the Face Recognition using PCA technique. It is a challenging and important technique. Compare to other biometric techniques, face recognition is more efficient, fast and accurate. It is user friendliness. In this paper, we have given an introductory part for the face recognition technology. Its advantage is to provide real time security. In many devices face recognition application is implemented for security reasons. In future security of data is major concern and it is very useful for that. As this is very vast technology we covered few issues.

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