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A Review on Face Recognition Technique

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ABSRACT:
Face recognition and face detection we propose a new locality preserving projection based approach called as LPP is implemented for mapping image into subspace for analysis. This approach is different from other approaches like principle component analysis and linear discriminant analysis approaches. Face recognition , as the main biometric used by human being, has become more popular for last twenty years. Human face recognition procedure basically consist of two phases, namely face detection, where this process takes place very rapidly in human, except under conditions where the object is located at a short distance away, the next is the introduction, which organize a face as individuals

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I. INTRODUCTION:

Facial recognition is an advance technology that helps in discerning and identifying human faces from an image and video. As the necessity for higher level of security rises, technology is bound to swell to fulfill these needs. Any new creation, enterprise, or development should be uncomplicated and acceptable for end users in order to spread worldwide. This strong demand for user friendly systems which can secures our assets and protect our privacy without losing our identity in a sea of numbers, grabbed the attention and studies of scientists towards what's called biometrics.

Biometric is the emerging area of bioengineering it is the automated method of recognizing person based on a physiological or behavioral characteristic. There exist several biometric system such as signature, fingerprint, voice, iris, retina hand geometry, ear geometry, and face. Among these systems, facial recognition appears to be one of the most universal, collectable, and accessible systems.

Biometric face recognition otherwise known as Automatic face recognition (AFR).

II. FACE RECOGNITION PROCESS:

Regardless of the algorithm used, facial recognition is accomplished in a five step process.

- Acquisition.
- Pre- processing.
- Face detection.
- Feature extraction.
- Declaring a match

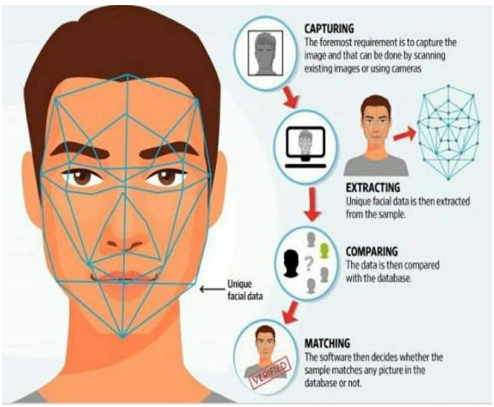

FIG: Face recognition process

2.1 Image acquision:-

Image acquisition can be accomplished by digital scanning an existing photograph or by using an electro-optical camera to acquire a live picture of a subject. Video can also used as a source of facial image. The most existing facial recognition systems consist of a single camera. The recognition rate is relatively low when face image are in various pose and expression and different illumination. With increase of the pose angle, the recognition rate decreases. The recognition rate decreases greatly when the pose angle is larger than 30 degrees. Different illumination is not a problem for some algorithms like LDA that can still recognize face with different illumination, but this is not true for PCA. . To overcome this problem, we can generate the face image with frontal view, moderate facial expression, and same illumination if PCA is being used.

2.2 Image preprocessing:

For recognition algorithm have a deal with significant amount of illumination variations between gallery and probe images. For this reason, image preprocessing algorithm that compensate for illumination variations in image is used prior to recognition. The image used as gray scaled.

Histogram equalization is used here to enhance important features by modifying the contrast of the image, reducing the noise and thus improving the quality of an image and improving face recognition. It is usually done on too dark or too bright images. The idea behind enhancement techniques is to bring out detail that is obscured, or simply to highlight certain feature of interest in an image. Images are enhanced to improve the recognition performance of the system.

2.3 face detection:

Face detection is a computer technology that determines the location and size of human face in arbitrary image. It detect facial features and ignore anything else, such as buildings, trees and bodies. Face detection can be regardless as special case of object-class recognition, a major task in computer vision. Software is employed to detect the location of any face in the acquired image. Generalized patterns of what a face look are employed to pick out the faces.

The method devised by Viola and Jones, that is used here, uses Haar like features. Even for a small image, the number of haar like feature is very large, for a 24*24 pixel window one can generate more than 180000 features.

2.4. Feature extraction:

This module is responsible for composing a feature a feature vector that is well enough to represent the face image. Its goal is to extract the relevant data from the captured sample. Feature extraction is divided into two categories, the holistic feature category and the local feature category. Local feature bases approaches try to automatically locate specific facial features such as eyes, nose and mouth based on known distance between them. The holistic feature category deals with the input face image as a whole.

Different methods are used to extract the identifying feature of a face. The most popular method is called Principle Component Analysis (PCA) , which is commonly referred to as the Eigen face method. Another method used here is called liner discriminant analysis (LDA), which referred to as the fisher face method. Both LDA and PCA algorithms belong to the holistic feature category.

Template generation is the result of the feature extraction process. A template is the reduced set of data that represents the unique feature of an enrollees face consisting of weights of each image in the database.

2.5 Declaring a match:

The last is to compare the template generated in step four with those in a database of known faces. In an identification application, the biometric device reads a sample and compares that against every record or template in the database, this process returns a match or a candidate list of potential matches that are close to the generated templates in the database. In a verification application, the generated templates is only compare with one template in the database that of the claimed identity, which is faster.

Closest match is found by using the Euclidean distance which finds the minimum distance between the weight of the input image and the set of weights of all images in the database.

III. LITERATURE REVIEW OF FACE RECOGNITION TECHNIQUES:

Several algorithms and techniques for face recognition have been developed in the past by researchers. These are discussed briefly in this section.

Face Recognition Based on Independent Component Analysis:

A number of current face recognition algorithms use face representations found by unsupervised statistical methods. Typically these methods find a set of basis images and represent faces as a linear combination of those images. Principal component analysis (PCA) is a popular example of such methods. The basis images found by PCA depend only on pair wise relationships between pixels in the image database. In a task such as face recognition, in which important information may be contained in the high-order relationships among pixels, It seems reasonable to expect that better basis images may be found by methods sensitive to these high-order statistics. Independent component analysis (ICA), a generalization of PCA, is one such method. We used a version of ICA derived from the principle of optimal information transfer through signoidal neurons. ICA was performed on face images in the FERET database under two different architectures, one which treated the images as random variables and the pixels as outcomes, and a second which treated the pixels as random variables and the images as outcomes.

The first architecture found spatially local basis images for the faces. The second architecture produced a factorial face code. Both ICA

representations were superior to representations based on PCA for recognizing faces across days and changes in expression. A classifier that combined the two ICA representations gave the best performance.

Eigen-spaces:

Eigen space-based face recognition corresponds to one of the most successful methodologies for the computational recognition of faces in digital images. Starting with the Eigen face algorithm, different Eigen space-based approaches for the recognition of faces have been pro-posed. They differ mostly in the kind of projection method used (standard, differential, or +kernel Eigen space), in the projection algorithm employed, in the use of simple or differential images before/after projection, and in the similarity matching criterion or classification method employed. The aim of this paper is to present an independent comparative study among some of the main Eigen space-based approaches.

We believe that carrying out independent studies is relevant, since comparisons are normally performed using the implementations of the research groups that have proposed each method, which does not consider completely equal working conditions for the algorithms. Very often, a contest between the abilities of the research groups rather than a comparison between methods is performed. This study considers theoretical aspects as well as simulations performed using the Yale Face Database, a database with few classes and several images per class, and FERET, a database with many classes and few images per class.

Elastic Bunch Graph Matching

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. Landmark Model Matching depends solely on Gabor wavelets for feature extraction to locate the landmarks (facial feature points). We show that improvements can be made by combining gray-level profiles with Gabor wavelet features for feature extraction. Furthermore, we achieve improved recognition rates by hybridizing Gabor wavelet with eigen face features found by Principal Component Analysis, which would provide information contained in the overall appearance of a face. We use Particle Swarm Optimization to fine tune the hybridization weights. Results of both fully automatic and partially automatic versions of all methods are presented. The best-performing method improves the recognition rate up to 22.6speeds up the processing time by 8 times over the Elastic Bunch Graph Matching for the fully automatic case

Linear Discriminant Analysis

Both PCA and ICA do not use face classinformation. Linear Discriminant Analysis (LDA) finds anecient way to represent the face vector space by exploiting the class information. It differentiates individual faces but recognizes faces of the same individual].LDA searches for vectors in the underlying space that best discriminate among classes. For all the samples of all classes, two measures are defined.

Theory Methodology and Algorithm:

The previous sections illustrate different techniques and methods of face detection and recognition. Each category of method performs well in certain criteria and also has drawbacks as well. Systems with robustness and certain level of accuracy are still far away. Keeping in view case study the following architecture is proposed for the detection and recognition system. As discussed earlier that the robust system catering the needs of real world situation is a challenging task. The images will be scanned by scanner and stored into database. Again the image will be scanned and stored into the database. Now two images of the same candidate will be stored into the database. The first step is to select desired images from the database then for comparisons them the next step is to detect faces from each image. The next step is to recognize that images as of the same candidate or not.

IV. CONCLUSION:

Face recognition system must be able to recognize a face in many different imaging situations. It will find faces efficiently without exhaustively searching the image. Face recognition system are going to have widespread application in smart environments.

Face recognition technologies have been associated generally with very costly top secure applications.

Today the core technologies have evolved and the cost of equipment is going down dramatically due to the integration and the increasing processing power. Certain applications of face recognition technology are now cost effective, reliable and highly accurate. This system can be effectively used in ATM's ,identifying duplicate voters, passport and visa verification, driving license

verification, in defense, competitive and other exams, in governments and private sectors.

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