

SMART FACE RECOGNITION SYSTEM BASED ON FEATURE ANALYSIS USING PCA

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ABSTRACT : Face Recognition System is computer application system. Face recognition is one of the most important image processing research topics which is widely used in personal identification, verification and security applications. This paper presents an efficient Face Recognition System using Principle Component Analysis. Principal Component Analysis PCA is one of the feature extraction techniques, commonly used in human facial recognition systems. PCA is applied to calculate the feature projection vector of a given face. The implementation of research is on image toolbox under MATLAB software.

KEYWORDS: Smart Face Recognition, PCA, face matching, feature based analysis

1. INTRODUCTION

With the rapid development of mobile devices and communication technologies, protecting personal information is becoming an important issue and safety must be considered seriously. There are various ways to protecting personal information of user. Traditionally, mobile devices secured by the password system. However, it has demerits that other person can easily find out the password of device.

To overcome this issue, biometrics technology commonly used in protecting personal information. Biometric technology is a recognition technology using the body state information of a person. Biometric technologies use voice ,iris ,fingerprint or face. At present commercialized and extensively used biometrics methods are finger vein recognition at an entry/exit door, face recognition of google android phones ,fingerprint recognition of apple iphone and voice recognition.

Each recognition method has its merits and demerits. The voice recognition rate is heavy influence from the language and the recognition rate of iris and fingerprint is high. Face recognition gets heavy influence from the various variables such as lighting, posture, occlusion, cosmetics surgery or makeup. Now a day Face Recognition becomes very popular research area for the researcher.

Facial recognition systems are currently used in a wide variety of applications including biometrics, pattern recognition and analysis, image processing and computer vision which in turn have led to various real world applications, e.g., robotics, crowd surveillances, access controls and criminal forensics .

Facial recognition is the process used to automatically identify and/ or verify a face from an image. The image is usually an unanimated image of a human (person) face in a digital picture snapshot or a video frame. There are several techniques used to achieve the recognition, one of which is to compare selected facial features, i.e., feature based extraction. [1]

2. FACE RECOGNITION SYSTEM

Typically, there are four main modules in a traditional facial recognition system: Acquisition, pre processor, feature extraction and classification. Training involves the use of images acquired from various inputs, e.g., captured photos and scanned images (Acquisition); face images are fed as inputs into the pre processing stage, e.g., image sizing, grayscale transformation and background removal including various normalization techniques (pre processor). Then, the system extracts the main features of the images (feature extraction).

The testing process is quite similar to that of the training but it requires a few more steps. After the test image has passed through the training process to produce a proper normalized face image, the image will be fed into a face image classifier to figure out the least feature matching distance between testing and trained features (Classification).[2]

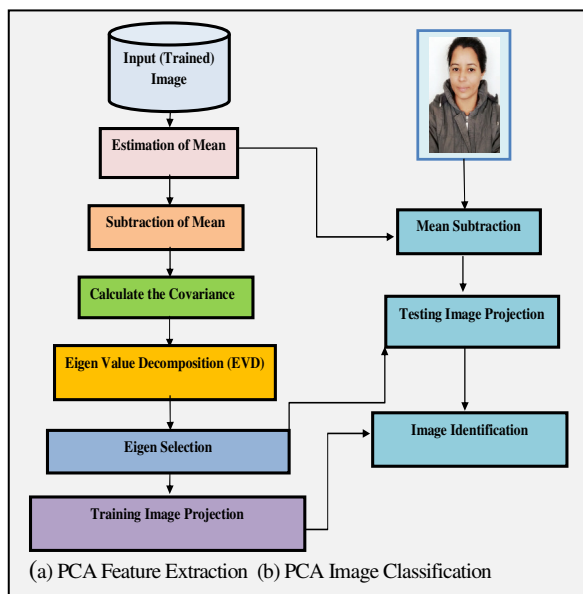


Figure 2.1 PCA Face Recognition Systems [4]

3. APPLICATION OF FACE RECOGNITION

1. Face Identification
2. Access Control
3. Security
4. Image data investigation
5. General identity verification
6. Surveillance [3]

4. PREVIOUS RESEARCH ON FACE RECOGNITION

The author Navpreet Kaur (Universal Group of Institutions, India) did her research on Face Recognition and published it in IJCST, Volume 4 Issue 3, May-Jun, 2016. "The title of the paper was Review of Face Recognition System using MATLAB". She has highlighted at importance of Face Recognition and gave the solution to the problem about how to best recognize the face using PCA. The hybrid model of PCA and Neural Network provides improvement in existent problem. Navpreet kaur found the best result using the PCA algorithm.[4] The author bruce poon, M.Ashrafal amin and hong yan did their research on face recognition and published it in proceeding of the international multi conference of engineers and computer scientists 2017 vol 1,IMECS 2017,march 15-17,2017,hong kong."The title of the paper was PCA based Human Face recognition with improved method for distorted images due to facial makeup".They used improved method for distorted images due to facial makeup and recognised the by the imposed method and found the best results. [5]

5. PCA INTRODUCTION

PCA is used to extract features from an image of human face. Principal component analysis (PCA) algorithm is used to extract features from a cropped and resized face image. It is used as a tool in predictive analysis and in explanatory data analysis and is used to transform higher dimensional data into lower dimensional data. A bunch of facial images in a training set of size $M \times M$ are converted into lower dimensional face images by applying principal component analysis technique.[6]

6. CONCLUSION

This paper has attempted to review a significant number of papers to cover the recent development in the field of face recognition. The paper presents an efficient approach for face recognition using the principal component analysis technique. The performance of the PCA method is compared with other existing face recognition methods and it is observed that better accuracy in recognition is achieved with the PCA method.

7. REFERENCES:

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