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Face Identification Using Statistics Theory Concept

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ABSTRACT: The face is the primary focus of attention in the society, playing a major role in conveying identity and emotion. Face recognition has become an important issue in many applications such as security systems, credit card verification, criminal identification etc. Developing a computational model of face recognition is quite difficult, because faces are complex. Face recognition is a very high level computer vision task, in which many early vision techniques can be involved.

KEYWORDS: Face recognition, Eigen Faces, Feature Vector, Image processing, Face Image.

1. INTRODUCTION

Face recognition is an efficient system to recognize faces from images with some near real-time variations. Our approach essentially was to implement and verify the algorithm Eigen faces for Recognition which solves the recognition problem for 2-D image of faces, using the principal component analysis. The face images are projected onto a face space (feature space) which best defines the variation the known test images. Which are the eigenvectors of the set of faces. The projections of the new image in this feature space are then compared to the available projections of training set to identify the person. Further, the algorithm is extended to recognize the identity and generally a person with different orientations and certain variations like scaling.
The face is the primary focus of attention in the society, 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. A human can recognize thousands of faces learned throughout the lifetime and identify familiar faces at a glance even after years of separation. This skill is quite robust, despite of 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 security systems, credit card verification, criminal identification etc. Even the ability to merely detect faces, as opposed to recognizing them, can be important. Although it is clear that people are good at face recognition, it is not at all obvious how faces are encoded or decoded by a human brain. Human face recognition has been studied for more than twenty years. 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.
For face identification the starting step involves extraction of the relevant features from facial images. A big challenge is how to quantize facial features so that a computer is able to recognize a face, given a set of features. Investigations by numerous researchers over the past several years indicate that certain facial characteristics are used by human beings to identify faces.

II. FACE RECOGNITIAION SYSTEM

There are two basic methods for face recognition. The first method is based on extracting feature vectors from the basic parts of a face such as eyes, nose, mouth, and chin, with the help of deformable templates and extensive mathematics. Then key information from the basic parts of face is gathered and converted into a feature vector. Yullie and Cohen used deformable templates in contour extraction of face images.[6] Another method is based on the information theory

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concepts viz. principal component analysis method. In this method, information that best describes a face is derived from the entire face image. Based on the Karhunen-Loeve expansion in pattern recognition, Kirby and Sirovich has shown that any particular face can be represented in terms of a best coordinate system termed as "eigenfaces". These are the Eigen functions of the average covariance of the ensemble of faces. Later, Turk and Pentland proposed a face recognition method based on the eigenfaces approach.[7]

An unsupervised pattern recognition scheme is proposed in this paper which is independent of excessive geometry and computation. Recognition system is implemented based on eigenface, PCA and ANN. Principal Component analysis for face recognition is based on the information theory approach in which the relevant information in a face image is extracted as efficiently as possible.[8] Further Artificial Neural Network was used for classification. Neural Network concept is used because of its ability to learn from observed data.[5]

III. EXISTING SYSTEM

Face recognition can be applied for a wide variety of problems like image and film processing, human-computer interaction, criminal identification etc .No high security.[4] Better than K-means and C-means method

3.1 Proposed System

The proposed a methodology for face recognition based on information theory approach of coding and decoding the face image[3]. Proposed methodology is connection of two stages – Feature extraction using principle component analysis and recognition using the feed forward back propagation Neural Network. The algorithm has been tested on 400 images (40 classes).[8] A recognition score for test lot is calculated by considering almost all the variants of feature extraction.

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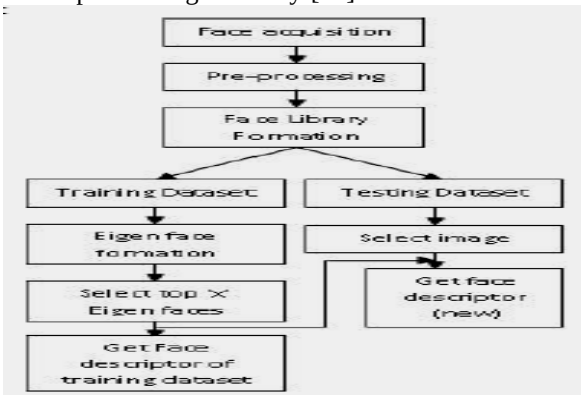
First method is based on the information theory concepts viz. principal component analysis method. In this method, information that best describes a face is derived from the entire face image.[9]

The second method is based on extracting feature vectors from the basic parts of a face such as eyes, nose, mouth, and chin, with the help of deformable templates and extensive mathematics.[2]

3.1.1 Advantages

Proposed technique gives a better recognition rate then the other Methods (K-means, Fuzzy Ant with fuzzy C-means).[1] The eigenface method is very sensitive to head orientations, and most of the mismatches occur for the images with large head orientations. So provide high security.[10]



IV. PROPOSED TECHNIQUE

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4.1 Face acquisition

This describes the basic input of the given image. Here first face image capturing take place the input of the image is pixel format.

Input: Face image
Output: calculation of pixel and recognition

4.2 Preprocessing

Image size normalization, histogram equalization and conversion into gray scale are used for preprocessing of the image. This module automatically reduce every face image to X*Y pixels (based on user request), can distribute the intensity of face images (histogram equalization) in order to improve face recognition performance. Face images are stored in a face library in the system[11]. Every action such as training set or Eigen face formation is performed on this face library. The face library is further divided into two sets – training dataset (60% of individual image) and testing dataset (rest 40% images)

4.3 Eigen Recognition

The face library entries are normalized. Eigenfaces are calculated from the training set and stored. An individual face can be represented exactly in terms of a linear combination of eigenfaces. The face can also be approximated using only the best M eigenfaces, which have the largest eigenvalues. It accounts for the most variance within the set of face images. Best M eigenfaces span an M-dimensional subspace which is called the "face space" of all possible images. For calculating the eigenface PCA algorithm [5], [8], was used. It includes the calculation of the average face) in the face space and then further compute each face difference from the average. The difference is used to compute a covariance matrix (C) for the dataset. The covariance between two sets of data reveals how much the sets correlate. Based on the statistical technique known as PCA, the number of eigenvector for covariance matrix can be reduced from N (the no. of pixels in image) to the number of images in the training dataset. Only M eigenfaces of highest eigenvalue are actually needed to produce a complete basis for the face space.[12]

4.4 Features

Proposed technique gives a better recognition rate then the other Methods (K-means, Fuzzy Ant with fuzzy C-means).The eigenface method is very sensitive to head orientations, and most of the mismatches occur for the images with large head orientations.[13] So provide high security

V. CONCLUSION

Face recognition problem is made difficult by the great variability in head rotation and tilt, lighting intensity and angle, facial expression, aging, etc. Some other attempts at facial recognition by machine have allowed for little or no variability in these quantities.[14] Yet the method of correlation (or pattern matching) of unprocessed optical data, which is often used by some researchers, is certain to fail in cases where the variability is great. In particular, the correlation is very low between two pictures of the same person with two different head rotations. The Proposed eigenfaces used for feature extraction and recognition rate was recorded. This project presents a face recognition approach using PCA and Neural Network technique. The project presents a face recognition approach using PCA and Neural Network techniques. The result is compared with K-means, Fuzzy Ant with fuzzy C-means and proposed technique gives a better recognition rate then the other two.[15]

VI. FUTURE ENHANCEMENT

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Increase the resolution. Increase the database size. High-resolution face images, 3-D face scans, and iris images were used in the tests. The results indicated that the new algorithms are 10 times more accurate than the face recognition algorithms of 2002 and 100 times more accurate than those of 1995. Some of the algorithms were able to outperform human participants in recognizing faces and could uniquely identify identical twins.

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