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FACE RECOGNITION USING EIGENFACES

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Abstract: Face recognition is one of the major challenges and is the most popular research areas in the computer vision. People in sustaining computer vision and pattern recognition have been working on direct recognition of human faces for the last 20 years. Computer can perform many face recognition through the development technique “eigenfaces”. Since, large database of faces must be searched. We use principal component analysis with “Eigenface” approach due to its simplicity, speed and learning capability. The design of the face recognition system is based upon “eigenfaces”& its approaches. The propose work is based on the well-known approach of eigenvalues. The original images of the training set are transformed into a set of eigenfaces E. Then, the weights of images are calculated for each image of the training set and stored in the set W. Upon observing an unknown image Y, the weights are calculated for that particular image and stored in the vector WY. The results indicate the proposed recognition strategy through eigenfaces works sophistically.

Keywords: Feature vector, eigenfaces, eigenvalues, eigenvector, PCA

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INTRODUCTION

Face recognition system is the major component for the security system. We find the security of the face image and recognition through Eigensapce- based security. We capture face through camera, Video image capturing and database image to match through Eigenspace based. The face is the focus of attention in face recognition, in the method face of face recognition we identify the conveying identity and emotion of the face. Computational model of face recognition system is a particular face is interesting because we identify and recognize the particular face. In the face recognition developing the computational model is quite difficult because the co-ordinate of the face is quite difficult and complex. Face recognition subdivides a face into its constituent co-ordinate or object.

Suppose the face of an image f(x,y) is co-ordinate of the object. The face intensity levels of the co-ordinate or the image of the value T is selected in such a way that it separates the object and the background. The condition for selecting T is given as

I (x,y) = 1 if f (x,y)> T

0 if f(x,y)<=T

The Eigenspace approach to the face recognition for the following operation:

i) The training set of the face.

ii) Keeping only the f1 faces define the face space.

iii) Calculate the image based input of the M1 dimension.

II. SIMILARITY VECTOR

The first face of the image in the training set is grouped according to their view and the image is used to build an eigenspace. The finally the similarity of vector of the input face is compared with the stored similarity vectors of the image using correlation.

III. SPECIFIC EIGENSPACE REPRESENTATION

By assuming the training face set first grouped into the training face. And the same view are used to build I to the same view are used. For n1 view, there are n1 sets of view eigenspace recognition. By assuming the training image face to be M1 x N1, these face can be represented the left to right and top to bottom. Let x1, x2, x3 - - - - - - - xp be the P training face.

The training face is1 isolated

$$C=\frac{1}{p}\sum_{i=1}^{p}(X_i - A)(X_i - A)T$$

Where A is the average training face.

These eigenvectors can be thought of as a set of features that together characterize the variation between face images. Each image location contributes more or less to each eigenvector, so that it is possible to display these eigenvectors as a sort of ghostly face image which is called an "Eigenface".

An N x N matrix A is said to have an eigenvector X, and corresponding Eigenvalue λ if AX = λX.

The eigenfaces span an M' dimensional subspace of the original *N*2 image space. The M' significant eigenvectors of the L matrix are chosen as those with the largest associated Eigenvalues.

A new face image (Γ) is transformed into its Eigenface components (projected onto "face space") by a simple operation,

$$w^k = \mathrm{U}_k^T(\Gamma - \Psi)$$

IV. REBUILDING A FACE IMAGE WITH EIGENFACES

A face image can be approximately reconstructed (rebuilt) by using its feature vector and the eigenfaces as

Γ ‘=Ψ + Φ f

Where

*w*Σ==wjuj

V. FACE RECOGNITION

During the training phase, the similarly vectors for each sample view of the persons to be structured and construct and stored using procedure.

In the face recognition phase the similarly vector of the input face and stored database face are matching and the normalized between the vectors Va and Vb is calculated as

Cal (Va, Vb) = $\sum_{i=1}^{p}(d_a - d_b)$

A correct match of the average face and value of the right image.

Algorithm of Eigenface computation:

The steps are:

Step 1: Compute an average face.

Step 2: Build a covariance matrix.

Step 3: Compute eigenvalues and Eigenvector

Step 4: Select only largest Eigenvalues (and its corresponding eigenvectors)

Step 5: Compute the faces using our Eigenvectors

Step 6: Compute our eigenspace for our given images.

Step 7: From then the rest of the algorithm (trying to match a face) has to be called in Face Bundle.

Step 8: param face_v 2-D array. Has to have 16 rows. Each column has to have the same length. Each row contains the image in a vector representation.

Step 9: param width the width of the image in the row-vector in face_v.

Step 10: param height the height of the image in the row-vector in face_v.

Step 11: param id the string representing each of the sixteen images.

Step 12: return A Face Bundle usable for recognition.

VI. EXPERIMENT

In the method of face recognition evaluated using the face database and finds the similarities of the vector. In the eigenspace. In the whole features of the face view and the role of the face moth in relatively important. We have recognized the validity of this approach to face recognition; we have performed experimental with stored face and locate the face.

VII. CONCLUSION

In this paper, there are two major approaches to the face recognition problem have been studied and a face recognition system based on the eigenfaces approach was proposed. Major properties of these two approaches are:

• *Feature based facial recognition* makes*:* use of the individual properties of the organs that are found on a face such as eyes, mouth and nose as well as their relationships with each other. Most common way of evaluating these features is the use of deformable templates and active contour models. Facial features are located firstly by a rough contour estimation method, and then by minimizing some energy function, exact locations are extracted. The basic characteristic of this approach is its dependency on extensive geometry.

• *Principal component analysis and proposed face:*, approaches to the face recognition problem by means of information theory concepts. It is the most relevant information that is contained in a face is extracted. Eigenfaces method is a principal component analysis approach, where the eigenvectors of the covariance matrix of a small set of characteristic pictures are sought. The Eigenfaces have been proposed to the major facial and matrix of the face recognition.

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