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Face Recognition And Detection Method With Image Based Security Access Control System

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1.0 INTRODUCTION.

With the help of biometrics there are many methods to identify the human identification in face recognition and detection. In this process, we have to collect the datasets and to calculate the evaluation method for video based face detection and recognition. This method is the most important part for the computational model for human perception system. It can be used for different applications such as protection access control, fault detection method, collection of images stored in database and so on. In this process , video-based face recognition was identified in a capable stage. For the past years, this method has developed more secure and used in a technical manner. Many of them can easily give their efforts and easily identify the face modeling and tracking. In this paper we have to create the new databases and also evaluate the recognition techniques. Nowadays, the energetic applications like pattern recognition, image analysis etc can easily detect the face recognition.

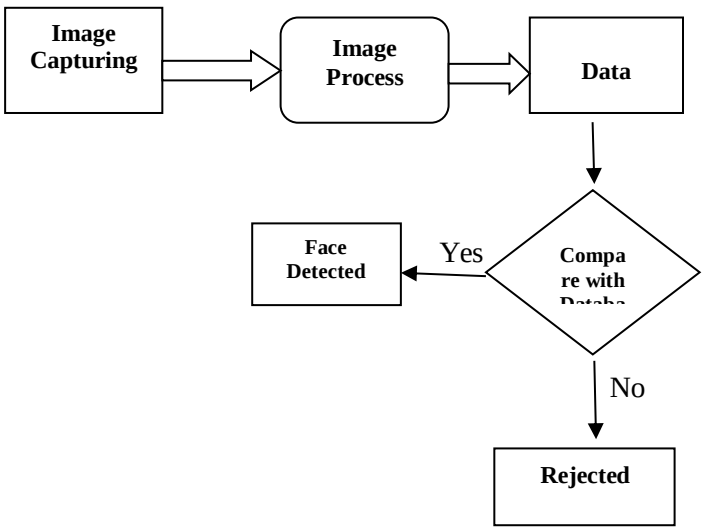

Figure A.1 Face Recognition System

2.0 RELATED WORKS

R.C.Gonzales [2] suggested that the methods such as neural network, they can use the facial expression recognition and detection techniques. There are so many methods used in facial recognition and they extract the types of eigen faces in a sequence order. Wright, J. and Yi Ma and Mairal [9] anticipated that they used the method called robust face recognition. Then the images are extracted from the highest deviation where as the pruning algorithm are developed to improve the best quality and also increase the speed of the databases. Although it automatically identify the images by using the multi face algorithm.

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The identified images are extracted with PCA and DCT methods. Then all the images will be compared with the original image. After all the process will be done they selected the similar comparison of the images. Fazl-Ersi, E.Tsotsos, J.K.[4] proposed that they used the technique such as pattern recognition , face detection ,computer vision, etc. AdaBoost [5] evaluated the new set of representation of images and their features whereas they used the boosting algorithm like Local Binary Pattern, support vector machine, etc. Adaboost [5] has reduced the non generative tree structure for fast and strong interferences. Haar [6] proposed that there are so many benefits and also they used the basic functions to increase the speed and intensity difference. Haar [6] suggested that basis functions for calculating the amount of different values and also they are easy to evaluate. In order to implement the system it has so many features and that features must be very large, by using the boosting algorithm and it limits the small number of significant values.

3.0 FACE RECOGNITION

In this method there are so many features like expressions, classification and has so many modifications. In face detection they focused three techniques like eigen faces, Local binary pattern, and Principal component analysis that's used to calculate the speed and accuracy and also identify the matches. we tried Eigenfaces, Principal component analysis (PCA)and Local Binary Pattern Histograms (LBPH) methods to compare with each other. It will be easily identified the pixel level such as facial expression, varying the images, etc. It is a new process that is easily developed and compared for texture analysis. In this method the Eigen faces will be considered as 2D face recognition problem to turn the face up and right. It is not required that the 3D information about the face can reduce the large bit. This set of images will be easily converted in to their general components as it is more efficient to declare the data. It is commonly decrease the computational effort.LDA is used to decrease the number of features for recognition as the face is detected by a large number of pixels. Each and every dimension in the pixel values form a pattern. Local Binary Pattern [8] is a sorting order set of binary comparisons of pixel intensities between the pointed pixel and its closest pixels.

Lbp (xa,ya) = 7Σn=0 s(im - ia) 2n ----------Eq (1)
That is ia represents the value of the pointed pixel (xa,ya), im represents the corresponding closest pixels, such that function f(x) is defined as:

$$f(x) = \begin{cases} 1 & \text{if } x>=0 \\ 0 & \text{if } x<0 \end{cases}$$

Gabor filters the properties such as spatial localization, orientation selectivity, and spatial frequency characteristics. Gabor suggested that the transformations are designed for face recognition but also used for trained the data. Moreover Principal component analysis [9] and Linear discriminant analysis [10] classifier consider global features whereas Local binary pattern [8] and Gabor classifier consider local features, according to the following results are shown below in the table.

Table A.1. Face recognition results summary

Dataset	Recognition			
	Principal Component Analysis	Linear Discriminant Analysis	Local Binary Pattern	Gabor
[1]	72.11	79.40	85.92	93.48
[2]	69.85	76.62	80.46	89.75
[3]	70.94	78.35	84.15	92.69

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[4]	75.79	82.93	86.44	96.92
[5]	68.05	73.20	77.68	88.95
Mean	71.34	78.1	82.93	92.3

4.0 DATASET

Five datasets have been used for the above table. In the first dataset, there is no head scale and similar variation and also slight difference in turning the head, face position and modify the expressions. In the second dataset, face with red background and also slight variation an also minor changes in turn, translation in the position of the image moves forward and also simple changes in arrangement. In the third dataset, also similar changes like head turn, some different translating images with light variation also. In fourth dataset faces are in plain background, small variation and also light variation. In the fifth dataset face collection with irregular background having simple variation and also big expression and face position.

5.0 PRINCIPAL COMPONENTS ANALYSIS

PCA is one of the geometric methods that uses an orthogonal conversion to translate a set of interpretation of possibly correlated variables into a set of values of linearly uncorrelated variables is called principal components. It is the first component for largest possible variance, and also in each component, it has the highest variance under that constraints. The outputting vectors such as linear combination of the variables and it also contain n number of observations can be an uncorrelated orthogonal basis sets. This algorithm is very responsive compared to the scaling of the unique variables. PCA is a very useful reduction technique used in all other applications. PCA condenses information from a large set of variables into fewer variables by applying some sort of transformation onto them. The transformation is applied in such a way that linearly correlated variables. Correlation tells us that there is redundancy of information and if there is any redundancy can be reduced, then the information can be compressed. For Example if there are two variables in the variable set which are highly correlated, and then we are not gaining any extra information by retaining both the variables because one can be nearly expressed as the linear combination of other. In such cases, PCA transfers the variance of the second variable onto the first variable by translation and rotation of original axes and projecting onto new axes. The direction of projection is determined using Eigen values and Eigen vectors. So the very few transformed features contain mostly with noise with negligible information with them. This transferability allows us to retain the first few principal components thus reducing the number of variables significantly with minimal loss of information.

As far as this method is divided into four as: i) Preprocessing ii) In PCA decrease the dimension iii) feature extraction using LDA and iv)sorting using neural network. Based on the first two methods, it can improve their capability and it decreases the number of objects. The experimental results based on the database can also compared with the previous methods. In face detection, a special approach can minimize the time and also accuracy.

There are three types of distances such as:

A).City block (Manhattan) distance: The interval between two points considered along axes at right angles. It is termed as $d(x-y)=|x-y|=\sum x_i-y_i$ -----Eq..2

B). Euclidean Distance: It means the normal straight-line interval among two points in their corresponding space. It will be defined as $d(x-y)=|x-y|=\sum(x_i-y_i)^2$ ------ Eq.3

C). Mahalanobis Distance:

It is a measure of distance between a point A and their corresponding values. Here two vectors such as x and y in the non scaled PCA space and equivalent vectors a and b in Mahalanobis space. First, we define $\lambda i = \sigma i2$ where λi are the PCA eigenvalues, $\sigma i2$ is the variance along those dimensions and σi is the standard deviation.

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6.0. PROPOSED APPROACH

In this paper, the proposed approach for face recognition is combination of Principal Component Analysis and Mahalanobis Distance. This approach uses Eigen Face method for the image compression and reduces the information. Since the image has large amount of information, some datas are repeated, so that the reduction may occur. Ihe extracted image will be represented by using this Principal Component Analysis In addition to that there are so many measures that are used for differentiating the distance to make certain the data. In the first method they can detect the faces which will calculate the average of 85 percent of accuracy i.e.Out of 450 faces it will calculate the 255 faces accurately. In city block distance with an average of 80 percentage, out of 350 faces ,it detect 255 face images..In Mahalanobis distance the average measure of accuracy is 92 percentage and it detects the 295 faces out of 320 faces. The last method will give the better results which will compared to the other one.
According to the above algorithm the following steps are as:
(i)First we have to collect the data set such as (x,y) in a 2-dimensional array (AxB) for face images.

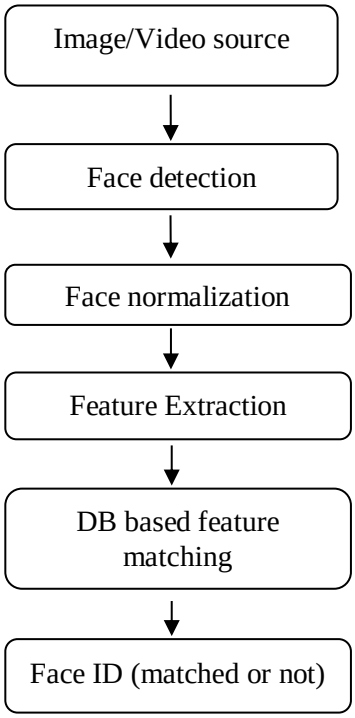
(ii)Then calculate the means of each and every dimension of the whole data sets.

(iii)Next compute the co variance matrix of each and every data set.

(iv)Also determine the eigen vectors and their equivalent eigen values.

(v)Classify the eigen vectors so as to reducing the eigen values whereas every column represent the eigen vector

At the first stage, each and every test image should be focused the center point and also focusing the check image into the same eigenspace. This focused image is differentiated with project training image in eigenspace. The images are correlate with the matching data. At last the resultant image that is closest to the image will be matched or not. The following figure shows how the algorithm works:



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7.0. CONCLUSION

We have to compare the special types of algorithms like PCA, LDA , LBP algorithm. This paper has presented a comparison of different type of face recognition algorithm like PCA, LDA algorithm. We concluded that the LDA gives more performance than PCA algorithm. The major difference between these two algorithms is to perform analysis and experimental results. While PCA are time consuming as compared with LDA algorithm. In this, the face recognition and detection method was considered and also the eigen faces method was proposed. The eigenface method is very quick and simple to work in a well controlled environment. Here we used the three types of distance method for detecting the face images. The results clearly shows that the face recognition system can support Mahalanobis distance perform much better than compared to Eucledian distance. The database is created and also the input of the image is matched or not. It increases the recognition rate from the number of faces. In PCA the resolution of image is not important but the expressions and pose have effect on the system. For calculating the eigen value we increase the recognition rate, where as the noisy images decrease the recognition accuracy. Also the works are accepted to reach the better output of this face detection system. It also provides the sufficient data and their design to execute and test the face recognition system

APPENDIX

In this paper we have to calculate the faces of the image and detect the above algorithm. It also evaluates the covariance matrix in the formation of images. We can compare the images through eigenface and worked in mat lab. Finally the images will be matched in the database.

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