Face Recognition Using PCA, Based on DWT as a Mediator

Samarjeet Powalkar, Ajit Ainapure, Sagar Birajdar, Shekhar More, Bhishmacharya Jadhav

Computer Engineering, Dr. D. Y. Patil, COE, Talegaon, Pune, Maharashtra, India

ABSTRACT

Humans are recognized to each other by their physical characteristics since thousands of year, those are voice, face, body, retina, body shape etc. this are all characteristics re include under image processing . By using advanced technology like biometric humans can easily recognized to each other. Biometric is a concept in which humans physical characteristics are detect and recognized. Our goal is developing system, which will able to detect an characteristics within such a small time limit with additionally feature i.e. accuracy .there are many fields in which fast face recognition is done. But our system is focused on fast face recognition. Many techniques are available for face recognition from large amount of database, but PCA using DWT as mediator is used for matching and fast face recognition. PCA is a way of identifying patterns in data and expressing the data in such a way to highlight their similarities and differences. Our system is proposed for optimization of PCA algorithm. Our system tries to optimize or reduce a pseudo code of PCA. After applying algorithm try to compute original image as it is using PCA, DWT. Our system tries to recognize face using optimization technique.
Keywords: Face Recognition, Fourier Transform, Fast Fourier Transform, discrete wavelet transform

I. INTRODUCTION

Now a day's identification and authentication is the most necessity thing in real world. this process is based on some techniques for this purpose we can use electronic signal in real time system, but for any security surveillance we can use some basic software and we can made some algorithmic implementation and identification and detection is done.[1]for identification and detection of image from database or real time environment some of techniques are used like, biometric, retina, fingerprint etc. are .the system that use for identification. biometric contain an fingerprint process. Face detection is also called as biometric. Biometric is an process which mostly used for security porpose in all business and organizational field. Mostly used process for security is face detection. For face detection we want a physical interaction between human and system. Face detection is a much implemented process than fingerprint. Fingerprint is also used for in fingerprint only live fingerprint is scan over

the stored database, but in face detection process we can take set of orientation images for identification process.in previous system concentrate on time

redundancy without accuracy of an image.it extract an number of parameters for fast image identification from database. Our system concentrates on time as well as accuracy of an image. In Our system image is divided into several part as per image and every part of image is compared with each and every image from database. Image is detected with maximum number of matching part. system is also process an image for Eigen images[5].this process is very complex on original image, system make it black shaded on that bases of edges in image face detection is done from system. Face detection is very complex process on live images like video and moving objects. It's not possible in day to day life. This process is implemented only for higher authority person or security purpose e.g. army area.

At initial stage we are using PCA for low dimension and detection of image i.e. for calculating Eigenvalues. In this algorithm we are selecting the Principal Component by using Eigenvectors having the greater value of Eigenvalue. After this we are going to apply a DWT for image compression which increased a speed of face recognition process and at the time of implementation we are made a changes in algorithm this will affect on accuracy of an image.

II. METHODS AND MATERIAL

A. Principals Component Analysis (PCA)

PCA is an very popular technique which is used in Data transmission and correlation[1][2].it is based on linear transformed based on statistical technique. This method is very powerful which is used for data analysis and pattern recognition in signal and image processing. Basically it was introduced by truce and pent lent in 1991. There are various algorithms based on multivariate analysis or neural networks [3, 4] that can perform PCA on a given data set. PCA is used in signal processing as well as in image processing technique. PCA for signal processing id described as

$$y = A (x - mx)$$

Data reduction is common task in data analysis .there are numbers of algorithms are available for image processing but PCA is important for our system. The implementation of an image is based on colored of an image but on original colored image is not possible so basically it convert in gray scale image.

For PCA is important to converted a two dimensional matrix into single dimensional matrix in higher value order. While number of training value is small and it is very difficult to calculate it.

PCA Algorithm

1. First of all we considered a set of images said to an X
X= (I1, I2, I3, In)
Where, N is the total number of objects present in total database.

2. Find average of Matrix:-
$$\mu = 1/N \sum_{n=1}^{N} in$$
Where n is number of object in set of image.
μ =mean of define matrix x

3. Next step is differentiating distance between trainee image and mean calculated.
$\Omega = Ii - \mu$
We will get Ω and matrix for an each image.
4. Find the covariance matrix
$$N \qquad t$$

$$C = 1/N \sum_{n=1}^{} \Omega n\ \Omega n$$

5. Find the eigenvalue and eigenvector value of the matrix C.
6. This feature vector is consist of the extracted data of all the images present in database and is compared with the vector of test image.

B. Discrete Wavelet Transform (DWT):-

Recently discuss from a researcher in image processing, DWT is a very powerful technique for image processing. Image are stored in raw and are converted into digital. Data compression is a technique which is used for data redundancy. [4] Redundancy is that portion of data that can be removed when it is not needed or can be reinserted to interpret the data when needed. Most often, the redundancy is reinserted in order to generate the original data in its original form. An image can be thought of as a matrix of pixel values.[4]

Compress the image, redundancies must be exploited, for example, areas where there is little or no change between pixel values. Therefore images having large areas of uniform color will have large redundancies, and conversely images that have frequent and large changes in color will be less redundant and harder to compress

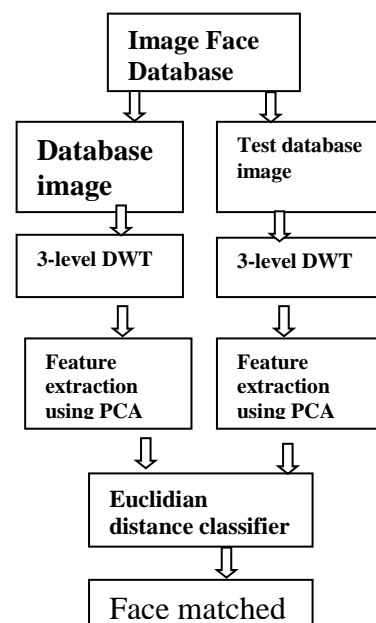## III. RESULTS AND DISCUSSION

Architecture

Figure 1. Proposed DWT based PCA.

In proposed system the original image is divided into 3 wavelet level by calculating Daubechies Transform.[1].in first level decomposing of image ,is divide in four subpart LL1, LH1, HH1, HL1. LH and HL are along horizontal and vertically respe.lly,image is decomposed in 3 level.at the time of decomposition of image parameter was also decomposed an it will reduced an original parameter for fast face recognition on the basis of size of image by using PCA ,DWT as a mediator. Proposed system focused only on fast image recognition by decreasing image parameter (decomposing) fast face recognition was achieved by system but after that accuracy of an original image will also decomposed. This part will try to recover in our system by using PC and DWT.

IV. CONCLUSION

Fast face recognition is done in proposed system. Face recognition is also done by using PCA and DWT. There are various algorithm for face recognition ,but using PCA time complex city will reduced by decomposing an image in 3 level of discrete wavelet using image compression algorithm i.e. DWT.

V. REFERENCES

[1] Fast Face Recognition Based on Wavelet Transform on PCA. Samarjeet Powalkar, Prof. Moresh M.Mukhedkar VLSI & Embedded System, Dr. D. Y. Patil College of Engineering, Pune, India.

[2] Face Recognition System Using PCA M.V.N.R. Pavan Kumar1, Shaikh Arshad A.2, Katwate Dhananjay P.3,Jamdar Rohit N.4 Department of Electronics and Telecommunication Engineering 1,2,3,4, LNBCIET, Satara-415020 1,2,3,4

[3] review on optimization techniques.Shet Reshma Prakash1, Vrinda Shetty2 1Student, Computer Science & Engineering, SVIT, Karnataka, India 2Asst. Professor & HOD, Information Science & Engineering, SVIT, Karnataka, India

[4] DWT for image processing. International JOurnal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified JOurnal, Volume 4, Issue 3, March 201.5

[5] Eigenfaces for Face Detection/Recognition (M. Turk and A. Pentland, "Eigenfaces for Recognition", Journal of Cognitive Neuroscience, vol.3, no. 1, pp. 71-86, 1991

[6] PRINCIPAL COMPONENT ANALYSIS IN IMAGE PROCESSINGM. Mudrov´a, A. Proch´azka Institute of Chemical Technology, Prague Department of Computing and Control Engineering

[7] https://en.wikipedia.org/wiki/Discrete_wavelet_transform

[8] http://www.face-rec.org