Face Recognition LBP Feature Extraction and PCA Techniques

Komal*, Dr. Rakesh Joon**
*M.Tech Scholar, Department of Electronics & Communication, GITAM, Kablana ,Jhajjar
** Head of Department, Department of Electronics & Communication, GITAM, Kablana ,Jhajjar

Abstract

There is a crucial need for high security while accumulating data and information in abundantly manner. Biometrics is a technique in which individuals can be recognized automatically by using their metrics. Use of Biometrics and extensive acceptability for individual's verification has prompted numerous techniques. By employing biometrics, the authorization of person's individuality based on "who he/she is," rather than by "what he/she holds is possible. Face recognition has been a fast developing, interesting and rousing zone in real time applications. A huge number of recognition algorithms have been established in recent epochs. In this paper an effort is made to review an extensive range of present methodologies of face recognition techniques, algorithms and certain perceptions into the studies of machine recognition of faces have been presented. A number of distinctive appearance based, feature based and hybrid based approaches are discussed in this paper. Additionally, some efforts have been put to summarize the purpose for using face recognition, applications and certain difficulties, disturbing current techniques.

Keywords:

Artificial Neural Networks (ANN), Biometric system, Elastic Bunch Graph Matching (EBGM), Face Recognition, Hidden Markov Model (HMM), Independent Component Analysis (ICA), Local binary pattern(LBP), Linear Discriminant Analysis (LDA), Principal Component Analysis (PCA).

Face Recognition, Linear Binary Pattern, .

I. Introduction

Biometric system is the authentication system to measure different physical characteristics. The physical characteristics are retina recognition, palm, pupil , fingerprint , face and voice. In the recent years, out of these authentication systems, face recognition have lot of attention in the research field. Face recognition system is most challenging task in the recent years.

In the recent yeas, face recognition is the best field to identify the person for authentication. There are various expressions of the faces like laughing, sadness, smiling and happiness. The other duplication of the faces is also identifying by the authentication system. Face recognition is powerful tool to differentiate between the thousands of faces. In respect to this , face recognition gives a realistic proof that have no issue without solution. It provides similarity & differentiation of thousands of faces. The main problem in the face recognition system is variation in visualization.It may be analyzed that variation of images is always less that illumination & direction of viewing of two different subjects. Main problem is occurring when there is large variation in the person.

There are a lot of applications of face recognition system. It could be used in building's mains entrance system. It prevents from any kind of fraud in the building. Now, a day's banks are also adopted face recognition system instead of cards for avoiding forgery. Face recognition system have much attention in the society of networking. In web servers also face recognition system is to be adopted. Many of identic cards like Voter card, PAN cards are adopted face recognition systems.

The rest of paper is design as follows. The overall past work is describe in Section II. Section III describes the framework of the implementation used for proposedwork. Result discussiondescribe in section IV. Finally, Section V describes the conclusion of paper.

II. LITERATURE REVIEW

Many researchers have adopted different method for enhancement of PSNR in lossless compression.

Rui Min*et al.* in 2014 proposed an algorithm to feature extraction of the different sequence of expression of a face. The PCA & LDA technique is apply. In this identification and verification rate was achieved up to 96.97% and 87.37 % respectively [1].

Rujiraku*et al.* in 2014designed a parallel EM PCA architecture to calculate the accuracy of 100 dataset images. A comparative analysis was analyzed between PCA , EM-PCA , P-PCA and PEM –PCA . The accuracy rate of PCA , EM-PCA , P-PCA and PEM –PCA were 90 % , 95 % , 90.5 % and 92 % respectively[2].

Ravi, S*et.al.* in2013 analyzed different variant of PCA & LDA techniques for data base ORL , UMIST , IFD ,Face 94 , Yale, Face 1999. The performance parameter was accuracy rate, calculated by PCA & LDA technique. The accuracy rate for LDA & PCA was 95.08 %, 99.5 % respectively [3].

Indumathi*et al.* in 2014described the various scheme followed by denoing, illumination, normalization and the feature extraction by HMM. Then Principal component analysis is done in the complete face recognition. The recognition rate was 99.61 % [4] .

Mallipeddi*et. al.* in 2012 proposed different evolution algorithm based on PCA technique. The reorganization rate of database YALE, ORL, AR was 8037 %, 66.26 %, 26.7 % respectively [5].

S. Thakur *et.al. i*n2014 demonstrated the radial base function used in neural network . The average reorganization rate for PCA technique was 93.60% and PCA & RBF was 94.10 % [6]

TomeshVerma, *et al*. in 2013 proposed various classification based on PCA- LDA. The ORL database is used to calculate the recognition rate. The recognition rate was 94.82 % [7].

Ebied, H.M*et.al.* in2012 proposed a most efficient kernel PCA technique for face recognition. The performance parameter is test score rate. The test score rate for KPCA (Gaussian width), KPCA (polynomial degree 2)and PCA was 91 % , 90 % , 91.5 % respectively [8].

Shamna, P*et.al,* in 2013proposeddifference component analysis of the face recognition. The YALE database, AT&T Database was used. The correction rate, false recognition, false acceptance rate and false rejection rate was 73.3 % , 26.7 % , 36 % and 0.1 % respectively [9].

Refaie*et al.* in 2012proposed PCA &wavelete transformation algorithm . In this the image are down from 150 × 100 to 31 ×25. The accuracy was increased up to 20 %.[10] .

***Taubman D* et.al in 2000**desined a visitor management system. The technique was reduce the dat to identify the individual to 1/1000th of data present [11].

III. Framework of the Implementation

In the proposed work, there isPCA technique applied followed by LBP.

The overall research is depend on linear binary pattern extraction & electronic principal component training. The feature of the given image is extracted by LBP & PCA is recognized in the efficient manner. Testing & the feature matching are done with parameter recognition rate. . Recognition is done on the bases of correction rate , acceptance rate , rejection rate respectively.

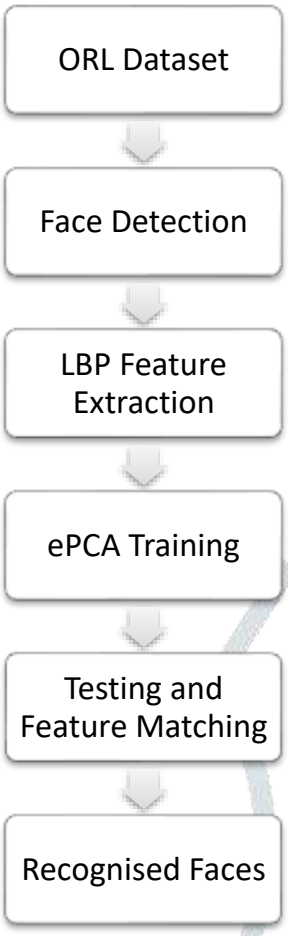

Fig 1 Proposed Face Recognition System

The objectives of the research work are to create a dataset of facial Images (collection, reordering, subject id assignment and format correction, Training and Test Data Creation).In order to expose more complicated structure within the data, use an efficient mechanism that can work for both local and global set of facial features by combining PCA (Eular) and LBP. LBP is work as an efficient texture extraction procedure which will label the pixels of an image by using threshold of the neighborhood of pixels and will consider the result as a binary number to overcome the limitations of linear transformation (illumination and Occlusion) that cannot be handled by PCA alone. To execute given procedure over each image in Training Dataset (70% of the ORL database). To Evaluate the Algorithm using Test set (30% of the ORL database) with Euclidian distance classifier.

IV. Result & discussion

There are different set of images taken out from the ORL dataset. In proposed work, 10 face images are taken out for compression. The sample image for face recognition is given in fig 2.



Fig 2 Sample Image for Face Recognition

Fig 3represents the recognition of the each part of the faces like eyes, noise, lips and the complete face. The face is recognized by LBP & LDA techniques.

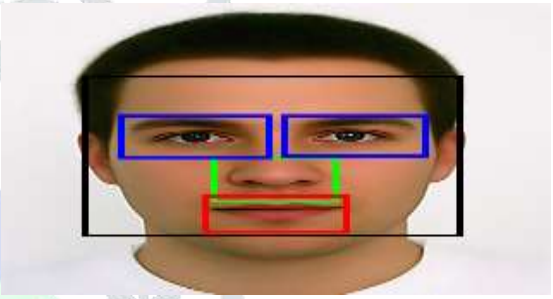

Fig 3 Face Detection after Proposed Algorithm

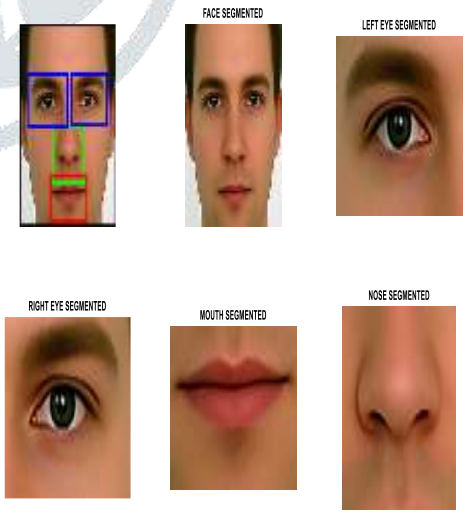

Fig 4 Segmented Facial part of Input image

Fig 4 gives the segmented facial part of the input image. The part is includes left eye right eye, noise , lips etc.

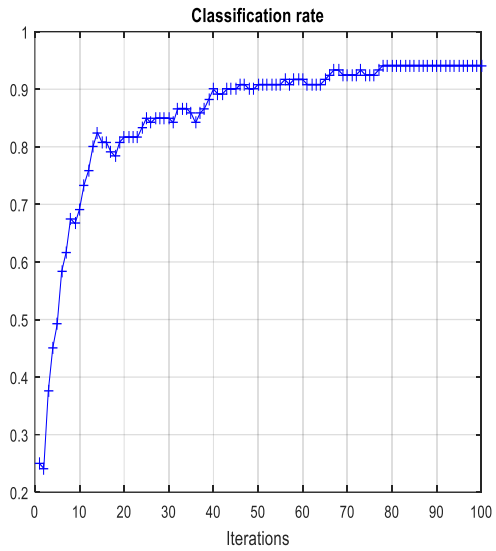

Fig 5 Classification rate for LBP and e-PCA, reaching and converging to 94.7 at around 80iterations

The classification rate for the proposed algorithm is representing in the fig 5. As no. of iteration increase recognition rate is also increase. The graph shows that recognition rate improve upto94.7 .

Table 1 Classification rate for LBP and e-PCA, and various other Algorithms

Method	Accuracy
Original Image + NNC	90.0
Original Image + SRC	90.5
e-PCA + NNC	85.0
e-PCA +SRC	43.5
LBP + ePCA	94.3

Table 1 represent classification rate of different algorithm used. For NNC method accuracy is 90 % . It is improve by SRC technique up to 90.5 %. Furthermore enhancement in recognition is done by LBP & e-PCA technique.

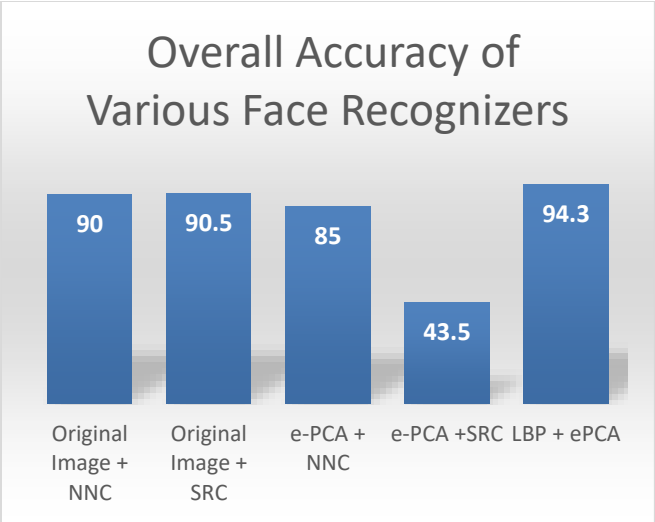

Fig 6 Overall Accuracy of Various Algorithms Compared

Fig 6 gives the graphical representation of the comparison of the various algorithms. The proposed technique gives highest accuracy

V. Conclusion

The methodology has been developed in this paper, is basedon linear binary pattern. The proposed techniques have high recognition rate ,high accuracy & false rejection rate. The LBP & PCA technique gives 94.3 % accuracy .Future scope of research work is to identify the person with high recognition rate & accuracy. The matching speed & percentage is to be high

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