FACE RECOGNITION BASED ON PRINCIPAL COMPONENT ANALYSIS (PCA) EXTRACTORS

M. JANSIRANI

Ph.D Research Scholar, PG & Research Department of Computer Science,
Vivekanandha College of Arts and Sciences for Women (Autonomous), Elayampalayam.

Dr. P. SUMITRA

Assistant Professor PG & Research Department of Computer Science,
Vivekanandha College of Arts and Sciences for Women (Autonomous), Elayampalayam.

ABSTRACT

Face recognition is one of the significant applications in the technology of biometric. It is generally used in the advanced application in computer field. In this paper, we are focuses on present state of the art in face recognition technologies on some traditional issues and apply some techniques to treat these problems. The advantage of this algorithm is used to solve the popular issues in face recognition i.e., light conditions and environmental factors that lead to the low-performance. In proposed algorithm, the groups of edge detection filters Sobel, Prewitt, and Roberts are used to juice edges of the faces in images. The new method is PCA to use as feature extractor of face recognition. By using PCA is to find the optimal faces vectors as the inputs to the classifier (NNMLP neural network). Results have revealed acceptable correct classification. We have used as data test set BIO-ID data base in the proposed system.

Index Terms— MLPNN, PCA, PREWITT, ROBERTS,

I. INTRODUCTION:

Face recognition is an absorbing and successful application of Pattern recognition and Image analysis [1]&[2]. It is mainly accepted that face recognition may depend on both componential information (such as eyes, mouth and nose) and non-componential/holistic information (the spatial relations between these features). The fundamental way of the proposed method is to construct facial feature vector by down-sampling face components such as eyes, nose, mouth and whole face with different resolutions based on theme of face component and then Principal Component Analysis (PCA) or Linear Discriminant Analysis (LDA) method is employed for element reduction and to acquire a good representation of facial features.

II. EXISTING SYSTEM

The Main advantage of this algorithm is used to solve the favored issues in face recognition i.e., light conditions and environmental factors that lead to the low-performance. So, Using physical body characteristics or human behavior for recognition is called biometrics.[3] Each person has physical characteristics which differ from one person to another. Special features for each identity can represent good clues that can be usedin the distinguishing process. In Fig [1], these features are treated for the identification of a variety of body parts such as the face, palm, iris, and DNA. The Biometrics Technology is used to convert above features into data and saves it to be used for identification or verification. We behind using biometrics are to solve security problems and minimize the challenges that are faced by the security system. For instance, passwords can be changed or missed, or ID cards can be missed or can be stolen and used by an unauthorized person to access confidential data such as bank accounts and personal information.
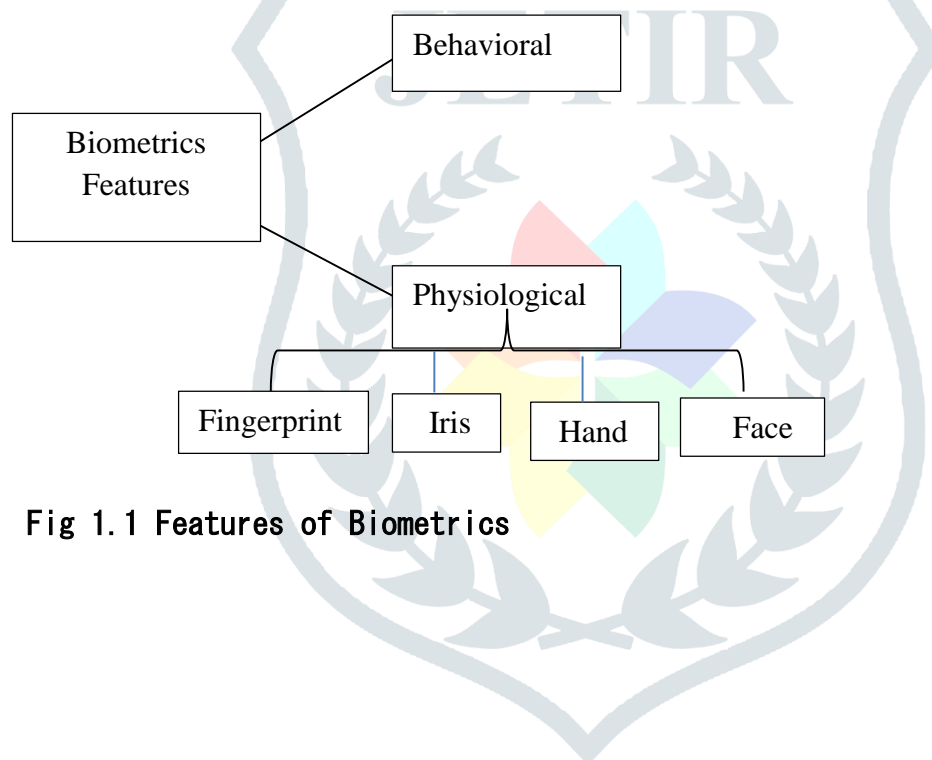
Fig 1.1 Features of Biometrics

III.PROPOSED SYSTEM

In proposed algorithm, the groups of edge detection filters Sobel, Prewitt, and Roberts were used to extract edges of the faces in images.The Edge detection is in the fore front of image processing for object detection. It is determining to have a good understanding of edge detection algorithms. In this paper to analysis various Image Edge Detection techniques to test the image face.[4]

In Fig[1.2] Shows the Diagram of Proposed System
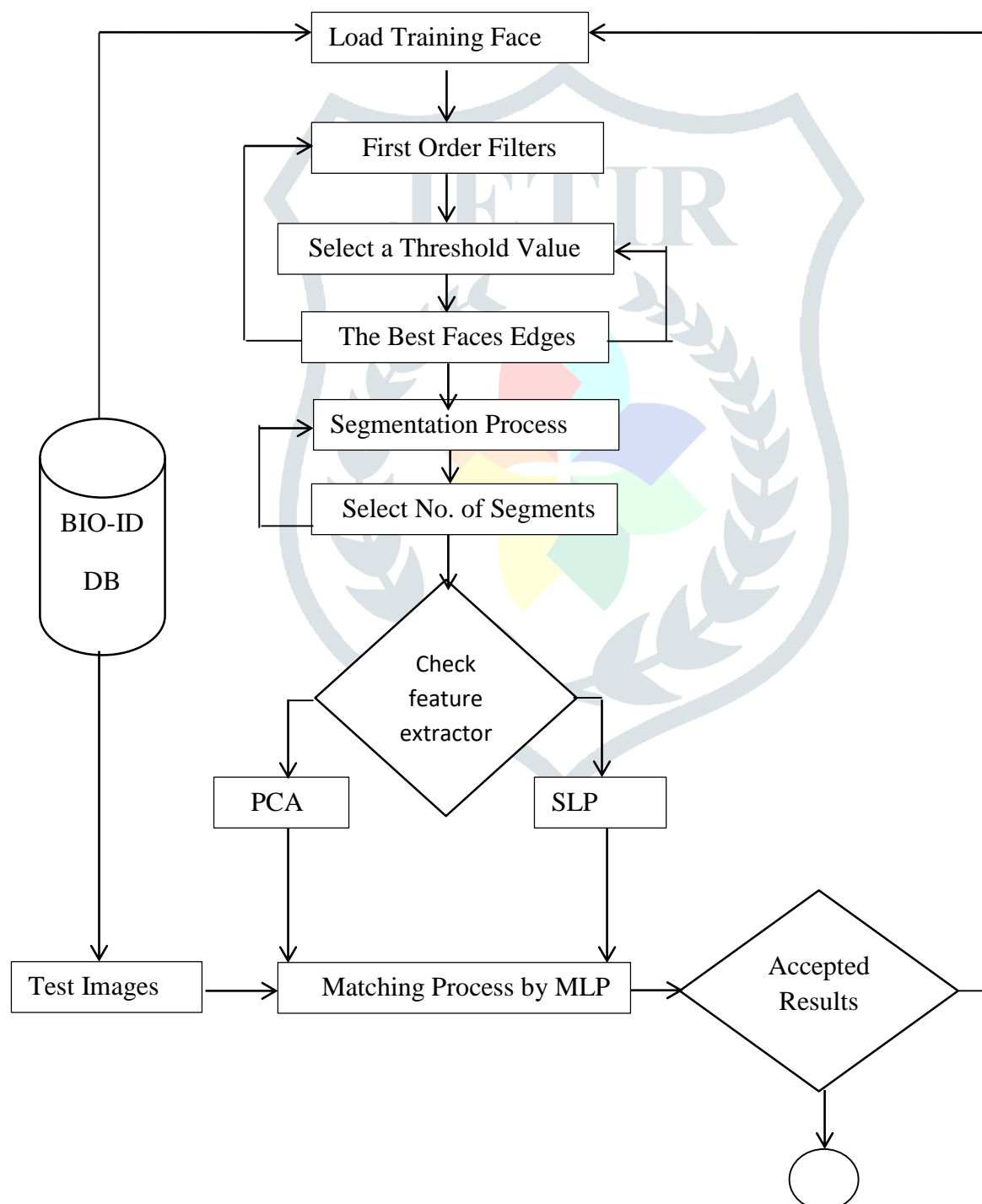
IV.METHODOLOGY :

The aim of this paper is to design and implement a system thatrecognizes faces in the image depending on the Edge detection, PCA, The Face Slope Map and MLP. The new system will be secure and not affected by the noise in the image, which can happen because of lighting conditions or other environmental factors. The proposed system consists of many levels to do it work perfectly. The output of these levels depends on each other, such that the outputs of the first level operations will be basic and input to the second level operations. A *Fig*.(2), explains all low and high-level operations.

The steps of the Proposed SystemDescription.

i) Groups of edge detection filters are used to obtain the edges of the faces in the images. The first derivative filters are used in the first group of filters, three operators are suggested to obtain the edges of the faces in the data set of images.

     a) The usage of the edge detection process to detect the edge of objects in the image and to remove the background. It is a powerful process to reduce the processed data as much as possible.

     b) Compare the results to obtain the best features from the best edges of data set of images is the aim of this stage after the edge detection process.

     c) The segmentation process is the next step in the proposed method to divide each image into equal size blocks.

ii) The Slope Map based methods are used as a new feature extractor addition to the PCA feature Extractors technique.

     a) The collection of the features by using the Slope Map method and PCA is very important to find the optimal facial features that will be the input matrix to the classifier (MLP Neural Network) to judge the overall process result.

     b) BIO-ID database is used as a dataset for the training and testing of the multi layers neural network.

A. Edge Detection

Edge detection is a process of locating the edges of an image. [5]. Edges consist of meaningful features data and contain essential information about image map. The edge detection filters significantly reduce the image size and throw out information that may be regarded as less relevant. [6]In the goal of proposed system mainly used to get the components of the face and apply the edge detection operation.The edge contains a map of face and prepare the image features after the edge detection to the next stages of the proposed system. We have applied the popular method of the first derivative based on edge detection filters in the proposed system,(Sobel, Prewitt, Roberts) on each training data set image to increase the system efficiency.

B. Sobel Filter

Sobel filter is founded to response maximally to image edges changing in both directions such as vertically and horizontally. There are two masks are used in Sobel operator. One mask for vertical direction of pixels and another mask for horizontal direction of pixels. The Sobel filter can be used Separately to the information of an image for obtaining isolate estimations of the gradient in horizontal directions as well as vertical directions.[6].

C.Prewitt Filter

The Prewitt filter is founded on convolving the image with asmall, discrete, and integer valued operator in both directions(horizontal and vertical directions). Prewitt operator is similar as the Sobel operator and it is used for detecting vertical and horizontal edges in images by using convolution process. Here, Prewitt filter ignores all edges that are not stronger than the threshold value. Thethreshold value is set automatically by the Prewitt algorithm if you don't set the threshold value. when using edge detection process, we do convolution process on an image.

D. Roberts Filter

The Roberts Cross filter apply an easy, rapid to calculate, 2-Dspatial gradient measuring on a digital image. Regularly, Robertsfilter used to find the values (magnitude) of the gradient, not the directions as we were seen in the Sobel and Prewitt filters. Pixel values for every purpose in the output represent the measurable magnitude of the spatial gradient of the input image at that time.

E. Segmentation

One of the fundamental steps in the proposed system is the segmentation process of the image to equal size blocks. The idea behind segment image to sub-images is inspired from problem-solving techniques.We divide the image into sub images to find the meaningful data and creates the features vectorsin each sub-image. The prime objective of the process of segmentation is to simplify the feature extraction process. Almost, we used more than one option of segmentation in the proposed system to get more accurate results. We have found segment an image to ten segments for each training image. It is the optimal choice for selected the image in the proposed system.
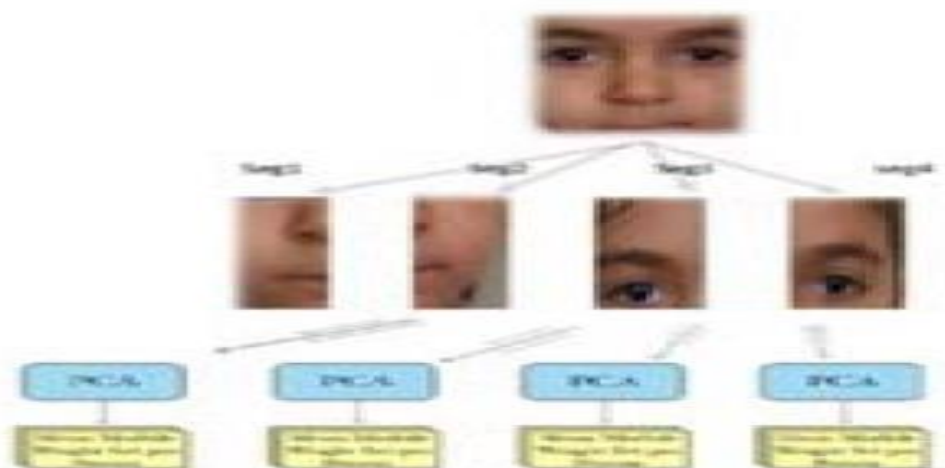
In Fig[1.3] Shows the Segmented Image Using 4 * 4 Blocks.

F. Features Extraction

The feature extraction process is the basic step in theproposed face recognition system. Therefore, two methods was used to extract features. PCA and a new method (SLP-MAP)were used to perform the features extraction process. Here, we can apply the PCA algorithmsare explained in the following paragraphs:

1) PCA

The Principle Components Analysis is the greatest features extractor. The efficiency of the PCA is very noticeable, especially inthe face recognition. In the proposed system, PCA used for features extraction and element reduction. The process of segmentation prepares data set of each segment of the image to beused by PCA and it used after we have created sameness matrix from training data set. In the following part, the algorithm that suggested to be used in the proposed system depending on first derivative operators and PCA feature extractor.[3]&[5].

Face recognition based on PCA Algorithm:

1- Initialize Matrices of Edges, CA, Training, Validation and Test set.

For each face:

Select edge detection method:

A. group of edge detection filters:

a. Sobel Filter.

b. Prewitt Filter.

c. Roberts Filter.

2- Choose edge detection filter threshold for eachfilter.

3- Face position modification process.

4- Segmentation Process.

4.1 Segment the edged image into nxn grid.

4-2 For each segment(j):

if the preprocess=1 switch to execute PCAalgorithm.

5- Save PCA features matrix.

V.CONCLUSION

In the proposed system, we applied first order derivative based on edge detection filters (Sobel,Prewitt, and Roberts) on data set to register differences among filtered images that possible effect on error rate later. The results display the strong relationship between edge detection filters and final results. New feature extractor method tested in the proposed system.This method smooth and revealed good results compare with PCA method.

VI.REFERENCE

[1]   M.Nandini,P.Bhargavi,G.RajaSekhar" Face   Recognition   Using   Neural   Networks" International Journal of Scientific and Research Publications on MARCH 2013, Volume 3,Issue 3, ISSN 2250-3153.

[2] DiMiao,Man Zhang, Haiqingli,ZhenanSun,Tieniu Tan "Bin-Based Weak Classifier

Blend of Iris and Face Biometrics", Center for Research on Intelligent Perception and

Computing,CASIA.

[3] AbdulbasitAIAZZAWI,OsmanNuriUCAN,Ogus BAYAT "Face Recognition Based on

Multi Features Extractors" ICET2017,978-1-5386-1949,IEEE.

[4]   Green,   B.   (2002).   Canny   edge   detection   algorithm   (5),   Retrieved fromwww.pages.drexel.edu/.weg22/can.tut.

[5]Athmajan, Y., Rajasinghe, N. N., Senerath, A. A., Ekanayake, M. P. B.,

Wijayakulasooriya,J., Godaliyadda, G. M. R. I."Improved PCA-Based Face Recognition

Using Similarity Measurement Fusion",2015 IEEE 10th International Conference on

 Industrial and Information Systems,978-1-4799-1876-8, 360–365.

[6] GirishN.Chaple,R.D.Daruwala,Manoj S.Gofane,"Comparisions of Robert,Prewitt,Sobel

 Edge detection methods for real time on FPGA ",

    Feb.04-06,2015, International Conference on Technologies for Sustainable

Development(ICTSD),978-1-4799-8187,IEEE.

Author Name and Address: Mrs.M.JansiraniM.C.A.,M.Phil.,

                Research Scholar in Computer Science,

                Vivkenanadha College of Arts and Sciences for

Women(Autonomous),

             Elayampalayam.

Co-Author Name & Address: Dr.P.Sumitra,

             Asst.Professor,

Department of CS & CA,

                Vivkenanadha College of Arts and Sciences for

Women(Autonomous),

             Elayampalayam.