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Face Recognition using MATLAB and Image Processing

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Abstract:
Human face detection play important roles in many applications such as face image database management. In our project, we have studied worked face detection techniques and developed algorithms for them. In face detection the algorithm used is PCA (principal component analysis), MPCA(Multilinear Principal Component Analysis) and LDA(Linear Discriminant Analysis) in which we recognize an unknown test image by comparing it with the known training images stored in the database as well as give information regarding the person recognized. These techniques works well under robust conditions like complex background, different face positions. These algorithms give different rates of accuracy under different conditions as experimentally observed. We have taken real life examples and simulated the algorithms in MATLAB successfully..

Keywords: *PCA,KLT,POD,MPCA,LDA,BPNN,CMLABP,GUI,PNG,JPEG*.

1. Introduction: A facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. It is typically used as access control in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems.

2. Problem Statement:

The face is our primary focus of attention in social life playing an important role in conveying identity and emotions. We can recognize a number of faces learned throughout our lifespan and identify faces at a glance even after years of separation. This skill is quite robust despite of large variations in visual stimulus due to changing condition, aging and distractions such as beard, glasses or changes in hairstyle. Computational models of face recognition are interesting because they can contribute not only to theoretical knowledge but also to practical applications. Computers that detect and recognize faces could be applied to a wide variety of tasks including criminal identification, security system, image and film processing, identity verification, tagging purposes and human-computer interaction. Unfortunately, developing a computational model of face detection and recognition is quite difficult because faces are complex, multidimensional and meaningful visual stimuli.

Face detection is used in many places now a days especially the websites hosting images like picasa, photobucket and facebook. The automatically tagging feature adds a new dimension to sharing pictures among the people who are in the picture and also gives the idea to other people about who the person is in the image.

In our project, we have studied and implemented a pretty simple but very effective face detection algorithm which takes human skin colour into account.

3. Objectives:

There are few objectives to design face detection system. The objective of face detection are:

1. To recognize the face from the entire picture.
2. If matched, we can get the details of the person.
3. We can also provide the feature of person matching with other pictures of same person.

4. Drawbacks of Existing System:

1. In this existing system there is no security provided.
2. Most of the time, Integra table facial recognition tools work pretty flawlessly with the existing security software that companies have installed.
3. There is a very low accuracy and not so efficient working with the existing system..
4. Not included attendance system with real time date and time with their id.

The face recognition algorithms used here is Principal Component Analysis (PCA). PCA is the most simple and fast algorithm

5. Principal Component Analysis (PCA):

Principal component analysis (PCA) was invented in 1901 by Karl Pearson. PCA involves a mathematical procedure that transforms a number of possibly correlated variables into a number of uncorrelated variables called principal components, related to the original variables by an orthogonal transformation. This transformation is defined in such a way that the first principal component has as high a variance as possible (that is, accounts for as much of the variability in the data as possible), and each succeeding component in turn has the highest variance possible under the constraint that it be orthogonal to the preceding components. PCA is sensitive to the relative scaling of the original variables. Depending on the field of application, it is also named the discrete Karhunen–Loève transform (KLT), the Hoteling transform or proper orthogonal decomposition (POD).

The major advantage of PCA is that the Eigen face approach helps reducing the size of the database required for recognition of a test image. The trained images are not stored as raw images rather they are stored as their weights which are found out projecting each and every trained image to the set of Eigen faces obtained. A better approach was studied and used to compensate these limitations which are called MPCALDA. While MPCA considers the different variations in images, LDA classifies the images according to the same or different person.

5.1 MPCA and LDA:

MPCA: Multilinear Principal Component Analysis (MPCA) is the extension of PCA that uses multilinear algebra and proficient of learning the interactions of the multiple factors like different viewpoints, different lighting conditions, different expressions etc.In PCA the aim was to reduce the dimensionality of the images. For example a 20x32x30 dataset was converted to 640x30 that is images are converted to 1D matrices and then the Eigen faces were found out of them. But this approach ignores all other dimensions of an image as an image of size 20x32

speaks of a lot of dimensions in a face and 1D vectorising doesn't take advantage of all those features. Therefore a dimensionality reduction technique operating directly on the tensor object rather than its 1D vectorized version is applied here.

LDA: Linear discriminant analysis (LDA) is a type of linear combination, a mathematical process using various data items and applying functions to that set to separately analyze multiple classes of objects or items. Flowing from Fisher's linear discriminant, linear discriminant analysis can be useful in areas like image recognition and predictive analytics in marketing.

6 BLOCK DIAGRAM:

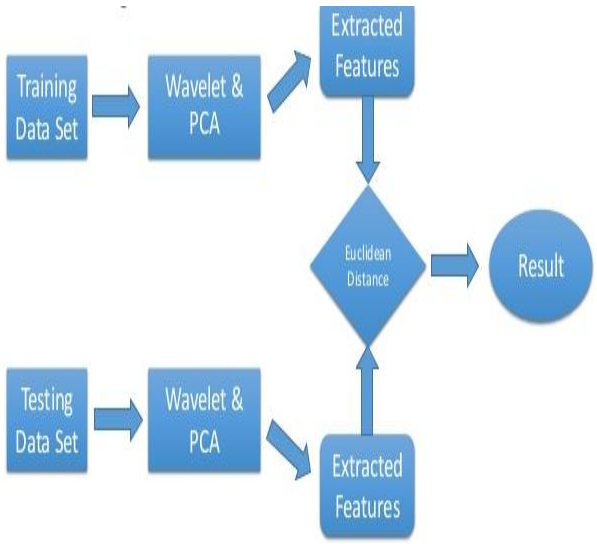
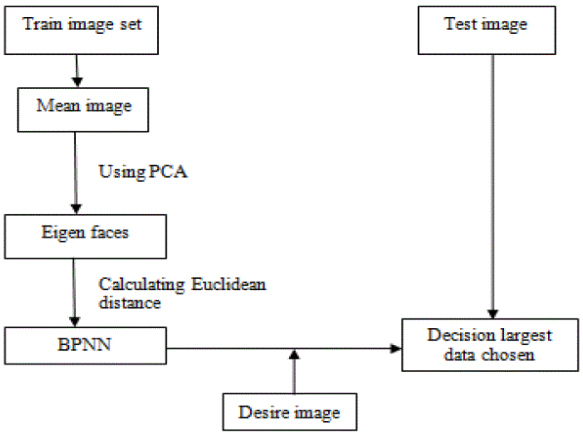


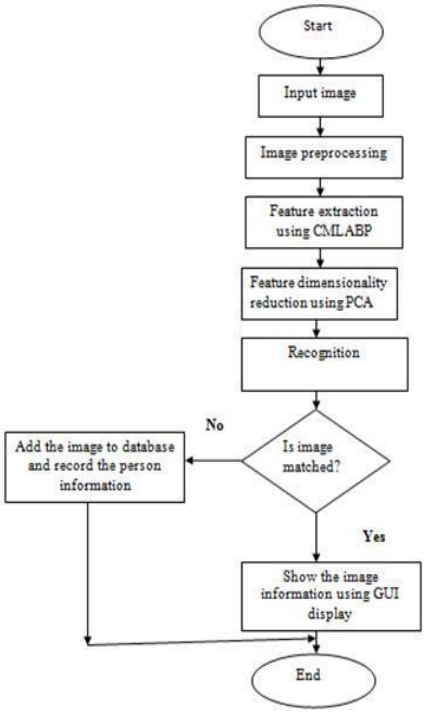
Figure: Block Diagram Face Recognition Using Wavelet PCA

7. FLOW CHART:

Flow Chart-1:



Flow Chart-2:



8 Methodologies:

1. In this first step is to collect the database of the persons. It consists of faces that need to be trained and in different positions like side etc.
2. When running the application first we need to train the faces and give the class labels (Name or Id) to each face.

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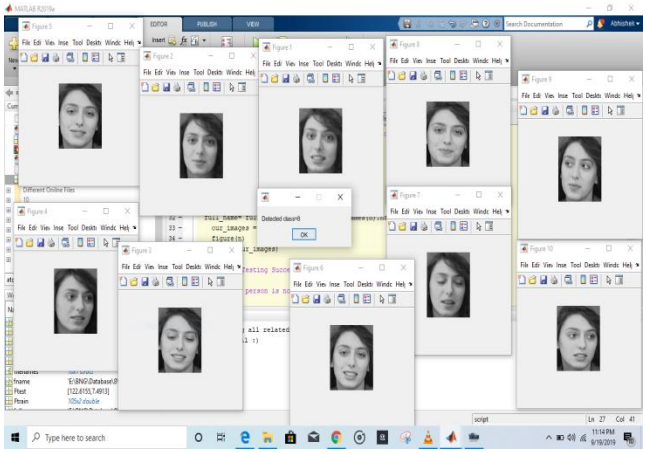
3. First it will ask for the image to load.
4. After loading the image it will ask for the id to enter.
5. After entering the id the values like mean and standard deviation.
6. It is along with class label will be extracted and stored in the database.So that the values stored in the database are used to compare while in the testing stage.Without training we can't even save the details of the person.So in this step be careful while filling the details of person.The class label means the id of the person.
7. In the Image Processing terminology we will call the unique identification as class lable.After that we need to see the information in the database.The information is like the details of the person in the database.Because if anything goes wrong we can correct it.If not the accurate results will not be obtained.

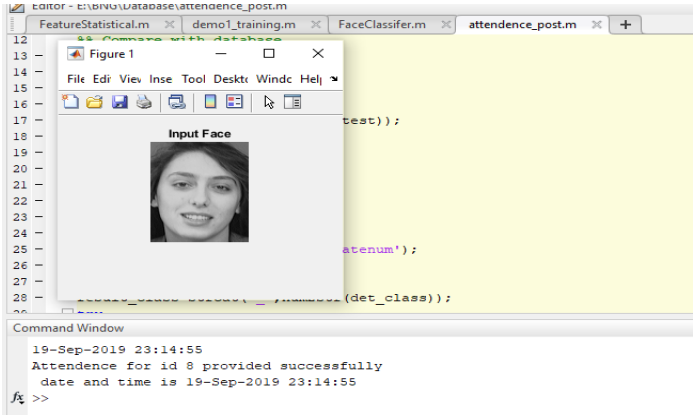
9 Gathering Related Images:



10 Attendance:

1. In this we have introduced face based attendance system.
2. After running this code it will first ask for the image to load.
3. After loading the image the class label will be detected and the attendance is provided using that.
4. The data is stored with the real time date and time with class label (Name or Id).
5. So that the face based attendance system is also included in this project.

10.1 Posting Attendance:



11 Simulation Results:

- It is the training part's output. Below in command we are entering the class label.

11.1 Entering Class:

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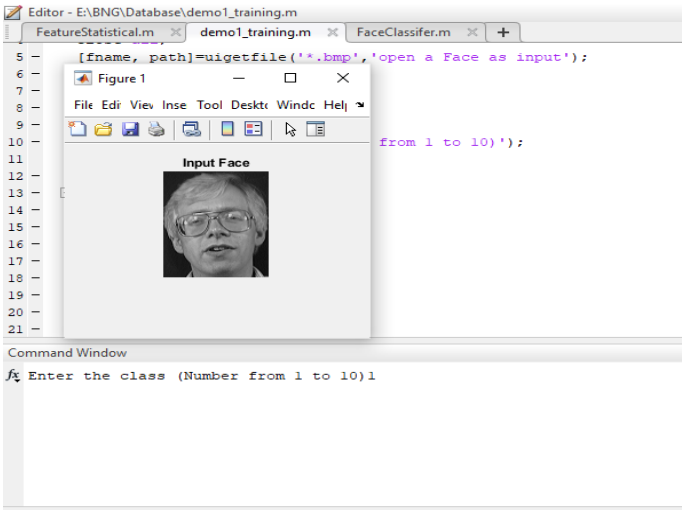
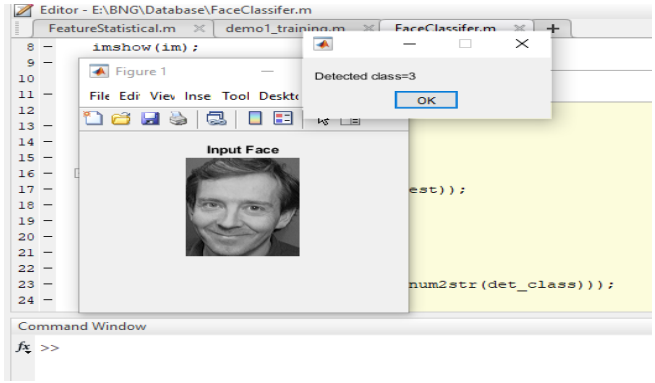


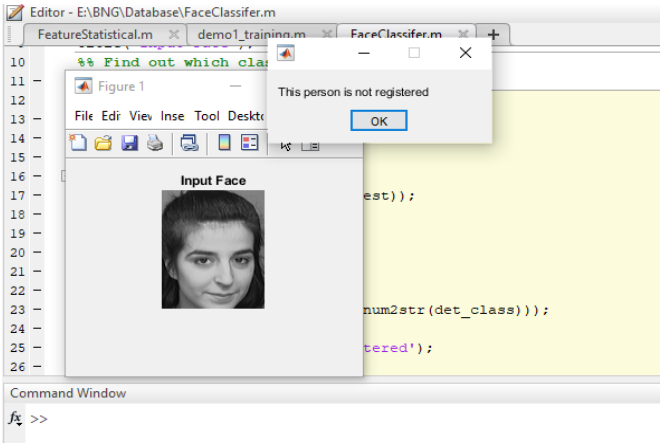
- This is the testing part's output. In this we give a face input.
- It will compare with database and tell us which class label it belongs as shown below.

11.2 Detected Output:



- This output is also a part of testing which will show the person how are not registered.
- It means the face of that person is still not trained.
- So the message "This person is not registered" will be displayed as shown below.

11.3 Not Registered Output:



12 Conclusion:

In this thesis we implemented the face recognition system using Principal Component Analysis and Eigen face approach. The system successfully recognized the human faces and worked better in different conditions of face orientation. In this research, Principal component analysis approach to the face recognition problem was studied and a face recognition system based on the Eigen faces approach was proposed.

The algorithm developed in a generalized one which works well with any type of images. The tests conducted on Bitmap images, PNG images and JPEG images of various subjects in different poses showed that this method gave very good classification of faces though it has limitations over the variations in size of image. The Eigen face approach thus provides a practical solution that is well fitted to the problem of face recognition. It is fast, relatively simple and has been shown to work well in constrained environment.

13 Future Scope:

In this paper, we worked with some still pictures but we will try to develop a system using video camera that will work with real time face recognition. Here we user 100 images of 10

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different people. In future we would like to work with huge database.

14 References:

[1] R. Chellappa, C. L. Wilson, S. Sirohey,"Human and Machine Recognition of Faces: A Survey", IEEE, Vol. 83, Issue 5, May, 1995, pp. 705-740.

[2] Martinez AM, Kak AC.,"Transactions on Pattern Analysis and Machine Intelligence", IEEE, Vol. 23, Issue 2, 2001, pp. 228-233.

[3] Renu Bhatia,"Biometrics and Face Recognition Techniques", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 3, Issue 5, May 2013, pp. 97-98.

[4] D.V. Solanki,"A Survey on Face Recognition Techniques and its Application", JoIPPRP, Vol. 1, Issue 3, 2014, pp. 1-2.

[5] L. Ma, K. Khorasani,"Facial Expression Recognition using Constructive Feed Forward Neural Networks", IEEE, Vol. 34, Issue 3, June 2004, pp. 1588-1590.

[6] Y.Zi Lu, Z.You Wei,"Facial Expression Recognition Based on Wavelet Transform and MLP Neural Network", In Proc.7th International conference on signal processing, Vol. 2, pp. 1340-1343, Aug 2004.