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# Face Recognition using PCA, Deep Face Method

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*Abstract- The performance process of face recognition involves the inspection study of facial features in an image, recognizing those features and comparing them to one of the many faces in the database. There are many algorithms capable of performing face recognition; such as: Principal Component Analysis, Discrete Cosine Transform, 3D recognition methods, Gabor Wavelets method etc. There were many issues to consider when choosing a face recognition method. The keys ones were: Accuracy, Time limitations, Process speed and Availability. With these in mind the PCA based method of face recognition has found to be better because: Simplest and easiest method to implement, Very fast computation time. PCA has the ability to recognizing a face with a different background is difficult.*

*Keywords- Feed Forward, Feature Extraction, face identification factors, Face Recognition, PCA*

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### I. INTRODUCTION

Face detection is a computer technology that determines the locations and sizes of human faces in arbitrary (digital) images. It detects facial features and ignores other things, such as buildings, trees and bodies. Various government agencies are now actually more motivated to improve security data systems centered on body or behavioral characteristics, often called biometrics.

As many of the biometric method have an ability of high accuracy and security. But in comparison to biometric applications face recognition system have variety of applications in security of information, enforcement of law, various cards like smart cards and observations, surveillance. The biometric authentication has been drawback worked on round the world for several persons, this problem has emerged in multiple fields and sciences, particularly in applied science, others fields that are terribly inquisitive about this technology are: Mechatronic, Robotic, criminalities, etc. For this reason Face recognition system has been used.

Almost techniques have been suffering from some limitation in the literature review to achieve the solution which may be cause to suffering from distortion of instrument as well as pose effects in the real life. Neural Network is

more capable of deriving multi-orientation information to various analyses of sources from a face image at different rules with the derived information being of local nature from a particular source. The common approach helps using neural network. Face recognition is to construct a filter bank for different scales and orientations to filter which has given face image with all filters from the bank storage.

#### A. FACE RECOGNITION

The face area plays a significant role in carrying identity of persons. Humans have ability to acknowledge the faces. Humans can recognize 1000s of faces and identify familiar faces despite large changes in the visual stimulus as a result of viewing conditions, expression, aging, sex, and distractions such as glasses, or changes in hair .It is quite helpful for security purposes. Humans have the natural ability to acknowledge the face but developing a computer algorithm to do the same is difficult.

#### B. FACIAL ACKNOWLEDGEMENT

Facial acknowledgment is a sort of biometric programming application that can distinguish a particular individual in a computerized picture by examining and contrasting examples. Facial acknowledgment frameworks are normally utilized for security purposes yet are progressively being utilized as a part of a mixed bag of different applications.

- Motivation Factors
- Cooperative Face
- Controlled pose
- Controlled position
- Controlled lighting
- Non-Cooperative Face

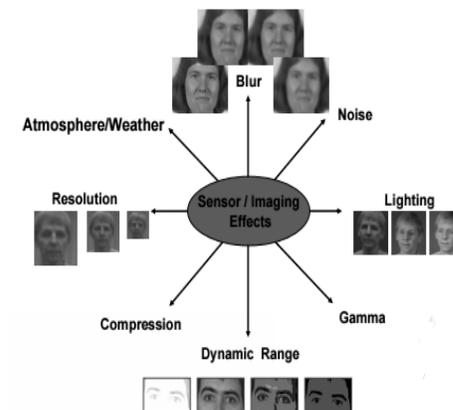


Fig.1. Effects for Face Recognition [6]

#### C. FACE RECOGNITION SYSTEM

The face recognition system works in 5 steps. The steps are followed in a particular order:

##### 1 Image Acquisition

The input can be recorded video or any image. It involves retrieving an image from any source.

##### 2 Face Detection

In this step the face is detected whether the human face appears in given image or where these faces are located.

##### 3 Facial Feature Extractions

After the face is detected the alignment is done to justify the scales and orientation of patches. In this the face is need to be turned at 360 degrees.

##### 4 Registrations and Represent

After the normalization is done of the face by using light the system converts the data into the unique code.

## 5 Classify

The computer systems are used to classify the features respectively. A new acquired pattern is compared with stored data sets.

## II. LITERATURE SURVEY

H. Josh *et al*. [1] observed that the human face is inherently symmetric and they wish to exploit this symmetry in face recognition. The average-half-face has been previously shown to accomplish just that for a set of 3D faces when utilizing eigenfaces for recognition. They build upon that work and present a contrast of the utilization of the average-half-face to the utilization of the initial full face with 6 different algorithms placed on two- and three-dimensional (2D and 3D) databases.

Yaniv Taigman, Lior Wolf, Ming Yang, and Marc Aurlio: Have recognized an ideal face classifier would recognize faces in accuracy that is only matched by humans. The underlying face descriptor would need to be proportional to pose, illumination, expression, and quality of image.

Wang *et al*. in 2008 year proposed to inspect a correlation matrix constructing a bank of Bayesian Networks with the aim of detecting such various filter parameters used in decreasing the filter bank would be as possible. The same methodology can also be used to visualization and found difference between the classical and the principal Bayesian Networks.

Ramya Srinivasan, Abhishek Nagar, Anshuman Tewari, Donato Mitrani, Amit Roy-Chowdhury in 2014 : analyzed the feasibility of a new set of face descriptors called sigma sets constructed from simple image features. Experiments show promising performance on the challenging LFW database.

Surabhi Varshney, Deepak Arya, Rashmi Chourasiya in 2014 : The artificial neural network based technology has played a main role in this inclusiveness and sustainability of intelligent and expert system to recognized & satisfy human need is concerned in this competitive arena. In present era Face recognition is widely used due to its numerous ability to cope up with various other techniques associated with it.

Yamin Taigman *et al*. in 2014 have presented closing the gap to human level performance in face verification which is based on conventional pipeline. The conventional pipeline consist detection, alignment, representation and classification to face images. This pipeline methodology was used for the 3D face image to fill the remaining difference for the accurate and best performance. The same methodology can also be used to visualization and found difference between the classical and the principal Bayesian Networks.

S. Mallat *et al*. in 2010 has presented Singularity detection and processing with wavelet and proposed the use of denoising and face detection. He also discussed the current status and future directions to simply the various tasks. He discussed and analysis the image features as color, texture, and shape in details. He also gives a summary of all the features with examples. For e.g. in texture recognition there are texture co-occurrence, Fourier power spectrum, Bayesian Network features and tamura features.

In the existing facial recognition algorithms have some problem while doing the Acquisition, lighting, Sensor. Lighting – simply it is a lighting effects of the given image. Like that lot of problem is there in the facial recognition in real time approach.

## III. EXISTING RECOGNITION APPROACH

Recognition algorithms will be divided into 2 main approaches, geometric, that appearance at distinctive options, or measurement, that may be a applied mathematics approach that distill a picture into values and comparison the values with templates to eliminate variances.

Some biometric identification algorithms establish faces by extracting landmarks, or options, from a picture of the subject's face. These options are then accustomed seek for alternative pictures with matching options. Alternative algorithms normalize a gallery of face pictures so compress the face knowledge, solely saving the information within the image that's helpful for face detection. A look image is then compared with the face knowledge. One amongst the earliest thriving systems relies on model matching techniques applied to a group of salient countenance, providing a form of compressed face illustration.

#### IV. RESEARCH METHDOLOGIES

The face is recognized using the methodology named as PCA. In which the EigenObjectRecognizer class in the application of face detection that focus on the article will remain with the new Eigen Face Recognizer. The Eigen Face Recognizer makes use PCA. This can yield preferable results to PCA based analysis favoring classification rather than representation.

The method of which PCA is done at different stages so what will be illustrated is a clear method for PCA application that can be followed. For the performance of PCA several steps are done:

Stage 1: Subtraction of the Mean of the data from each variable (our adjusted data)

Stage 2: Calculation and formation of a covariance Matrix

Stage 3: Mathematical Determination of Eigenvectors and Eigen values from the covariance Matrix

Stage 4: Selection of a Feature Vector (a fancy name for a matrix of vectors)

Stage 5: Multiplication of the transposed Feature Vectors and the transposed adjusted data.

#### V. RESULTS AND DISCUSSION

The result of Face recognition using PCA and Deep Face is implemented using different stages. The framework is created for the face recognition are:

*A. This is the main frame where all work will be done.*

The framework uses a blend of systems in two subjects; face location and acknowledgment. The face recognition is performed on live gained pictures with no application field personality a primary concern. Forms used in the framework are white parity revision, skin like locale division, facial element extraction and face picture extraction on a face competitor. At that point a face arrangement technique that uses Feed Forward Neural Network is coordinated in the framework.

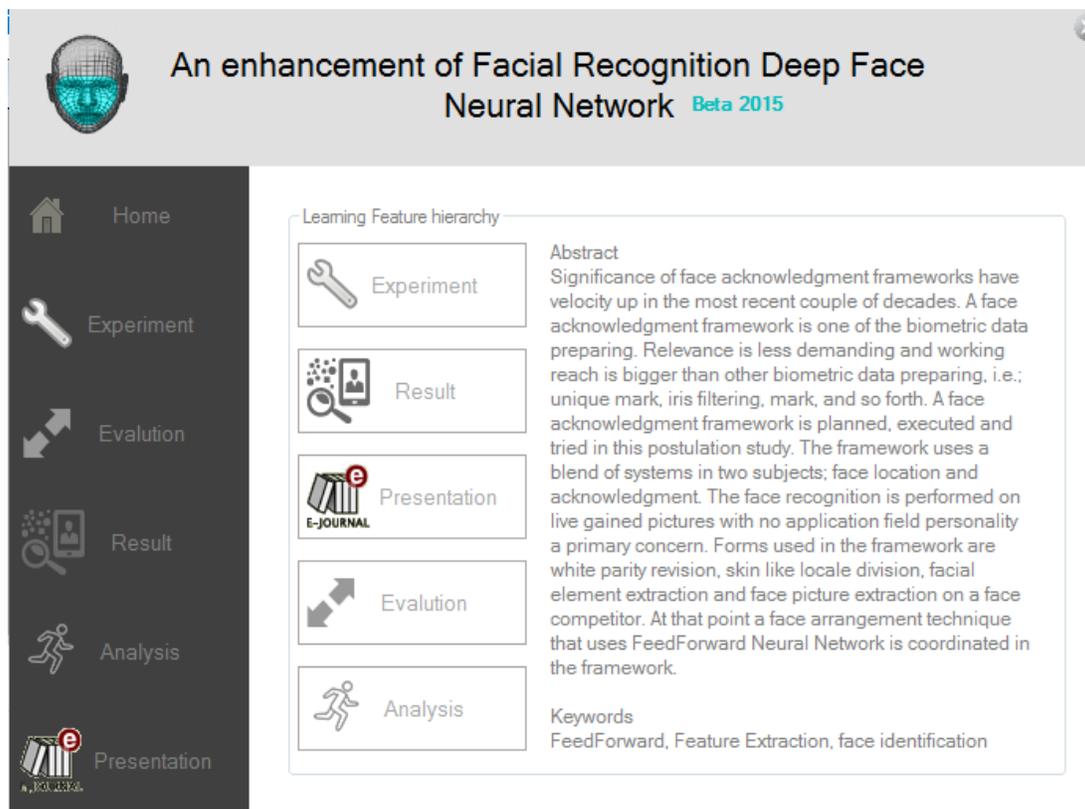


Fig 2. Frame is created to recognize face

*B. In this the live image is captured.*

(a) By clicking on experiment the camera is opened and this interface is displayed.

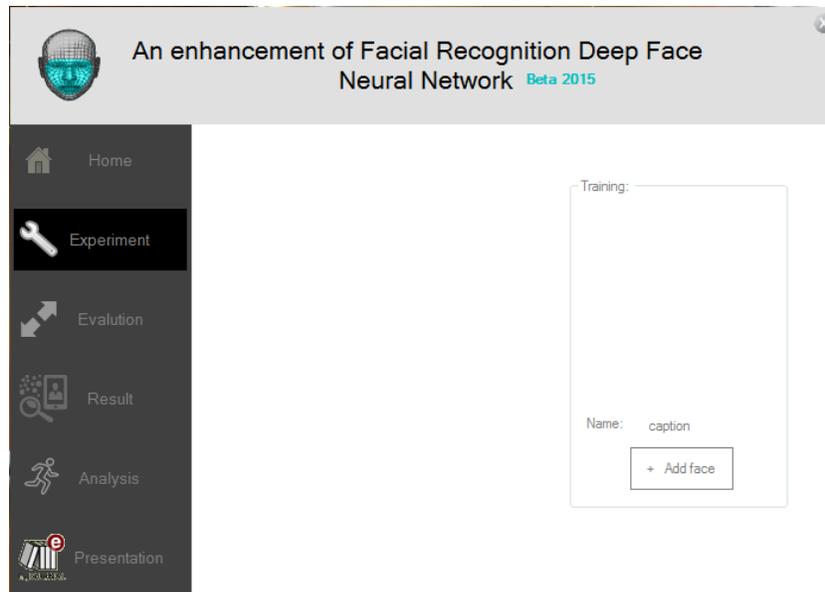


Fig 3.Loading the camera to capture image

(b) In this its starts detecting the faces and red window is displayed on the face and here the image is saved by giving the name and is added by clicking in add face.

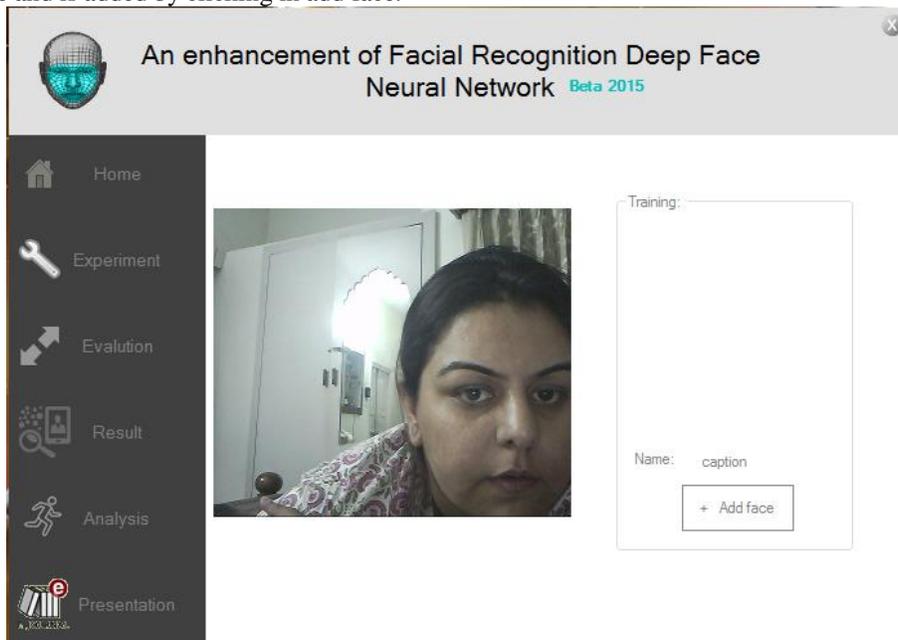


Fig 4.Image is being captured

(c) After giving the name it is displayed on the screen.

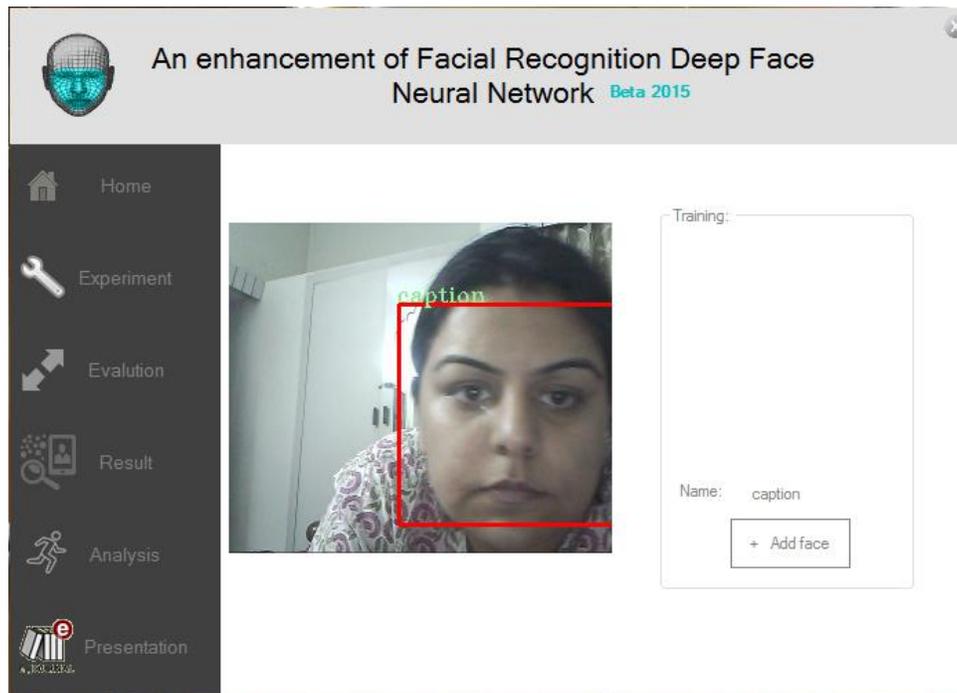


Fig 5. Window is detected on the face

*C. Trained Faces are created and stored*

In this it provide the whole information of the images which are clicked.

Face ID	Face Image	Trained Face	Type	Resolution	Raw Format	Pixel Format
23	face23.bmp		System Drawing Bitmap	96 x 96	[ImageFormat: b99b3cab-0728-11d...	Format8bppIndexed
22	face22.bmp		System Drawing Bitmap	96 x 96	[ImageFormat: b99b3cab-0728-11d...	Format8bppIndexed
21	face21.bmp		System Drawing Bitmap	96 x 96	[ImageFormat: b99b3cab-0728-11d...	Format8bppIndexed
20	face20.bmp		System Drawing Bitmap	96 x 96	[ImageFormat: b99b3cab-0728-11d...	Format8bppIndexed
19	face19.bmp		System Drawing Bitmap	96 x 96	[ImageFormat: b99b3cab-0728-11d...	Format8bppIndexed
18	face18.bmp		System Drawing Bitmap	96 x 96	[ImageFormat: b99b3cab-0728-11d...	Format8bppIndexed

Fig 6.Trained Database

D. Eigen analysis is done

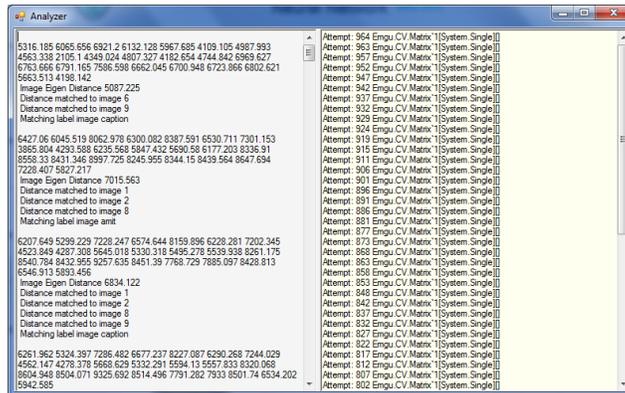


Fig 7.Eigen value and Eigen distance of the image

E. Matching of the face is done and its recognized with name.

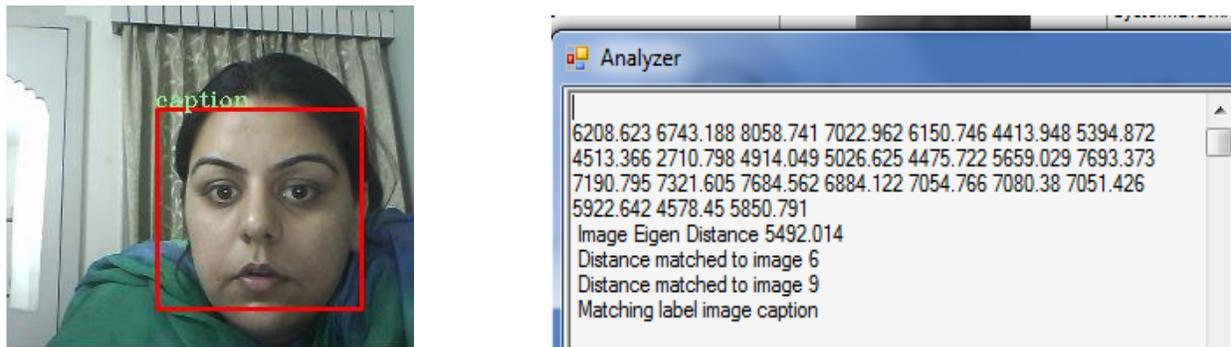


Fig 7.Matching is done

VI. CONCLUSIONS

In this research review, Eigen vectors, covariance matrix and feature vector are found from the responses of image to neural network separately a set of weights can be assigned to these feature points and feature vectors in the face recognition to close filling gap. These measurements of these points feature and vector will be measured on the basis of previous work. In this paper, our proposed algorithm is better for the feature point detection in the face recognition scheme. The estimation stage using feature vector is followed by neural network. These would to minimize rotation effects for better visualization. This process will not create much computational complexity with other method. Therefore, we would focus to feature vectors for recognition by the help of this scheme face images would be aligned to close gap in the future analysis.

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