

# Study of Face Recognition techniques

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**Abstract** - In this study, we have reviews various methods and techniques used in face recognition research.

**Category: Major techniques:** Template Maching, Neural networks, Fisher face, Geometrical feature matching

**Minor techniques of template matching:** Naïve Template maching, Image correlation matching.

**Minor techniques of Neural networks:** Principal Component Analysis, Multi-Layer Perception

**Minor techniques of Geometric features matching:** Features based PCA

**Key Words:** ANN,PCA,LDA,MLP,PNN

## 1.INTRODUCTION

Face recognition is a very popular and widely use technique. It is widely used in various applications using Pattern recognition and Image analysis based on two Methods are Verification and Identification . In which Face images are compared with the template images from a data set. Input images is matched and give a match report. Then classification is done.[1]

The various steps of General face recognition system

### a)Face detection.

We are detecting Face In a digital Images Face-detection algorithms work on the identify of human faces from front. image detection in this technique the image of a person is comparing bit by bit. Input image is match with dataset images.



Figure (a): Face detection [2] Figure (b): Face recognition features[2]

### b)Features extraction.

We are extract features from image Like Face Expressions,eyecolour,etc. In which convert input data with set of features.

### c)Face recognition.

After successful completion of first two steps Face is recognized successfully.

In which input image is compare with image dataset , Input image is matched it give a match report and classification is done using observing sub population.

## 2.Literature review

Various approaches used for face recognition can be categorized as feature based.

Features Based approach

Holistic based approach

Hybrid approach

**Features based Approach:-** In which we are recognize the facial features (eye colour, nose ,hair) are divide into segments for easy to recognize .It is used like as input data for Recognition of face. In which we are match Input images with available dataset images

**Holistic based Approach:-**In which approach we are used face like as input for Recognition of face

**Hybrid based Approach:-**In which working based on both approached Features based and holistic approach. We are create a 3D model of face for checking position of head ,skin colour.

### Techniques of face Recognition

Template Matching

Neural Networks

Fisher Face

Geometrics features matching

### TemplateMatching

In this Technique we are searching and location of image in a template image .in which compare image with image classifier .it is used for quality improvement .in this technique Grey scale and Binary images are most commonly used.

Bruneli and Poggio they are provides four template features are eyes,nose,mouth,face .in which compare results with graphical based Algorithm. Eigen face templates is easy to understand , it is low costly than other classifiers. Template Matching is expensive technique.



Figure 3: Template matching [3]

In this figure we are compare the features with store database .In which we are recognition of face using phase angle and normalize correlation technique.imagesIn Karungaruet al. uses template based algorithms, It shows different results of a

target image by changing the size of template as preprocessing Anlonget al worked on construct reliable and proper infrastructure. This techniques are highly effective for large Database for solve the problem of face recognition under the reasonable cost. Sao and Yegnanarayana proposed an algorithm for Person verification using Template based face recognition technique, edginess based face representation is based on calculation to process one dimensional images. The system is associated with neural networks to testing of image of different poses Kaur and Jarial[4] worked on input images and selection images are detecting using surf method. It is descriptor which describe local neighbor points. In Nazanin Sadat Hashemia and, Roya Babaei Aghdam[5] In which author works on template matching applications. It is based on decision making to improve efficiency. using the convolution-based method is used for as their features are less sensitive to scale and shift Face is used to represent geometric shape. Other templates are detected darkness and bright area of face. Standard input images are compare with template image. It is easy to implement but template matching is provide not good results in the variation of scale ,size and position.

**2. Neural Network Method**

Neural networks are used in many research areas (pattern recognition, character recognition, object recognition). The main working principal of the neural network in the face recognition is the feasibility of work, it has to be highly tuned number of layers and number of nodes. The neural networks in the network it is mostly used technique for face recognition. The feature extraction technique is more efficient than the[6][7].

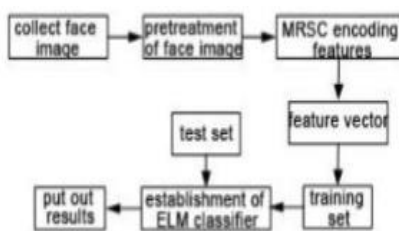
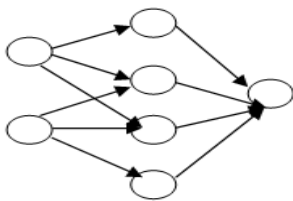


Figure 3. Neural network diagram.

Figure 4: Work flow diagram of face recognition using NN[8]

In this diagram we are represent flow of information is from Input layer to intermediate nodes and transfer info to Output layer **Principal Component Analysis(PCA)**. The authors results 96.2% accuracy in the face recognition process when 400 images o40 individuals. It is hierarchical structures of layers and provides partial uniform to translation, rotation,

scale **Multi-Layer Perceptron (MLP)** In which feed forward learning algorithms are used for the proposed system for its simplicity and ability of supervised pattern matching. It is used in many successfully applied to many pattern classification problems. A new approach to face detection is used with Gabor wavelets & feed forward neural network are presented. In which used both methods are Gabor wavelet transform and feed forward. Neural network are used for locate both feature points and extracting feature vectors. The experimental results are shown that proposed method get better results than compared to other successful algorithm like the graph matching , eigenfaces methods **Hybrid neural network** is combination of three techniques(methods) are local image sampling, a self-organizing map neural network, and a convolution neural network. A new face detection techniques are suggested by using polynomial neural network (PNN) The PCA technique is used to make smaller dimensionality of the image patterns and extract features for the PNN technique. Work on a single network the author had get results very fairly high detection rate and low false positive rate on images with complex backgrounds. In comparing with a multilayer perception technique, the representing of PNN is better. In which reflect the geometry of the 3D face differently and improve recognition of face

**3. Fisherfaces:-**

Fisherfaces is the mostly successfully used Technique for face recognition. It is work on appearance based method. In which used LDA to detect set of beginning images which has maximizes the ratio of class scatter and within class scatter. The demerits of LDA the class the scatter matrix is always single value, but the number of pixels value in images is bigger than the number of images so that is the reason of increase detection of error rate if there is a change in position and lighting condition within same images. overcome this problem many algorithms are suggested. Because the fisherface technique works on the merit of within-class information so it minimizes the change within class. Problem are related with change in the same images in lighting changes can be control .



Figure 4.Face recognition using fisherfaces technique[9] Figure 5: Geometric based recognition [10] In Fisherfaces technique are used for face recognition described by Belhumeur et a works on both principal component analysis and linear discriminant analysis which creates a subspace projection matrix, near with used in the eigenfaces technique, yet the

Fisherfaces method is able to take advantage of within-class information, reduces changes within each class, yet still maximizing class separation. The demerit of Fisherfaces technique are more composite than Eigenfaces to finding the projection of face space.

**4. Geometrical feature matching:-**

Geometry Feature matching is based on the calculate the local face features, In which we are measure the distance between two eyes, and nose, etc.[11]In Basavaraj and Nagaraj is used a geometrical model of a face is used for extract facial feature. This process is used for improvement of front side of face .It including ears and chin features because they growth the various methods of face recognition.

Face models are work used Four steps for face detection:

1.In first step we are used preprocessing. It is used for noise removal and converted into binary image

2.in Second step we are labeled various facial features for finding the origin of labeled face features.[12]Huiyu and Sadka In which measure distance between pair of points After all calculations face images .These images are describe position of garbor filter and it includes the size and description of face.In Zhen et al. In which author work on facial geometry. In this techniques, first the image is partition in many facial geometrical domains like as image space , image orientation at various different scale

**Feature based PCA(2016):** Inwhichtechniques face recognition system is based on facial features. They use their facial features like as eyes, nose, ears and mouth. In which we are apply rotation for get better results. In which we are compare input images with all image patters are highly matched with image is selected. EBGM Steps for Face Recognition The algorithm for EBGM used here. The recognition are as follows:

Standardization

Locating landmarks

Creating face graphics

Distance measurement

Identification

**Standard Datasets**

**a)Tiny Image[13]** is a popular dataset is a collection of 80 million 32 × 32 dimensional images which are low resolution In thisimages are used successful applications because noise level is low. Low level resolution images are nor used for generally training**b)Label Me and Lotus Hill datasets** are most popularly used they provide segmented and labeling images. Both datasets used 200 categories they are provides the outline and location of objects . **c) Webimagedatasetretrieval** When the size of dataset is increased from time to time, We are need codes to find the nearest image of nighbourhood in this [1] Patel, Riddhi, and Shruti B. Yagnik. "A literature survey on face recognition techniques." *International Journal of Computer Trends and Technology (IJCTT)* 5.4 (2013): 189-194

dataset, by using methods we are convert nabouring image into original imaged) **AT&T (ORL)** Is known as ORL database which contains 40 different persons each person has 10 images with total of 400 images. In which 4 females and 36 males images are included in dataset. and the files are support in PGM format **e)FERET Database** The FERET database is a standard dataset and most commonly used in face recognition used. In which images are divide into two classes images: gallery and probe images. Gallery images are those images are available with known labels, and probe images are those images are match with gallery images for identification

**BENEFITS OF BIOMETRIC FACIAL METHODS**

**Never chance of Fraud** –Biometrics are used mostly in organizations they are provides security against fraud

**Provided Security** – In which Biometric system provides security .We are tract employs details using facial features .we are provides access only which are part of organization other persons are not part of system are not give access

**Automatically working System** – Mostly organizations used biometric facial methods because these are automaticall

**3. CONCLUSIONS**

Face recognition is a claiming problem in the field of computer vision. In which we are used multiple software’s and its application which are receive more attention .In this paper we are discuss the merits and demerits’ of face recognition techniques and algorithm. We are used techniques as per their requirements. You can work on mentioned techniques and algorithms for improves performance.

**4. REFERENCES**

Face recognition methods	Template matching	Neural network	Fisherfaces	Geometry based Recognition
Review about techniques	input images are compare the charter of faces with stored images in image datasets . In this technike we are recognition of face using various facial features which are like as eyes ,mouth, ears are compare with templates	Neural networks Are work on using a principle of flow of information from one node to next nodes using hidden or intermediate nodes	It is a appearance based method. In which used LDA to detect set of beginning images .	Geometry Feature matching techniques is working based on the calculate the distance between two eyes ,nose, ears, shoulders
Benefits of techniques	This is a easy techniques. Easy to implement. Easy to understand.	Neural networks are used for face recognition. In which we are trained neurons using training data sets for report minimum error	It is used for detect large amount of changes in layering and face expression in face image	In which we are create a 3d Projection of images face
Demerits of techniques	In which we are difficult to recognize when head position ,pose are diff than template	This is a time consuming and costly technike. we are spend more time to trained neurons	Fisher face techniques require large amount of processing time, in which require more storage space for face recognition	In which the size of head in input image is must be ,head size in the input image is 60x60 pixels. Otherwise detecting factorial points at low accuracy

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