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# Survey on Face Recognition using Neural Network

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**Abstract:** *The strategy of face recognition involves the examination of facial features in a picture, recognizing those features and matching them to 1 of the many faces in the database. Now a day face recognition continuous in demand in image processing system because of its requirements such as authentication access control, surveillance systems. Face can be categorize into two process such as appearance and features. The proposed system of face recognition and extraction is done based on the neural network.*

## I. INTRODUCTION

Face recognition has been the prominent biometric technique for identity authentication and has been widely used in many areas, such as military, finance, public security and daily life. Face recognition is the long standing approach in CVPR community. In earlier, the study of face recognition is one of the popular in historical eigenface approach. In general, many methods can be used to recognize the face by one or more layer representations are filtering responses, histogram of the feature codes or distribution of the dictionary atoms. A neural network is nothing but computational learning system network function to understand and translate a data input of one form into a desired output, or in the another form. The concept of the artificial neural network was inspired by human biology and the way of neurons of the human brain function together to understand inputs from human senses. Neural network are just one of the many tools and approaches used in machine learning algorithms. The neural network itself may be used as a piece in many different machine learning algorithms to process complex data inputs into a space that the computer can understand. Facial recognition is one of the most successful applications of image analysis and understanding. It is one of the favored subject in computer vision and one of the most successful applications of image analysis. Mainly, the face detection is carried out using haar-classifier which produces an accuracy of around 80.2 percent.

## II. LITERATURE SURVEY

In real-time face recognition system process it can be divided into three steps such as feature extraction, clustering, detection, and recognition. Each one of the step can be uses a different method that is local binary pattern(LBP), agglomerative hierarchical clustering(AHC), and Euclidean distance. Here, they also use the content based image retrieval(CBIR), and that can be processed by using the image searching techniques based on image features which is to be implemented as the searching method. Based on these experiments and testing result will give the accuracy level of precision values are 65.32% and 64.93% respectively[1].

Facial expression is one of the most successful application of analysis. This paper presents the Principal Component Analysis(PCA) and eigenface method for facial feature extraction. I also perform of the several metrics such as accuracy, precision and also uses the two public data sets are SOF(Speech on faces) and MIT CBCL Facerec are incorporated in the experiment[2].

The paper presents the latest technology of face recognition using image processing which provide the knowledge of the image to activate the process regarding the face detection. But face recognition is one of the challenging problems in Image processing. Basically the aim of the face detection is used determine the any face in an image and it locate the position of the image. The neural network is created and trained with training set of faces and non-faces. Here the system uses the MATLAB technology. The network which is work based on the hidden layer processing[3].

In this paper, they mainly use the method called deformable templates which is used to detect and describing of features of faces. The method which is used to describe or identify the feature of eyes, mouths and each part of the face to recognize the complete image of the image. Here, which can use energy function such as links that are edges, peaks and valleys of the image intensity that includes the properties of the template. These template can be used to detect dynamically a image which is stored in the database. By using the energy function it can be deforming the image for best fit. This method can be show the deformable templates for detecting the eyes and mouths in real image[4].

In this paper, it mainly use the swarm intelligence that based on the algorithm of data clustering. Here, mainly uses fuzzy c-Means which is used on the cluster. The main approach is develop the face recognition system to create the function for covering the pose variation region. RFID can be used to recognize the face in 3D graphic database. This approach mainly uses when the multi-pose face recognition using the fuzzy ant algorithm for correct matching with the database given[5].

In this paper, the author described about comparative analysis of the faces using principle component analysis algorithm. The author set the new way to find the optimal learning that can be used to reduce the training data and also increase the accuracy by analyzing the back propagation neural network and feed forward neural network. And another two process can be used that is wavelet and efficient variable learning rate and also use the ORL database for the experiment[6].

In this paper, the author described about the geometric approach using PCA algorithm. Here, the system can use the ailments of geometric process that will be used to map the fiducial points of the face and will compare the faces invariantly. And also here the face can be recognize effectively and retrieve the data. The algorithm can be used as fusion in the geometric way and that can be used to retrieve the faces based on their database. The k-means clustering is plays an important role face recognition[7].

In this paper, the system uses the principle of probabilistic neural network which is the one of the algorithm used in face recognition and also application can be used here. By simulation this algorithm can be processed and also it proves good accuracy, stability and real time performance of PNN. Here, the wavelet decomposition and discrete cosine transform can be used to extract the image feature of face. Here, wavelet decomposition can be used to adopt the image of face in dimension reduction and also uses the discrete cosine transform to extract the features of image, PNN is used to recognize the image of face. In this simulation ORL face database can be used [8].

In this paper, the author said about the convolution neural network one of the better algorithm for recognize the image of faces and it also used in the 3 dimensional object of images which is to be depth images. Mostly the recognition done through the hand crafted design but it cannot give the good result. For this situation the paper performed based on the convolution method and it uses the database IIITD kinect for better performance in the convolution architecture which gave the good recognition of base than the traditional methods as HOG and LBP. The CNN will be designed for small database[9].

In this paper, the author described about the heterogeneous process which include the Matching near-infrared(NIR) face images and visible light(VIS) images to processed in the robust approach to recognize the face. The system can performed based on the linear discriminative projections where the NIR and VIS images are matched through two process i.e., directly through random subspace projections and sparse representation of classification[10].

### III. COMPARISON OF DIFFERENT METHOD FOR FACE RECOGNITION

Table 1, it gives the different methods regarding the face recognition with unique ideas.

Serial no	Title	Author name	Techniques	Advantage and Disadvantages	Result
1	Multi-object face recognition content based image retrieval(CBIR)	Muhammad Fachrurrozi, Erwin, Saparudin IEEE 2017	1)Hierarchical cluster algorithm 2)Local binary pattern 3)Euclidean distance	The hierarchical algorithm I used to improve the speed and accuracy of image matching with CBIR. LBP is gives better accuracy than the hierarchical algorithm.	In this paper, the system can recognize the face based on the testing data if it is having same lighting, distance and effects of training.
2	A study about principle component analysis and eigen face for face extraction	Erwin, M Azriansyah, N Hartuti, Bayu Adhi Tama IEEE 2019	Principle component analysis	The PCA algorithm is better than the other face recognition due to simplicity, speed and insensitivity for gradual changes in the face. The drawback is to use the limited files for recognize the face.	The system can perform the test based on the png image and jpeg image, which provide the food facial classification
3	Face recognition and detection using neural network	Vinita Bhandiwad, Bhanu Tekwani IEEE 2017	Image processing, MATLAB.	Neural network one of the easiest way to create the structure of elements because it contains bunch of neurons. The drawback limited number of training and testing data can be used	In this paper, they conclude that neural network perform good while recognize the face through hidden layer processing.
4	Feature extraction from	Alan L,	Deformable	The templates give the each	This paper gives better

	faces using deformable templates	Yuille, Peter W. Hallinan and David S. Cohen	template	feature of faces such as eyes mouth etc. It interact with image in a dynamic process. The template should consider the limited process images for better feature extraction.	facial classification for feature extraction that can be done while deform template is captured it.
5	Invariant range image multi-pose face recognition using fuzzy ant algorithm and membership matching score	Supawee Makdee, Chom Kimpan, Seri Pansang	Swarm intelligence and Fuzzy c-means algorithm and fuzzy ant clustering algorithm.	The algorithm in which the data point can be accessed with clustering. The data can be obtained through the other technique i.e., fuzzy ant clustering.	The result given that the fuzzy ant and fuzzy c-means is give the better performance than k-means classification for face recognition.
6	A comparative analysis of different neural network for face recognition using principle component analysis, wavelets and efficient variable learning rate	Raman Bhati, Sarika Jain, Nilesh Maltare and Durgesh Kumar Mishra	Principle component analysis, Wavelets and Variable learning rate, back propagation and single layer feed forward neural network	This technique can be used in airports, military bases, government officers etc. and also we can use this system if unauthorized persons prohibited. The drawback is a neural network performed on low convergence of weights, by this problem the system uses the learning rate approach.	The paper gives 100% accuracy if learning rate is correctly assigned in the form of database. And also gives the good result in back propagation neural network in an sensitive of learning parameter . Then wavelets can be used in both network for feature extraction.
7	Face recognition using PCA and geometric approach	Navya Sushma Tummala, PNRL Chandra Sekhar	Principle component analysis, geometric approach, local dissimilarity, k-means clustering	Geometric approach gives the better measurement in the recognition of each part such as mouth, eyes, nose etc. it can uses the wavelets to characterize the features of faces. PCA is the mathematical approach which is used to for orthogonal transformation by series of observation.	The result obtained that by this approach the face can be recognize in high rate when the image in different expressions and variation.
8	Research of face image recognition based on probabilistic neural networks	NI Qiakai, GUO Chao, YANG Jing	Wavelet decomposition , discrete cosine transform, probabilistic neural network	The main advantage of probabilistic access the nonlinear algorithm into linear algorithm and it is characterize the high precision with nonlinear algorithm	The result shows that the PNN is the best accuracy level than the BP and LVQ neural network and it is also consistent process for face recognition. And also obtain the good result in the ORL database.
9	Face recognition using depth images base convolution neural network	Juxiang Chen, Zhihao Zhang, Bo Li, Tong chen	Convolution neural network Deep learning	The convolution method can conduct the high feature to combine the low level feature. CNN is the good field for image processing, the convolution layer	In this paper, the CNN uses the small layer of database which gives accuracy of 86%. It also applicable for robust noise environment.

				is the small layer which can optimize the faces through the database. Here uses the IIITD kinetic face database for doing the experiment in through large set data.	By comparing the CNN is the most suitable application than the depth image recognition in terms of recognize and robustness.
10	Heterogeneous face recognition: Matching NIR to visible light images	Brendan Klare and Anil K. Jain	Near infrared images, visible light images, spare representation	To described the NIS and VIS images in facing is done by HOG and LBP features of image which gives good effectiveness of finding the image of face. The HOG uses the SIFT network to match the sketches and photographs of faces, which gives the good result.	This paper gives the better result or accuracy for given process.

#### IV. CONCLUSION

The survey of the different papers studied have given special identification and classification techniques which have been summarized above. Each papers has its own methods in different manner, advantages and disadvantages, by combining with various method have given the better results than other. As per the survey, we have analyzed that the principle component analysis method has the good accuracy and it can be used with the aid of researchers for identification and classification of face recognition. These algorithm which extract the face recognition problem by studying the facial recognition using eigenface approach through ORL face database. This can be performed based on the PNG images and JPEG images which is giving the better facial classification. It also has the review and comparison of various papers on face recognition system and this can be reduce the unwanted data is used in the system. These comparisons will help us to know the different form of methods to enhance the existing system and derive a new model to achieve the object of the system.

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