

Face Recognition Using Hybrid Algorithm

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Abstract- In this paper Genetic and Fuzzy hybrid approach is used to recognize the face from the data set to improve the reorganization rate. The proposed method is implemented in a four steps. Any sensor device is used to sense the face attributes and measured the attributes used for biometrics based identity. In second step any collected data from the sensor device will be pre-processed. Various types of noises in the attribute will be removed for increasing the accuracy for post processing. In the third step various features required for matching will be extracted. These features are identified from the inputted image. In fourth step these collected features values are stored into the database as training set. Later on any input image attribute values are matched with the stored dataset features. Whom the features will be matched will return success else will return failure.

Keywords- Biometrics, Face Reorganization, Hybrid, Genetic.

I. INTRODUCTION

Biometric recognition refers to the recognizing of people based on its traits like face, finger print, voice sample etc. These attributes help in recognizing the person using machine learning way. So that person cannot forget his identity. Other identities such as username and password based identity can be stolen easily but biometrics based identity is difficult to copy [1]. These biometric traits are unique and stronger attributes for each individual. Biometric verification is the process in which a person is uniquely identified by evaluating one or more distinguishing biological traits. Unique identifiers include fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA and signatures. The oldest form of biometric verification is finger printing [2]. Historians have found thumbprints used to unique identification on clay seals in ancient China. Biometric verification has advanced considerably with the advent of computerized databases and the digitization of analog data, allowing for almost instantaneous personal identification. Iris pattern [3] and retina pattern authentication methods are already employed in some bank automatic teller machines (ATM). Voice waveform recognition, a method of verification that has been used for many years with tape recordings in telephone wiretaps, is now being used for access to proprietary data banks in research facilities. Facial-recognition technology has been used by law enforcement in order to pick out individuals in large crowds with better reliability [4]. Hand geometry is being used in industry to provide physical access to buildings. Earlobe geometry has been used to disprove the identity of individuals who claim to be someone they are not identity theft. Signature comparison is not reliable, all by itself, as the other biometric verification

methods but offers an extra layer of verification when used in conjunction with one or more other methods. No matter what biometric methodology is used, the identification and verification process remains the same. A record of a person's unique characteristic is captured and kept in a database. When identification verification is required, a new record is captured and compared with the previous record in the database. If the data matches in the new recorded database, the person's identity is confirmed [5]. One of the most used features for biometrics is face recognition. With high resolutions of the cameras it is very easy to capture the image. The image captured from high resolution cameras will be having lower noise and less time consuming for processing the high resolution image. The success rate is higher. The face recognition is most adaptable technology because it is easy to capture the face image as compared to the other biometrics. Each person has their own feature for their face and considered a unique for each individual [6].

The paper is organized as follows, Section I contains the introduction of Face recognition, Section II contain the various techniques of face recognition and Section III contain the face recognition using proposed hybrid method using three different data sets., Section IV contain the step wise procedure to recognized the face from the data sets. Section V focus on the experimental results and compared with existing techniques with help of graph. Section VI concludes proposed research work

II. LITERATURE REVIEW

A literature review is the information about existing methods. The main purpose of literature review is to find the relation between existing fields to proposed method. In the

form of literature review may study the different types of methods for analyzing the proposed method. The study of literature review is as following:

Jindal et al. described the noisy fingerprint matching [1]. In first step the smoothening of the image is taken place. Later on different points are being recognized. These points can also be called as key points. So that these key point are matched with the another dataset stored images. The matching of key points produces the result to 96% accurate.

Garg et al. explained the technique named as structural approach for face classification [2]. This approach is based on a hierarchical decision tree for the GMM means super vector based feature set and using various classifiers viz. SVM, BLG and SVR, to improve the performance of the existing emotion recognition systems. Faces are classified into different categories. Each category will be different features selection for matching the results.

Sara et al. explained the Biometrics as the process to extract the Biometrics identity [3]. Physiological biometrics detection and face detection is based on the skin color. It uses the features of the face based on both shape and morphological features.

Desai et al. described the finger print matching for biometrics [4]. This paper has used the technique called as neural network based approach. This technique will be having collection of various features. Matching is done based on the matching of these features values. This technique has been performed on to the finger print matching robustly.

Girgis et al. explained the face recognition using a fusion based technique [5]. This fusion based technique is consisting of Kruskal-Wallis statistic tests. This technique identify the key point on the face prepare the kruskal based graph. This graph can be cyclic graph. Later on based on matching the optimal path for matching is performed on to the graph .

Hsieh et al. described the matching of the speech [6]. Which is another biometrics based technique. This technique will produce the MFCC point in the speech. These higher and lower pitches points are matched with the various speeches stored as database. So that matching is performed with less processing time and less processing efforts. This technique has produced 94% result.

Lumini et al. explained the face recognition using fuzzy neural network [7]. Various key points on the face are being recognized. So that corresponding training images are key points are matched with the inputted image. That means less time and processing is taken. Rather than matching whole

image few points are matched. These points are also called as minutia points.

Bansal et al. explained the technique for finger print matching with Genetics based approach [10]. This genetic based approach identifies the precise matching of the finger print image of the finger print images. The accuracy has been upto 96%. This paper has performed the graph matching supported line extraction based mechanism.

Gour et al. explained the finger print matching and it identify the various trivial points in the image of the finger print [11]. So that those trivial points are matched with the dataset stored fingerprint images. These trivial points are randomly selected point in the total image. These randomly picked point matching produces better and higher accuracy results [11]

Gabriel et al. described the different signature matching and they have used the technique named as projection based technique [12]. This technique is used to match the dataset stored signature specimen. This type of technique is use full for matching the signature with higher accuracy and with less processing time and processing efforts. This projected image is matched in context to stroke with and stroke height and stroke width.

III. PROPOSED METHOD

In this method, face is recognized from the three data sets (UMIST, ORL, INDBASE) shown in Figure 1, 2 and 3. The propose hybrid approach is used to recognize the face from the data set based on Genetic and Fuzzy based approach. In this method various steps will be taken place. The following are performed in sequence to detect the face from the data set.

Step1 In first step prepare the data base for three types of databases like UMIST, ORL and INDBASE is taken from open repository at www.uci.edu.

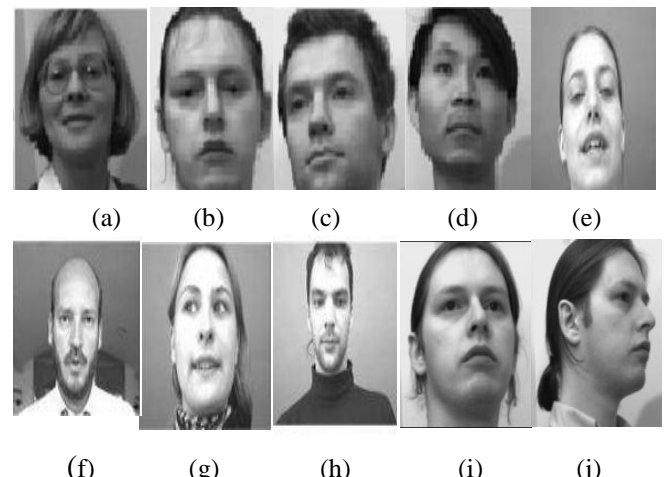


Figure 1:-UMIST dataset used in the proposed method

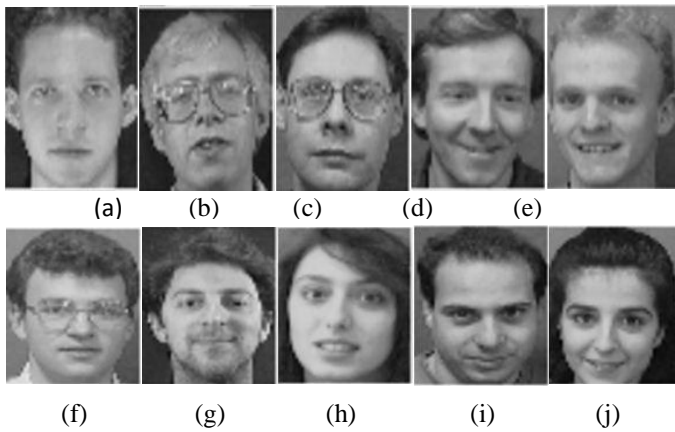


Figure 2 ORL dataset used in the proposed method

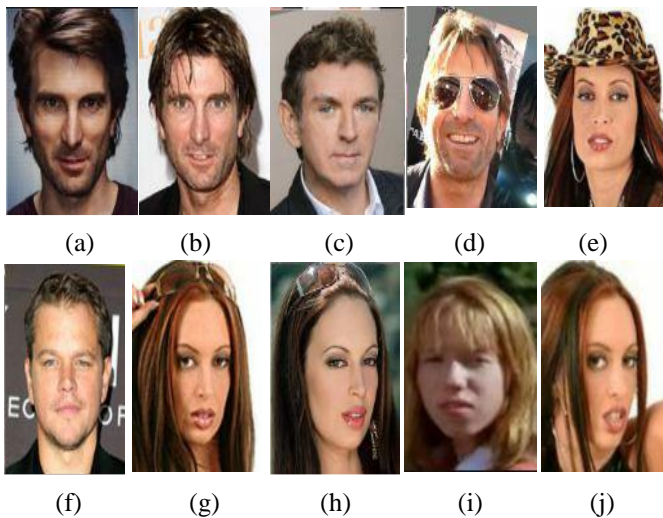


Figure 3:- INDBASE dataset used in the proposed

Step2 In the second step the base technique based on Genetic for face recognition is applied on all three dataset images like UMIST, ORL, and INDBASE.

Step3 Build an interface for Genetic with Fuzzy System for face recognition

Step4 compare the result of genetic algorithm and proposed algorithm . These results are in the form of Accuracy.

IV. PROPOSED ALGORITHM

To enhance the accuracy of the face recognition Hybrid approach is used based on Genetic and Fuzzy logic. The proposed method outperforms the existing face recognition technique based on Genetic and improves the accuracy time and the accuracy rate. The following steps of the proposed

algorithm are given below and also flowchart of proposed method is shown in figure 4

Step1: In first step, select any one image from the database related to different images of three Databases like UMIST, ORL, and INDBASE.

Step2: In second step extract the features of all the images of the database and stored as dataset.

Step3: In third step input the real time image for face matching. Extract the features of the inputted image and will be matched against the database stored features of training set Images.

Step4: Apply the fuzzy rule set for different features for matching the features of training set and Inputted image.

Step5: End

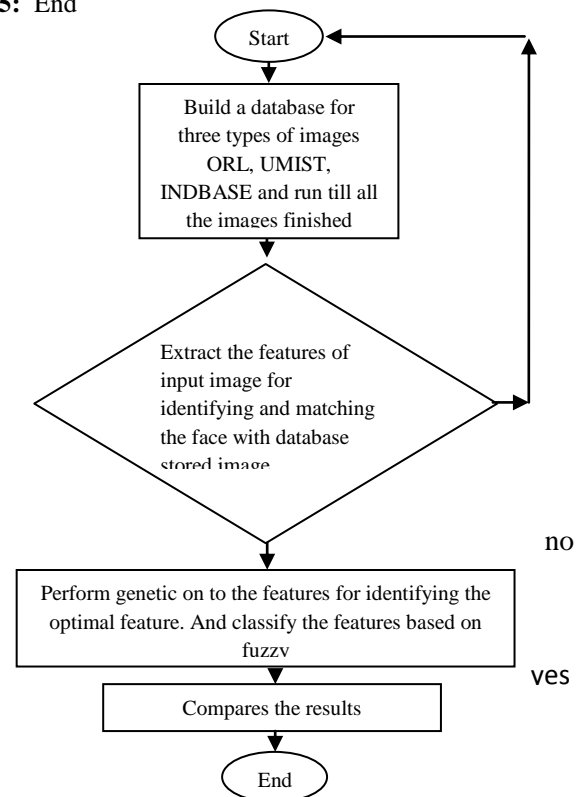


Figure 4 Flowchart of the Proposed

Figure 4. shows the flowchart of the proposed Genetic based approach for the face recognition using Genetic based approach. The features extraction will be taken place using proposed approach. In first step a dataset of image of face is collected. These dataset images are of UMIST,INDBASE and ORL. Each image will undergoes through the extraction process of the features. In third step based on genetic and the fuzzy classify the features in to different classes and extract the optimum feature from the given set of features. In last

step compare the performance of proposed approach with the existing Genetic based approach.

V. EXPERIMENTAL RESULTS

In this section experimental results of the proposed method is presented and discussed. The proposed approach is implemented on three dataset images UMIST, ORL, and INDBASE. The following parameters are used to evaluate the performance of the proposed method like Accuracy and False Accuracy Rate (FAR)

(a) **Accuracy:** It is the measure of the recognition of the face recognition accuracy. How many faces are being identified as true positive and true negative.

$$A = 1/M * N \sum_{x=1}^M \sum_{y=1}^N S_{xy} - C_{xy} \quad (4.1)$$

(b) **FAR:** Where the FAR has to be reduced. Where any face is recognized it is called true positive otherwise face is not recognized.

$$FAR = 10 \log_{10} \left(\frac{1}{Accuracy} \right) \quad (4.2)$$

and other is solidly filled image

Experimental results of face recognition using proposed method are tabulated in Table 1. and compared with LDA, PCA, Genetic methods in terms of accuracy. The proposed approach has better accuracy rate and the lower FAR.

The comparison of the face recognition using LDA, PCA, Genetic and proposed algorithm has been performed on all the data sets like UMIST, INDBASE and ORL. Comparison of the face recognition using LDA, PCA, Genetic and proposed method in terms of accuracy is shown in Figure 5. Hybrid approach shows the improvement of accuracy for all the databases. The matching of the images is performed based on shape and morphological features.

Table 1 Comparison of Enhanced Genetic, Genetic, PCA and LDA

			LDA	PCA	Genetic algorithm	Hybrid algorithm
Database	Number of classes	Number Of test cases	Recognition rate	Recognition rate	Recognition rate	Recognition rate
ORL	10	3	30.32	60.45	98.58	99.32
	20	4	30.89	60.34	97.5	98.67
	30	8	29.31	59.31	95	97
	40	7	30.39	59.9	92.5	96.5
UMIST	10	6	31.29	59.23	97.5	96.2

	10	7	30.78	61.21	99.2	99.2
	20	7	30.34	60.67	91.66	99.4
INDBAS E	10	4	29.34	60.21	98.33	99.32
	10	5	29.78	59.89	98	99.23
	20	6	45.78	60.28	96	98

Table 1 shows the comparison of Enhanced Genetic, PCA and LDA. The accuracy for the recognition rate is much higher for the genetic based approach. That means Enhanced genetic based approach has tremendously higher results.

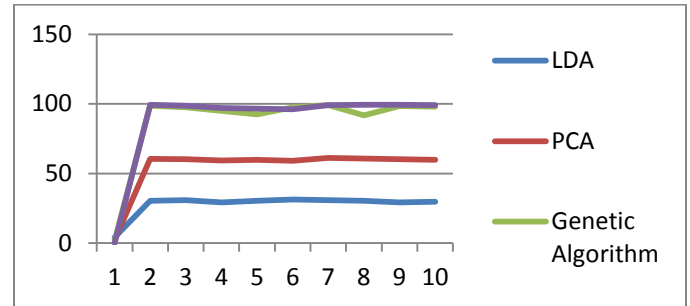


Figure 5 Comparison of the face recognition using LDA, PCA, Genetic and proposed method in terms of accuracy

Graph in Fig. 6 shows the comparison of the recognition rate for Genetic, LDA and PCA. Top Magenta line denotes the recognition for the Enhanced Genetic based approach.

VI. CONCLUSION

In This study, face recognition using hybrid method is applied on three dataset images like UMIST, ORL and INDBASE. In the existing work genetic algorithm is used for face Recognition. Various features are extracted from the inputted image. These features are compared with the features extracted from data set images using proposed method. The matching of the images is performed based on shape and morphological features. In the proposed work recognition rate is improved compared the existing technique. So hybrid approach of fuzzy and genetic provides better solution.

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