

# FACIAL FEATURE IDENTIFICATION AND COMPARISON USING KNN ALGORITHM

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**ABSTRACT--** *Biometric is the statistical analysis of the user's unique physical and behavioral characteristics. This technology is used for identification and access control, or else for identifying the individuals who are under surveillance. Some examples include palm veins, face recognition, hand geometry, iris recognition, retina etc, physiological traits or behavioral characteristics. They are the way to measure the physical characters to verify their identity. Once measured, the information is compared and matched in database. Features extracted from the facial images play a major role in the security system. This research paper explains how facial features are identified using KNN algorithm. Finally the proposed method is compared with existing methods. The comparison table represents that, DLBP and RLBP with KNN classifier provides better result in terms of accuracy than existing methods.*

**Keywords-** *Face recognition; face identification; local binary pattern (LBP); k-nearest neighbor (K-NN)*

## I. INTRODUCTION

Days ago in bank the details are safe guarded with OTPs, Usernames, and Passwords etc. Biometric is more secured than any other methods. In earlier days security is made with passwords usernames etc,. But this method is not more secure to safeguard our information. Now a days we have some improved technology to make our information secured one of the developed technology is biometric system. Now days the use of smart phone is increasing, the technology in the Smartphone is also increasing. Security is the process of implementing measures and system designed to protect and safeguard in formations. So the smart phones should be secured with some security. Though we have passwords to our mobile phones, we can't say that we are more secured with our information. As technology increases we can secure our information by using facial identification. It is the best method to secure our information in our Smartphone. Recognition of facial expressions is an important component of human machine interfaces. . This biometric technology is used in day to day life as for unlocking a Smartphone or to login our bank account using finger print or facial recognition under biometric. Facial recognitions and finger print detection is used in all the fields to safeguard our information. This technology considers a number of aspects for successful face recognitions. So all these factors help the technology to remember whose face is given as password. This advantage of this face recognition is enhanced security, Faster processing, Automation of identification, privacy. The advanced Facial expression classifier has been tested on a publicly available facial database and the average 98.95% successful classification rate has been achieved this face recognition is based on the KNN algorithm.

This research article organized as follows. In section 2 various existing methods are used to extract the facial features. Section 3 deals with the proposed method used to extract facial features. Section 4 deals with the result part. Finally section 5 concludes this research topic.

## II. LITERATURE SURVEY

Hasan Farsi et al., explained about the limitations of an existing facial feature extraction techniques. Less number of feature extraction methods is available now. Normally one training data set can be used. To find out better accuracy more than one sample training sets are needed. In facial feature extraction because of illumination value and rotation value the level of accuracy was automatically reduced. In this research article the authors proposed a new method was introduced. In this hybrid recognition approach single person image is used. Here compensation phase and rotation identification stage was added for achieve robustness. This proposed concept was called as WGPCA (Weighted Graphs and PCA). In this concept face values are used to extract the facial features. Genetic algorithm was used with training data set to achieve more facial features. In this research article KNN concept was used to classify the face values depends on the weighted facial features of the existing training data set. After detect the facial features PCA(Principal Component Analysis) was applied. This hybrid algorithm was trained by using MATLAB software. Delphi XE2 programming was used to identify the faces in real environment. The important feature of the proposed algorithm was to identify the faces in real time environment. FERET database was used in this analysis. This new concept showed better accuracy compared with other facial feature extraction methods [1].

Idelette Laure Kambi Bel et al., explained the importance of facial recognition. They said that human face is playing an major role interplay and identify the peoples. Currently varieties of applications are available on the internet. So, human face is the important security object to protect our personal data and our own applications. Facial features can be changed person by person. Due to age, expression and pose the facial features are varied from human by human. The main contribution of this research work is to provide a new concept to solve facial recognition problems with the various parameters like different pose, radiance value of the face and appearance of the faces. Here various data mining algorithms are used to extract the facial features. To extract the facial features by using LBP (Local Binary Pattern) concept was applied. Facial images are classified using KNN algorithm. These algorithms are applied on CUM PIE data set. Finally the performance of this system was calculated. This concept produces the better performance on feature extraction in facial images [3].

Basma Ammour et al., says that in facial recognition feature extraction was the very important process. Many researches were going on this particular field. In this paper the authors proposed a new hybrid concept with Gabol filter and LBP. Thos concept was giving more importance to reduce the data using GDA(Generalized Discriminant Analysis). Using the concept of Euclidian distance the matching process was executed. Here ORL and FERET databases are used for performance analysis. The output of this concept shows that this new method shows the better result compared with other methods[4].

C.V.Arulkumar et al., described that facial recognition was very difficult task because the lighting condition was unstable. To avoid this problem combine various features like illumination, face texture value, transform distance and distance with multiple fusion. In additionally to find the phase spectrum values by using phase

Congruency approach. The combination of the above two approaches provides better accuracy level in facial recognition system if the light conditions also unstable [5].

Dong Li et al., discussed about the features of human faces. Face identification methods normally used human face images with different facial features. The performance of the facial recognition was varied because several variations are there in the human faces. In online database various HR databases with face images are available. Here the authors used a new concept called pose-invariant face-verification method. The final experiment result shows that this proposed method achieves better accuracy level when the images have different expression and vary in pose value [6].

Pooja Yadav et al., proposed a new method for gender identification by using face images. Gender identification is one of the important research topics in current world. Increase the accuracy level in gender identification was very difficult. The major part of this research area was feature extraction from human faces. Male and females are having unique shape value. Here Gabor filter concept was used to take out edge value from the human face images. Using feature reduction huge dimension value was generated with unnecessary features [7].

Dihong Gong, et al., discussed about various challenges in facial recognition. The face features was varied from one person to another one. In this paper the authors describes about the various key problems in mixed face recognition. The facial feature extraction approaches LBP, HOG and SIFT are commonly used. In this research paper the authors proposed a new encoding model to extract facial features for mixed facial identification. This concept is used collecting the common values like modality gap and decrease the stages of facial feature extraction. Normally using this concept original face image can be encoded form and minimize the original form. Using this encoded form the level of the matching was applied to find the hidden value [8].

Ming Shao et al., says that in visual learning concept facial recognition was the critical problem. The main issue in the facial recognition is the major changes are occurring between the captured image and already registered image. To avoid this problem the authors proposed a new method called shared casual faces (RFs)-guided encoders. Here the first level of this proposed system was collect high level feature with different pose values using supervised auto encoder. In the second stage random signals are applied to replace original value. In the third stage the performance of this proposed frame work was incorporated with deep convolutional neural network. At last the experiment was conducted on the Multi-PIE database. The final result shows that this proposed architecture provided better result when the pose variation of an image [9].

### **III. PROPOSED METHOD**

The Facial recognition is used in various places. Every human being having unique facial features. The same features are not repeated to others. Because of that reason facial recognition concept is used in various applications for authentication purposes. Extracting facial features by using various machine learning classifiers. In this research paper facial features are extracted by using KNN classifier. The following fig 1 shows the block diagram of our proposed system.

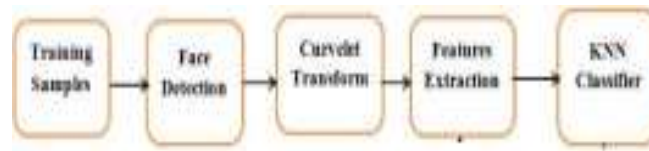


Fig1. Block diagram of proposed method

This entire process can be classified into various phases.

**Face Detection:** This is the first phase of our proposed system. It means capture the images and extract the face values from the different background value. Face images are extracted from photos or capture from videos. Initially the unwanted parts are removed by using cropping concept. The face images are cropped based upon location of two eyes.

**Curvelet Transform:** This is the next level of facial recognition. It is the task of the original object to another one for recognition. In curvelet transforms the resolution tool is used to increase the level of identifying edge values. This transform also used in image compression technique, enhancement of contrast level and improve the image quality. This transform combined with LBP provides the better result.

DLBP(Robust Local Binary Pattern) : This concept is used to avoid illumination level effect issue of LBP.

RLBP(Distinct LBP): This concept is used to convert the images to monotonic gray scale transformation value and insensitive concept to noise.

KNN Classifier: this classifier is used to classify the images based upon the nearest training values. Compare with other machine learning algorithm KNN classifier is the simplest classifier. During this task, unlabeled point is allocated to the K near value. When the value of K=1 the object is classified to near object. If the two classes are available, the k value must be an odd integer value. In KNN classifier concept calculate distance between two points called as Euclidean distance. It is calculated by using the following formula.

$$D(a, b) = \sqrt{\sum_{i=1}^n (a_i - b_i)^2}$$

#### IV. RESULTS AND DISCUSSIONS

In this research article the facial recognition is identified using Curvelet transform, DLBP, RLBP and KNN classifier. Facial recognition concept is used in different applications. In traditional security methods are not provide better security levels. This proposed method provides better accuracy compared with other existing techniques. In this method the facial images are collected from pictures or videos. After capture the images preprocessing techniques are applied to improve the quality of the images. Then curvelet transform concept is applied on the pre processing images. Then the features are extracted by using DLBP and RLBP. Finally the images are classified by using KNN classifier. The following table 1 shows that proposed concept of facial value extraction method is provides better result compared with existing feature extraction methods.

<i>Sr. No</i>	<i>Feature Extraction Methods</i>	<i>Accuracy in %</i>
1	LBP	85.57
2	Curvelet + LBP	93.69
3	Curvelet + CLBP	95.56
4	Curvelet + RLBP	97.22
5	DLBP + GLCM	96.67
6	Curvelet +DLBP+RLBP+KNN	98.85

Table 1 Accuracy level of proposed method and existing method

## V. CONCLUSION

Biometric concepts provide high security level of various applications. Under biometric concepts finger identification, iris recognition and facial identifications are the important concepts. The facial images play a major role in our society. Because every humans have unique identification. The facial features are varying from one people to another one. Because of that reason facial security system is used in various applications. To extract the features from the facial images various machine learning concepts are used in the existing system. In this proposed system to extract the features by using the combination of curvelet transform, DLBP, RLBP and KNN classifier. Finally the proposed concept is compared with existing feature extraction concepts.

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