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# Efficient Facial Expression and Face Recognition using Ranking Method

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**ABSTRACT**
Expression detection is useful as a non-invasive method of lie detection and behaviour prediction. However, these facial expressions may be difficult to detect to the untrained eye. In this paper we implements facial expression recognition techniques using Ranking Method. The human face plays an important role in our social interaction, conveying people's identity. Using human face as a key to security, the biometrics face recognition technology has received significant attention in the past several years. Experiments are performed using standard database like surprise, sad and happiness. The universally accepted three principal emotions to be recognized are: surprise, sad and happiness along with neutral.

## I. INTRODUCTION

Expression is the most important mode of non-verbal communication between people. Recently, the facial expression recognition technology attracts more and more attention with people's growing interesting in expression information. Facial expression carries crucial information about the mental, emotional and even physical states of the conversation. Facial expression recognition has practical significance; it has very broad application prospects, such as user-friendly interface between man and machine, humanistic design of goods, and emotional robot etc. With facial expression recognition systems, the computer will be able to assess the human expressions depending on their effective state in the same way that human's senses do [3]. T he intelligent computers will be able to understand, interpret and respond to human intentions, emotions and moods [3].

The facial expression recognition system applied in different areas of life such as security and surveillance, they can predict the offender or criminal's behavior by analyzing the images of their faces that are captured by the control-camcorder. Furthermore, the facial expression recognition system has been used in communication to make the answer machine more interactive with people.

The answer machine has become more intelligent by analyzing the client's voice and dealing with the responses according to their emotions. Moreover, it is powerful in signed language recognition system that deals with the deaf and dumb people. The facial expression recognition system has a considerable impact on the game and entertainment field besides its use to increase the

efficiency of robots for specific military tasks, medical robots, and manufacturing servicing [7]. Generally, the intelligent computer with facial expression recognition system has been used to improve our daily lives.

Bartlett explores and compares techniques for automatically recognizing facial actions in sequences of images. These techniques include analysis of facial motion through estimation of optical flow; holistic spatial analysis, such as independent component analysis, local feature analysis, and linear discriminant analysis; and methods based on the outputs of local filters, such as Gabor wavelet representations and local principal components [1].

Lien describes a system that recognizes various action units based on dense flow, feature point tracking and edge extraction. The system includes three modules to extract feature information: dense-flow extraction using a wavelet motion model, facial feature tracking, and edge and line extraction [5].

The system that used color information, Rajapaskse et al., (2004) proposes the use of non-negative matrix normalization (NMF) with color cannel encoding [4]. This process is performed by representing the (RGB) color channel as a three indexed data vector separately: red, green and blue channel for each image. Then the color using non-negative matrix (NMF), a decoding method, is applied. This technique makes better use of the color image because of the excessive iterative matrix and the decoding operation that involves inverting the matrix; the inherent processing cost was so big [4]. The work presented here provides a novel solution to

the facial expression recognition problem, describing a facial recognition system that can be used in application of Human computer interface. There are three main components to this system: a Feature Extraction, Principal Component Analysis and Euclidean Distance Classifier. To classify the images final facial expression recognition system uses Euclidean Distance Classifier.The system developed is able to find and recognize the facial expressions of database. It recognizes expression of the seven basic emotions, namely happy, disgust, neutral, anger, sad, surprise and fear.

## II.     PROPOSED FACIAL EXPRESSION RECOGNITION SYSTEM

This section describes facial expression recognition system architecture. Our system is composed by four modules: Pre-processing, Principal Component analysis and expression classification using Ranking method. Pre-processing is the next stage after entering the data into the facial expression recognition system. The important data that is needed for most facial expression recognition methods is face position.

As the pattern often contains redundant information, mapping it to a feature vector can get rid of this redundancy and yet preserve most of the intrinsic information content of the pattern. These extracted features have great role in distinguishing input patterns. Ranking method give the preference of the database to decide the expression.

Face recognition technology utilizes the Ranking method that provides high speed and high accuracy for facial detection and facial features extraction. The main logic for facial recognition within ranking method which searches and selects face area candidates after the generation of potential eye pairs. Ranking method is based on a neural network and is not easily fooled by attempts to conceal identity via the usage of caps, hats, sunglasses, etc.

As compared with other biometrics systems using fingerprint/palm print and iris, face recognition has distinct advantages because of its non-contact process. Face images can be captured from a distance without touching the person being identified, and the identification does not require interacting with the person. In addition, face recognition serves the crime deterrent purpose because face images that have been recorded and archived can later help identify a person.

*Facial Expression Classification*

The proposed approach to the     facial expression recognition involves following steps.
1) The train images are utilized to create a low dimensional face space. This is done by performing Principal Component Analysis in the training image set and taking the principal components with greater Eigen. In this process, projected versions of all the train images are also created.

2) The test images also projected on face space, all the test images are represented in terms of the selected principal components.

3) In order to determine the intensity of the particular expression its Euclidean distance from the mean of the projected neutral images is calculated.

4) The Euclidian distance of a projected test image from all the projected train images are calculated and the minimum value is chosen in order to find out the train image which is most similar to the test image.

5) The test image is assumed to fall in the same class that the closest train image belongs to.

EXPERIMENTAL RESULTS AND DISCUSSION

The main useful statistical measurements that were utilized to evaluate the emotion recognition system are: Recognition Rate, Precision and Accuracy. These measures are useful in that they help judge the performance of the emotion recognition system. The recall rate measures and studies the relation between the correct classification rates of specific emotions and the wrong classification of this specific emotion whereas precision measures the relation between the correct classification rate of specific emotions and the wrong classification of other emotions that are classified as special emotions. Finally, the accurate rate measures the relation between the correct classification rate of specific and other emotions and the total number of testing images, i.e. the following convert of these relations into a symbolic equation.

To reduce the impact of adverse local changes (e.g., varying facial expression caused by smiling and blinking eyes, and intentional changes caused by the wearing of caps, hats and glasses), Ranking Method face recognition technology utilizes the algorithm, which reduces the impact of such local changes during the matching process. The

minimization of the local changes guarantees the overall face recognition accuracy.

Where *true positive* for specific data set of emotions is the correct classification rate of emotion; while, *false positive* of emotion is the wrong classification rate of other data set of emotions that are classified as type whereas false *negative* is the wrong classification of emotion. Finally, *true negative* of emotion is the correct classification for images whose label is not. Additionally, it is noticed that the summation of true *positive*, *false positive*, *false negative* and *true negative* is the total number of the testing images.
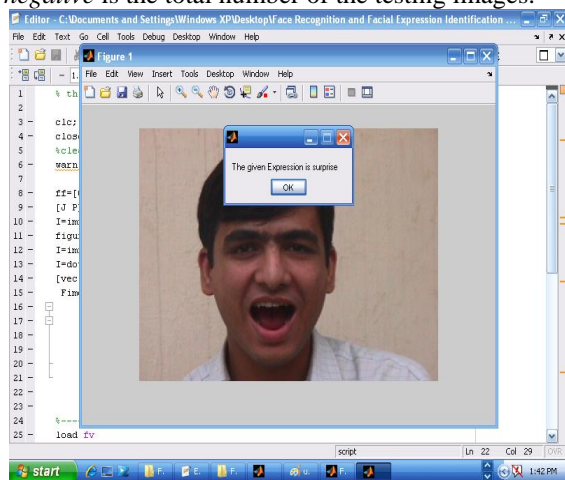


Fig.1 Expression is surprise

The training set is consisted of 70 images (the set contains 10 persons and each person contains 7 images). On the other hand, the test set contains 70 images that are consisted of random choosing 10 images from every expression. The experiment is iterated 10 times. So, we can get the recognition rate of every expression and average recognition rate of all test samples. The average recognition rate of 70 test samples reveals the comparison of the recognition rate for every expression with Ranking methods about training set of 70 images and test set of 70 images. The recognition rate of the neutral, sad and anger with Algorithm is higher than other expressions for 70 test images.
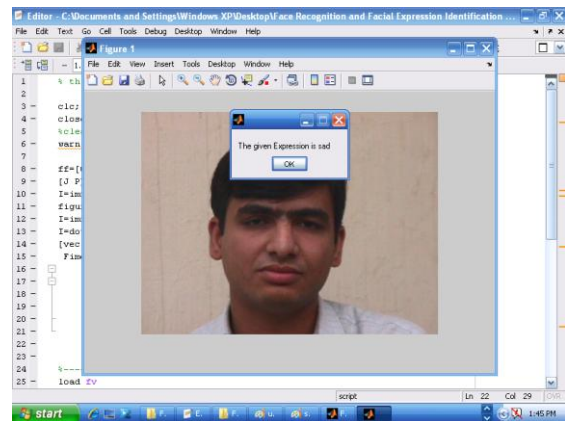


Fig.2 Expression is sad

Face recognition technology utilizes the Ranking method that provides high speed and high accuracy for facial detection and facial features extraction. The main logic for facial recognition within ranking method which searches and selects face area candidates after the generation of potential eye pairs. Ranking method is based on a neural network and is not easily fooled by attempts to conceal identity via the usage of caps, hats, sunglasses, etc.
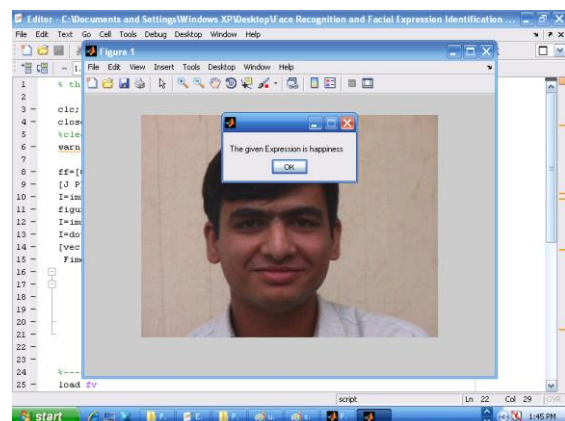


Fig.3 Expression is happiness

Face recognition is also resulting in other dares, like expression recognition or body motion recognition. Overall, face recognition techniques and the emerging methods can see use in other areas. Therefore, it isn't just a unresolved problem but also the source of new applications and challenges.

### III.     CONCLUSION

We have implemented a facial expression recognition system using Ranking method. This approach has been studied using image database. The experiment results demonstrate that the accuracy of the images using Ranking method analysis is 91.63%.

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