Cognitive Human Emotion Detection with Vocal Output

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ABSTRACT: Face recognition process pertains to recognizing meaningful expressions of emotion by a human, involving angry, happy, fear, sad, disgust and anger. It is of utmost importance in designing an intelligent and efficient human computer interface. The face is a rich source of information about human behaviour. The proposed method will recognize the facial expression from a well captured image. The approach for Facial Expression Recognition System is based on Neural Network. For any Facial Expression Recognition, it is necessary to extract the features of face that can be possibly used to detect the expression. For Feature Extraction the Support Vector Machines will be used. After extracting the features the eigenvectors will be generated. This will be further fed into the Neural Network for Emotion Recognition. The paper briefly describes the schemes for selecting the image and then processing the image to recognize the expressions.

KEYWORDS: Face Detection, Neural Networks, Feature Extraction, Emotion Detection, Database.

I. INTRODUCTION

The importance of facial expression system is widely recognized in social interaction and social intelligence. The system analysis has been an active research topic since 19th century. The facial expression recognition system was introduced in 1978 by Suwa et. Al. The main issue of building a facial expression recognition system is face detection and alignment, image normalization, feature extraction, and classification. There are number of techniques which we use for recognizing the facial expression[1].

Facial expressions are generated by contractions official muscles, which results in temporally deformed facial features such as eye lids, eye brows, nose, lips and skin texture, often revealed by wrinkles and bulges. The term face recognition refers to identifying, by computational algorithms, an unknown face image. Facial expressions give us information about the emotional state of the person. Moreover, these expressions help in understanding the overall mood of the person in a better way. Facial expressions play an important role in human interactions and non-verbal communication. Classification of facial expressions could be used as an effective tool in behavioral studies and in medical rehabilitation. Facial expression analysis deals with visually recognizing and analyzing different facial motions and facial feature changes. This operation can be done by comparing the unknown face with the faces stored in database.

Face recognition has three stages a) face location detection b) feature extraction c) facial image classification. Various face recognition algorithm exits and each has advantages and limitation. Lots of research work has been published on face recognition. In the field of neural network, back propagation method mostly used for recognizing the facial expression [2]. The paper proposes the different techniques to extract the features such as angry, happy, fear , sad, disgust, anger and neutral. These extracted features provide us the different recognized output using back propagation method. The experimental results show that the back propagation algorithm or method can recognize the appropriate facial expression than other methods. These networks are most widely used and the work is considered as a main part of artificial neural network.

II.   LITERATURE SURVEY

Ekman and Friesen [5] developed the facial action coding system (FACS) to measure the facial behaviour. The FACS codes different facial movements into Action Units (AU) based on the underlying muscular activity that produces momentary changes in the facial expression. An expression is further recognized by correctly identifying the action unit or combination of action units related to a particular expression. Beaurepaire et al. [6] tells the identification of the nature of the noise is an important part in determining the type of filtering that is needed for rectifying the noisy image. Mehrabian[7] pointed out that 7% of human communication information is communicated by linguistic language (verbal part), 38% by paralanguage (vocal part) and 55% by facial expression. Therefore facial expressions are the most important information for emotions perception in face to face communication. For classifying facial expressions into different categories, it is necessary to extract important facial features which contribute in identifying proper and particular expressions. Pentland in [8] uses a nearest neighbour classifier while feature-line-based methods explained by Li and Lu in [9], replace the point-to-point distance with the distance between a point and the feature line linking two stored sample points.

III.   PRESENT WORK

The training and testing is done using the back propagation neural network[8]. During training, the network is trained to associate outputs with input patterns. When the network is trained, it identifies the input pattern and tries to output the associated output pattern. The various steps used in the facial gesture recognition system are discussed below.

 A. *The Database:*
Since the main purpose of this project is gesture recognition, therefore, the sample pictures are taken under special consideration to ease up the face detection process. Each picture is taken under the condition that, only face is the largest skin coloured continuous object in the frame. There are two sets of pictures. One is used for training purpose (training database) shown in Fig. 1 and another is used for testing (test database) shown in Fig. 2.

B. *Training & test database:*
The training database is the Japanese female facial expression (JAFFE) database which has 23 pictures of the same person under various expressions such as disgust, fear, happy, angry, sad and surprise. The test database has 6 pictures of same person as in training database. Fig. 1 & 2 show the training database & test database respectively.

FIG. 1 TRAINING DATABASE

FIG. 2 TEST DATABASE

IV. NEURAL NETWORKS APPROACH

A successful face recognition methodology depends heavily on the particular choice of the features used by the pattern classifier Neural based Face recognition is robust and has better performance of more than 90% acceptance ratio. The term neural network was traditionally used to refer to a network or circuit of biological neurons. The modern usage of the term often refers to artificial neural networks, which are composed of artificial neurons or nodes. Thus the term may refer to either biological neural networks, made up of real biological neurons, or artificial neural networks, for solving artificial intelligence problems[8].

V. METHODOLOGY

In this article the system proposed four stages: face detection, pre-processing, support vector machines (SVM).
STEP-1 The first stage is face detection method. In this method the database of images are almost identical environment of distance, background, etc. the collection of all the images includes different poses of several anger, happiness, etc. expressions. For creating any type of database some images used for training and some for testing, both of which include number of expressions.

STEP-2 To select a image and add selected image to database. Read input image from database and localize face using expression.

STEP-3 The database is used to recognize manually giving expression that are angry, happy, fear, sadness, disgust and surprise.

STEP-4 Load an image and click on facial expression recognition then insert the recognized number of facial expression and then match it to texture expression with train neural network which starts testing the facial expression.

STEP-5 Recognize expression if match the facial expression to texture expression then image expression should be successfully recognized by LBP algorithm.

VI.   EXPERIMENTAL RESULTS

The output involves a series of steps to be followed as explained in the methodology section. Fig. 3 illustrates the initial main menu after simulation of main program. Fig. 4 & 6 illustrate the outputs of face detection performed once on an image from the database and then on a real time image. The emotion is vocally played and displayed after being detected as illustrated in Fig. 5 & 7, first with an image from the database followed by the real time image.

A. *Main Menu Output*
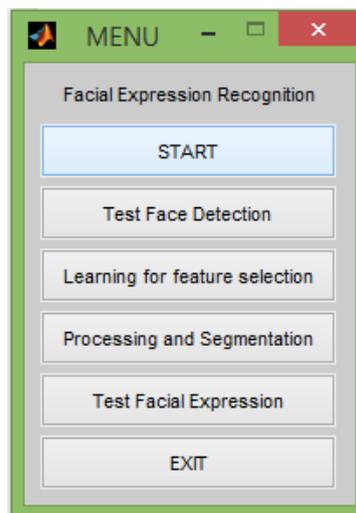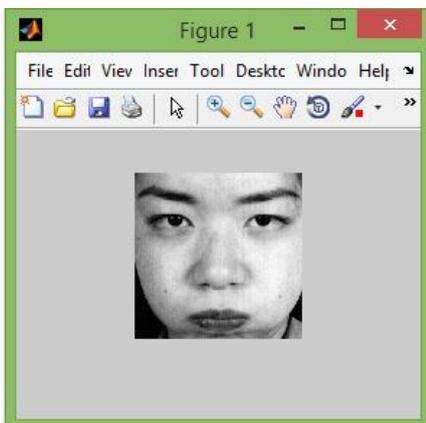

Fig.3. Main Menu Output
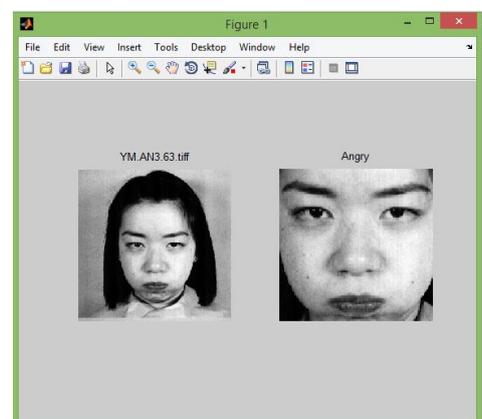
B. Database output

Fig. 4 Detection of Face

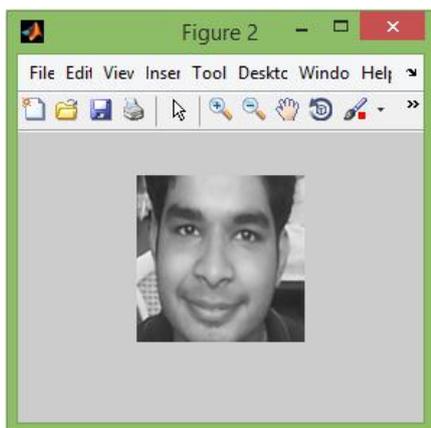Fig. 5 Emotion Detected

C. *Real Time Output*
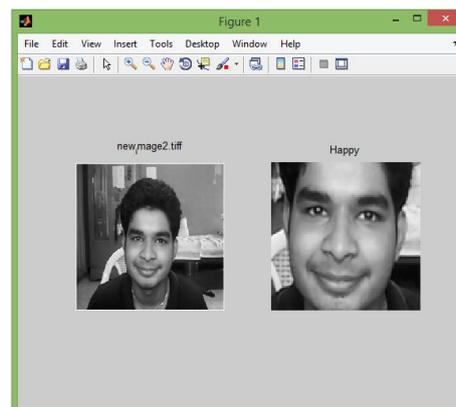

Fig. 6 Detection of Face

Fig. 7 Emotion Detected

VII.   FUTURE SCOPE

Today, the world of the smart devices such as the personalized digital interactive TV is a fast developing area with well-established and proven research concepts .The future interactive TV should be designed to learn for it-self and to prioritize the available programs for the final viewer according to the accepted knowledge. The introduction of the interactive TV brings new challenges as well as new opportunities to the existing world of TV services. The interactive TV applications enable the consumer to actively give feedback on the TV program. This feedback can be collected by the application and fed-back to the content provider. The information on the viewer preferences or reactions could be used for the planning of the TV program. This would require that the user feedback is collected in real-time and that the whole content delivery process is adapted to effectively use this new information. Considering the above requirements, in this paper, we introduce a novel structure of the future interactive TV and investigate a robust real-time face analysis system based on multi-class pattern recognition to enable consumer authentication and even his or her preference feedback for the personalized interactive TV services.

VIII.   CONCLUSION

In this paper the automatic facial expression recognition systems are overviewed. The neural network approach is based on face recognition, feature extraction and categorization. The approach of facial expression recognition method involves the optical flow method, active shape model technique, principle component analysis algorithm (PCA) and neural network technique. The approach does provide a practical solution to the problem of facial expression recognition and it can work well in constrained environment. This paper gives 100% efficient result. To propose an algorithm to recognize human facial features automatically. To use custom neural network 2008 for getting results accurate. This paper recognizes more facial expressions. To measure the performance of proposed algorithm by checking the results accuracy and the algorithm was observed to give 100% result when the person in the training and test database is same.

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BIOGRAPHY

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