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Emotion Recognition using Image Processing

Yash Bardhan, Tejas A. Fulzele, Prabhat Ranjan, Shekhar Upadhyay, Prof. V.D. Bharate
Department of Electronics and Telecommunication, Sinhgad Academy of Engineering, Kondhwa, Pune, India

ABSTRACT

Emotion plays an important role in daily life of human being. The need and importance of automatic emotion recognition has grown with increasing role of human computer interaction applications. All emotion is derived from the presence of stimulus in body which evoke the physiological response.

Keywords: *Emotion recognition, Face recognition, Edge detection, Feature extraction, Database, RGB*

I. INTRODUCTION

In our day to day life emotions or facial expression are the prime factors which are required for communication purpose. Human has an ability through which it can detect emotions of any person without error, whereas in case of machines like computer this does not holds true. An Emotion is a mental and physiological state which is subjective and private it involves lot of behaviour, actions, thoughts and feelings. The facial expression plays a vital role in communicating without any actual verbal communication between human being and also it comes under non-verbal communication technique. Research in facial emotion recognition has being carried so as to improve non verbal communication especially while determining emotion recognition. In fact there exist other applications such as by using MATLAB which benefit from automatic facial emotion recognition.

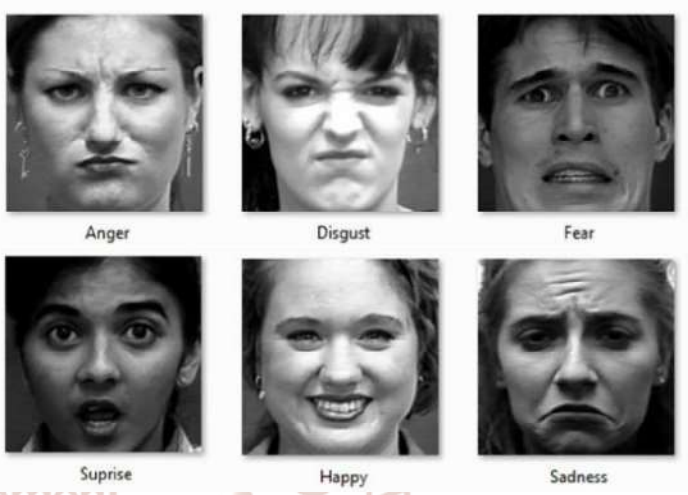

Fig 1: Categories of human emotions

Human emotions are mainly classified into various categories of emotions i.e. Neutral, Happy, Sad, Anger, Disgust, Fear and surprise. Above mentioned emotions can be used to convey messages .However, different sizes, angles and poses human causes various errors while determining emotions. The emotions which are deducible from the human face and different imaging conditions such as illumination and occlusions also affect facial Emotion Recognition with Image Processing and Neural Networks appearances. In addition, the presence of spectacles, such as beard, hair and makeup have a considerable effect in the facial appearance as well. Such Obstacles increases the chances of error in the system . We can say that probably the system is not effective as 100 % efficient.

II. SYSTEM DESCRIPTION

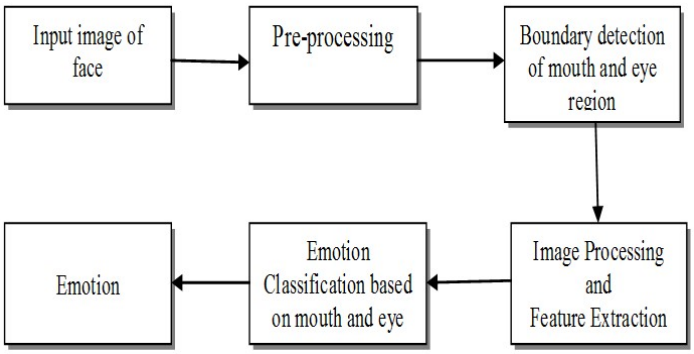

Fig. 2 Block diagram of the system

a) Pre-processing: [3] Pre-processing of image is a technique which enhances the image quality using histogram equalization. After this, we discover the probability of the largest connected region which is related to facial region. If the connected regions height & width is larger than or equal to 50 and the ratio of height to width is between 1 and 2, then it might be considered as face. [2]For detection of facial boundary regions, firstly convert RBG image into binary image. To do this we have used inbuilt Matlab function. This binary image further might be used to isolate the forehead from the face.

b) Boundary detection Method:

Face detection: For a given image detecting a human face might be a complex task due to various possible variations in the face. The different sizes and angles that human face posses may cause this variation.[1] Facial expression approach can be divided into three steps so that the face in an image is known for further processing. Facial feature extraction is the method used to represent the facial expression and finally classification which is the step that classifies the features extracted in the appropriate expression.

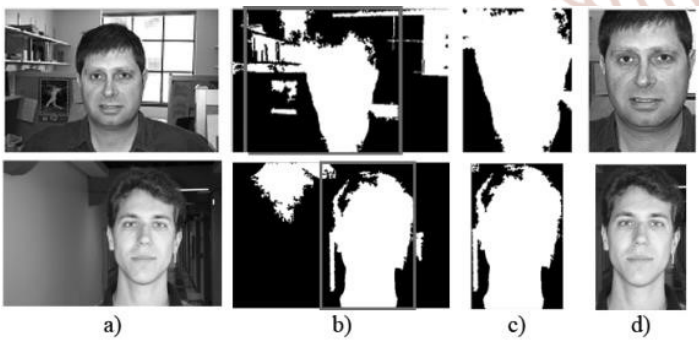

***Fig. 3**: Steps in face detection stage.(a) Original image b) Result image from original image c) Region after refining d) Face detected)*

c) Eye Extraction:

The eyes display strong vertical edges (horizontal transitions) due to its iris and eye white.[4] Thus, the Canny edge can be applied to an image and the horizontal projection of vertical edges can be obtained to determine the Y coordinate of the eyes.[3][4] The Canny edge detection is applied to the upper half of the face image and the sum of each row is horizontally plotted. The top two peaks in horizontal projection of edges are obtained and the peak with the lower intensity value in horizontal projection of intensity is selected as the Y coordinate of the eyes. Then pair of regions that satisfy certain geometric conditions are selected as eyes from those regions.

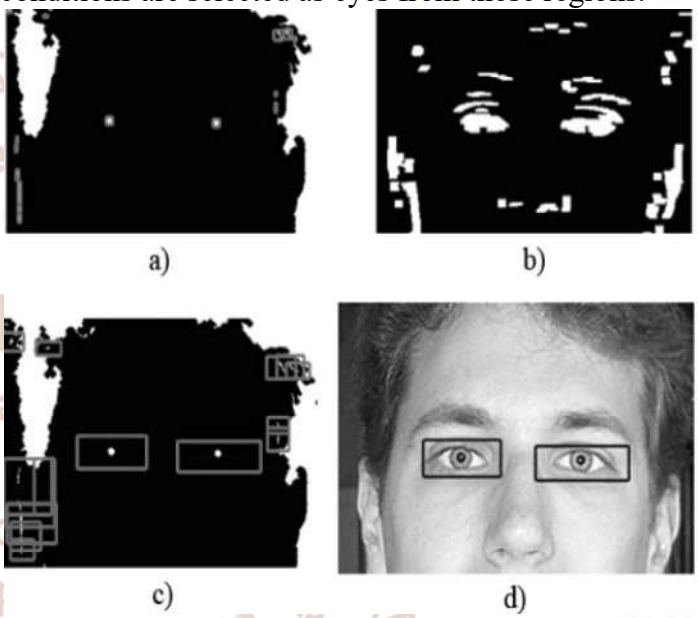

***Fig 4:** Steps in eye extraction(a) Regions around the y coordinate of eyes b) After dilating and filling the edge image c) After growing the regions d) Selected eye regions)*

d) Feature extraction:

After the face has been detected in the scene, the next step is to extract the emotion information of the face in automatic way. It is known that the face representation and the kind of input image will affect the choice of the approach. Various analysis of face has been developed.[2] For this, the Ekman has given some descriptions of emotion states related to facial points from physiologist point of view. According these relations, this paper originally defines fourteen feature points as Fig 5.

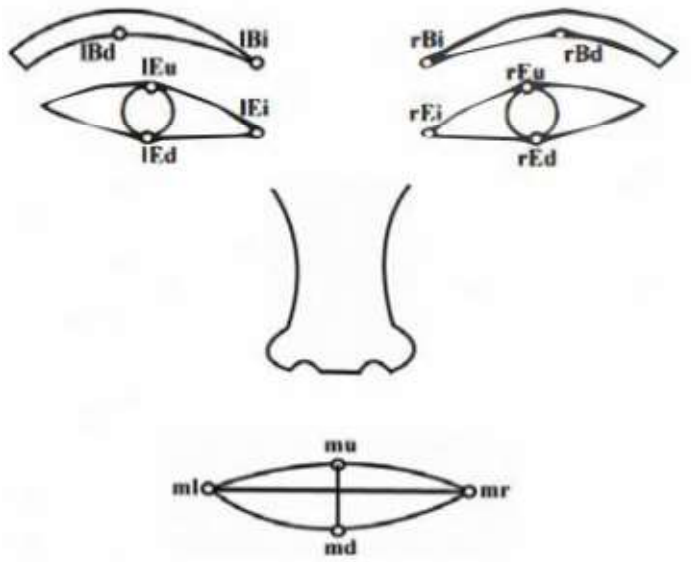

Fig. 5 *The fourteen feature points defined in face*

III. EXPERIMENT RESULTS

This section will show some experiment for facial emotion recognition. All experiments are considered to be in the same environment condition, and the background can be complex.

Fig 6.(a)Human emotion.

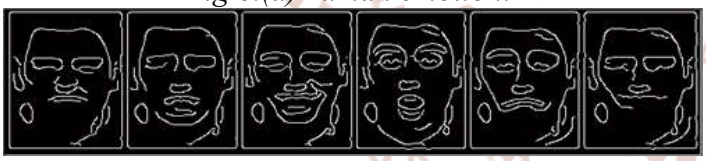

Fig 6.(b) Edge detection

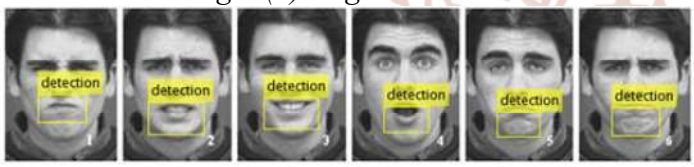

Fig 6.(c) Mouth region

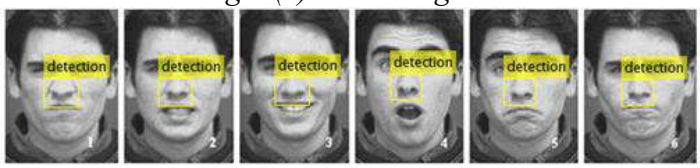

Fig 6.(d) Nose region

Fig 6.(e) Eyes region

IV. RESULT

In this project we will use the classes that are based on different emotions of human beings to store various features of different images, which have been utilised further for the next part of our project which is testing, as a reference. We have designed a classifier which utilises the features present in the reference classes in order to determine type of emotion of the photo that is being provided during testing process. The distance measures extracted from the facial features provide very reliable and valuable information for robust recognition of facial features. Facial expression database is used which is more reliable. Facial expression analysis experiments carried out is person independent which is more challenging then experiment carried out in a person dependent manner. There is no need for manual system for determining emotion of a person. However, average recognition rate is lesser for anger class due to confusion with neutral and anger classes.

Also, output is less precise if the person in the image is wearing spectacles. If technical issues occur in the code or the system implementing this code, it may affect result.

V. CONCLUSION

We have presented an emotion detection algorithm by using facial image. The algorithm composed of three stages. In image processing stage, the face region and facial components are extracted. The pre-processing of image has been shown by removing noises present in the image and applying filter algorithm in it. In Facial detection we have detected individual regions around the face and used it to extract the features and maintained a database for testing and training of image.

VI. ACKNOWLEDGEMENT

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