

## Automatic Emotion Detection

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**Abstract:** Facial expressions analysis most significant part for human computer interaction. Now days, face emotion recognition is most important application of computer vision that can be used for security, entertainment and human machine interface. Automatic face emotion recognition is still challenging & emerging problem with many applications such as automatic surveillance, robot motion, video indexing and retrieval and monitoring systems. Emotion recognition and classification depends upon gesture, pose, facial expression, speech and behavioral reactions, etc. In this paper, an automatic emotion recognition and classification method is based on Genetic Algorithm and on neural network. This system consists of 3 steps which automatically detect the face emotion image: First, pre-processing such as adjusting contrast, colour segmentation, filtering, and edge detection is applied on the input image. Secondly, features are extracted with projection profile method due to high speed which has taken as processed input image. Finally, in third stage to compute optimized parameters of eyes and lip through the GA, then emotions (neutral, happy, sad, dislike, angry, surprise and fear) is classified using artificial neural network. The proposed system is tested on a face emotion image. The obtained results show that better performance of genetic algorithm along with neural network.

**Keywords-** pre-processing, feature extraction, projection profile, recognition, Genetic Algorithm, Neural network.

## I. Introduction

We meet no. of peoples in which we know someone and some are stranger to us. But some things are common in all of them is facial expression of them. We know that facial expression gives the idea of emotions. Or we can say that facial expression gives information about the mood, personality, motivation of other person but it is not possible with our computer system. Our system can't recognize our emotion by looking our face. And our emotions are changes due to some place or situations. So it is somewhat difficult for system to detect it properly. Emotions plays important role in human interaction which can be expressed as either verbally or non-verbally such as voice, facial expression, and gesture. If we take current situation it is a drawback that computer can't detect emotions more accurately. So now a days the automatic emotion detection is has broad area for research for us. This create a gap between the computers and humans. And this issue is hurdle in communication between human and computer. So, automatic emotion detection helps to better communication between computers and humans. In this we try to understand the emotions on computer without give it any inputs.

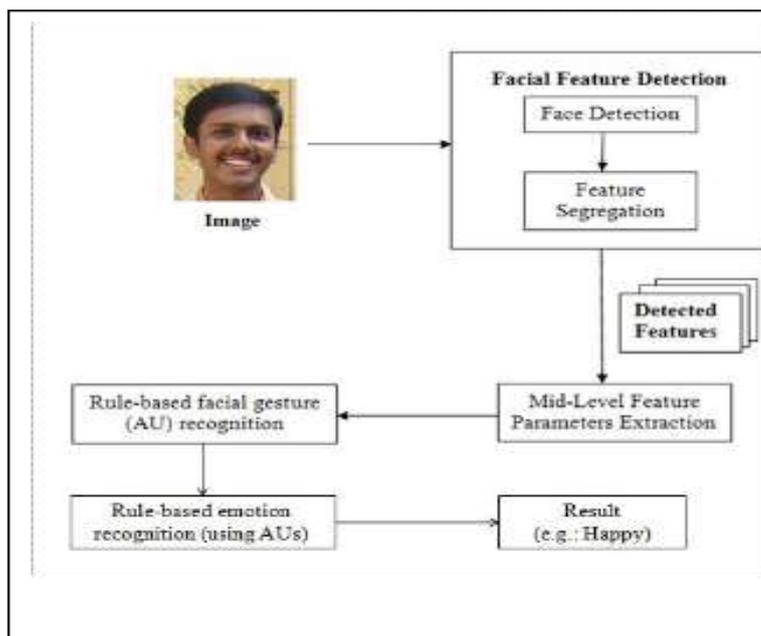


Figure 1: Automatic Emotion Detection

## **II. Related Work**

Generally, emotions related to facial expressions. Hence, the features based on position of the face. different methods proposed to classify emotions. Muscle issues are important in this detection. K-nearest neighbour rule was used with an accuracy of 80% with happy, anger, disgust & surprise emotions. Extract the shape & movement of the eyes, mouth & eyebrows into the detector & also we can detect all the emotions. For detecting the boundary of eye region, consider the face width by  $W$ . & starts the scan for detect the emotions. Detect the emotions is not that much of easy without the detector so we can easily use this detector to identify what the clients, or other persons thinks in their mind. The eyes, eyebrows & the mouth are the main part of to detect the emotions of the human being. Emotion reorganization is also the basic need of this project. The methods that are used in the emotion detection is also based on the software quality. The software are highly secured for the identity. All the information of the people are hide from the others. Also the programmer can saw the database.to create a profile of your emotions you join the registration format of the database.

## **III. Classification**

In this automatic emotion detection project we use different type of things like pre-processing of images and for that we use database. By use of database we match our input image. Than the system take decision about the specific emotion in this we can also add some other methods which are helpful for detecting the facial emotions, mood and personality etc. In our project we are use things like:

### **3.1 Generic algorithm:**

GA is an iterative process each iteration is called generation. In each generation, the fitness of each individual is calculated and to form new population. In this paper, GA algorithm is used to calculate the optimized value of eye and lip features. For this purpose, length of chromosome is 7 bits and size of population is 20 used. In our approach, first select a pair of eye and lip region. The GA process is described in the following steps. 1) First, represent the fixed length of chromosomes and initial population with cross-over and mutation probability. 2) Define fitness functions of individual chromosomes. 3) Randomly, generate an initial population of chromosomes. 4) Calculate the fitness of each individual chromosome. 5) Select a pair of high fitness chromosomes for matting from initial population. 6) By applying genetic operators such as crossover and mutation - to create a pair of offspring. 7) Created a new pair of offspring placed in new population. 8) Repeat from step 5 until the size of initial population becomes equal to the size of the new population. 9) Replace the initial population with the new population 10) Go to step 4, and repeat the process until the criteria is satisfied.

### **3.2 pre-processing of input image:**

Now, a feature extraction method is applied to sobel edge detected image. This feature extraction method is associated with the row-sum and column-sum of white pixels of edge detected image. For this purpose, projection profile method is used because of high speed. In this method, let  $f(m, n)$  represents a binary image with  $m$  rows and  $n$  columns.

**3.3 Boundary detection of eye and lip regions:** For detecting the boundary of eye region, consider the face width by  $W$ , and starts scan from the  $W/4$  to  $(W-W/4)$  for to find the middle position of the two eyes. Then find the upper position and lower position of the two eyebrows. For left eye, scan from  $w/8$  to mid and for right eye scan from mid to  $w - w/8$ . Here  $w$  is the width of the image and mid is the middle position of the two eyes [1]. Some white pixels present between eyebrow and eye, to make connection between eyebrow and eye some black pixels are placed from eyebrow to eye. Also, scan the black pixels vertically and horizontally for lower and upper position of two eyebrows [2]. For detecting the boundary of the lip region, first consider the lip box and calculate the distance between the forehead and eyes. Then determine the lower height of eyes and upper height of the box which will contain the lip [3]. Therefore, this box will contain lip and some part of nose. Then, cut the RGB image according the box. Finally, sobel edge detector is applied to the eyes and lip image for edge detection [4]. The sobel edge detected image of lip and eyes.

#### **IV. Analysis**

Facial expressions analysis most significant part for human computer interaction. Now days, face emotion recognition is most important application of computer vision that can be used for security, entertainment and human machine interface. Automatic face emotion recognition is still challenging & emerging problem with many applications such an automatic surveillance, robot motion, video indexing and retrieval and monitoring systems. Emotion recognition and classification depends upon gesture, pose, facial expression, speech and behavioural reactions, etc. an automatic emotion recognition and classification method is based on Genetic Algorithm and on neural network. This system consists of 3 steps which automatically detect the face emotion image: First, pre-processing such as adjusting contrast, colour segmentation, filtering, and edge detection is applied on the input image. Secondly, features are extracted with projection profile method due to high speed which has taken as processed input image. Finally, in third stage to compute optimized parameters of eyes and lip through the GA, then emotions (neutral, happy, sad, dislike, angry, surprise and fear) is classified using artificial neural network. The proposed system is tested on a face emotion image. The obtained results show that better performance of genetic algorithm along with neural network.

#### **IV. Conclusion & Future Work**

In this paper, a method of classification and detection of emotions (Happy, sad, fear, angry, dislike, and surprise, neutral) based on a genetic optimization algorithm and neural network is used. Then, % accuracy is obtained in the NN (Neural Network) model of  $(3*20*7)$  structure. Finally, the result of ANN (Artificial Neural Networks) is used for optimization and the ANN provides the best accuracy of classification.

In future we can think about that we can add more features in the automatic face detection project. Also we can provide more software which are relate itself with the original version of the automatic face detection.

#### **V. Acknowledgment**

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