

## FACE EMOTION RECOGNITION AND DETECTION

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**Abstract** -The face emotional recognition is the method of recognizing or detecting the human emotion from their facial expression. Basically, every human brain recognizes or detects the emotion of other person automatically by visualizing their features. Now software is being developed to detect the facial motion and read the emotion of humans accurately as us humans do. Though there is strong research going on this area, face recognition systems are far from ideal to perform accurately in all situations in real world. In this paper we developed an algorithm which is used to identify the person's emotional state through facial expression.

**Key Words:** Artificial Neural Network (ANN), K-nearest neighbors(KNN), Face emotion recognition.

### 1. INTRODUCTION

Humans facial emotion is most important factor which helps to interact with other human to understand the intention of others. Human emotion can be considered as the universal language through which people can communicate irrespective of the place they come from or the languages they speak. Human express lot of emotions of which there are seven basic emotions that human express often namely happy, sad, anger, sad, confused, neutral and fear. These emotions can be recognized by the fellow humans easily. The conversation between the people may grew higher or lesser according to the emotions expressed by the listener hence facial emotion plays a vital role.

Recognizing the emotion of fellow human being helps us to communicate with them in more appropriate way and help them to deal with their emotion. But machines neither possess any emotions nor recognize it. But it can be trained to recognize the facial emotion and human being and it can be applied in security system in banks, airport, education system etc., This research describes a neural network-based approach for emotion classification.

### 2. OBJECTIVE OF THE PROJECT

The project mainly aims to come up with a solution to the facial expression thus facilitating Intelligent Human-Computer Interaction recognition problem by acquiring the image, processing it and extracting the face by identifying the face, nose and eye regions then estimating the features and classifying the different emotion using ANN (Artificial Neural Network).

### 3. EXISTING SYSTEM

For interactive human and computer interface (HCI) it's important that the machine understand the facial expressions of human. With HCI the gap between humans and computers will reduce. By judging their expressions of humans, the computers can interact in more appropriate way with them. They have proposed Zernike moments-based feature extraction method with KNN and support vector machine to identify facial expressions.

### 4. PROPOSED SYSTEM

The proposed system consists of five modules namely image acquisition, image pre-processing, face extraction using Viola-Jones algorithm and classification of emotion using ANN (Artificial Neural Network).

#### 4.1 IMAGE ACQUISITION

Image Acquisition is a process of getting an input image for the process of automatic detection of facial expression using digital image processing with machine learning.

#### 4.2 PRE PROCESSING

The acquired data might be from different sources, hence the data must be standardized and cleaned up before passing them to the algorithm. Once the image is fed it is resized and the noises are removed so that it does not affect the efficiency of the algorithm.

### 4.3 FACE EXTRACTION USING VIOLA-JONES ALGORITHM

In this project we have used Viola-Jones algorithm for face detection. Once the image is resized it is feed to Viola-Jones algorithm. It consists of four stages Haar-feature extraction, creating integral image, adaboost algorithm training and the cascade classifier.

First the image is feed to the Viola-Jones algorithm. The Haar-like features are extracted from the image. Haar-like features has dark and light region. It produces a single value by subtracting the sum of intensities of dark and light region. Then integral image is produced. It is an intermediate representation of an image. In that image the value for location (x, y) on the integral image equals the sum of the pixels above and to the left of the (x, y) location on the original image. Adaboost algorithm select the best feature of all. The output of this algorithm is a strong classifier. Then it is sent to cascade classifier which consist of set of strong classifiers which will extract the face, mouth, eye and mouth region from the image (Figure 1).

### 4.4 LOCATING THE FEATURE POINTS FROM THE FACE

In these five feature points are marked on the image. Constrained Local model (CLM) is used to mark the key points. Two on either eyes and one on the midpoint of the nose and two points in the mouth region. The marked key points are processed to end as input to the neural network (Figure 2).

Once the key points are processed, it is fed to the Artificial Neural Network (ANN) which has been trained. The emotion is classified depending on the output produced by the neural network. If the output is 1 or 3, it is classified as happy, 2 as neutral, 4 as sad, 5 as angry and 6 as confused, else it is classified as fear (Figure 3).

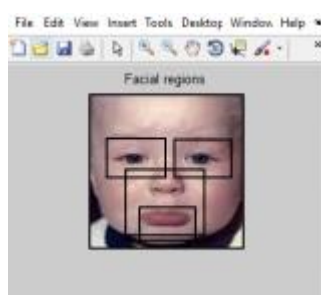


Figure 1. Face Region extraction



Figure 2. Locating key points



Figure 3. Emotion detection

## 5. CONCLUSION

In this project we have detected the face, extracted the facial features and classified the emotions. Based on this method we were able to get an accuracy of 60%. Facial emotion recognition system has many applications. It acts as an interactive tool between humans and computers. The output from the model can be embedded with security system to detect suspicious activity in bank, airport, can be used for lie detection amongst criminal suspects during interrogation etc.

## 6. REFERENCES

- [1] Shan, C., Gong, S., & McOwan, P. W. (2005, September). Robust facial expression recognition using local binary patterns. In *Image Processing, 2005. ICIP 2005. IEEE International Conference on* (Vol. 2, pp. II-370). IEEE.
- [2] Kumar, D.K., et al (2018). Emotion Detector. *International Journal on Recent and Innovation Trends in Computing and Communication*, 6(3), 120-126.
- [3] Sunil Kumar, M.K. Bhuyan, and Biplab Ketan Chakraborty, "Extraction of informative regions of a face for facial expression recognition," *IET Computer Vision*, Vol. 10, No. 6, pp. 567-576, 2016.
- [4] Y. Sun and A.N. Akansu, "Facial expression recognition with regional hidden Markov models," *IET Journal on Electronics Letter*, Vol. 50, No. 9, pp. 671-673, 2014.
- [5] Facial expressions of emotion: An old controversy and new findings discussion; P. Ekman, E. T. Rolls, D. I. Perrett, and H. D. Ellis, *Phil. Trans. Royal Soc. London Ser. B, Biol. Sci.*, vol. 335, no. 1273, pp. 63-69, 1992.
- [6] Salman, Madaini, & Kissi (2016) " Facial Expression Recognition using Decision Trees". *IEEE International*

- Conference on Computer Graphics, Imaging and Visualization (CGiV), 120-130.
- [7] Bharati A.Dixit and Dr. A.N.Gaikwad "Statistical Moments Based Facial Expression Analysis" IEEE International Advance Computing Conference (IACC), 2015
- [8] M. Parisa Beham and S. Mohamed Mansoor Roomi " Face Recognition Using Appearance Based Approach: A Literature Survey", IJCA Proceedings on International Conference and workshop on Emerging Trends in Technology (ICWET 2012) icwet(12):16-21, March 2012.
- [9] Govind U Kharat & Sanjay V Didia," Emotion Recognition from Facial Expression Using Neural Network" 1-4244-1543-8/08 © 2008 IEEE.[33] Kazmil S.B. Qurat - ul - Ain, Ishiag. M.
- [10] Happy, S. L., George, A., & Routray, A. (2012, December). A real time facial expression classification system using Local Binary Patterns. In Intelligent Human Computer Interaction (IHCI), 2012 4th International Conference on (pp. 1-5). IEEE.
- [11] Cybernet Intelligent Systems (CIS) 2010 IEEE 9th International Conference Vol 1,Pg 1-6.
- [12] 1-4244-1543- 8/08 © 2008 IEEE. [13] Tian, Y.L., et al (n.d). Facial Expression Analysis. Retrieved on 25th February 2019.
- [13] Mehmood, Raja Majid, and Hyo Jong Lee. "A novel feature extraction method based on late positive potential for emotion recognition in human brain signal patterns." Computers & Electrical Engineering.
- [14] Ou, Jun, et al. "Automatic facial expression recognition using Gabor filter and expression analysis." 2010 Second International Conference on Computer Modeling and Simulation.