IMAGE PROCESSING FOR HUMAN EMOTION DETECTION

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Abstract
Our main point of focus in social situations is the face, which is crucial for expressing identity and emotions. A mental state known as emotion includes numerous behaviors, actions, thoughts, and emotions.
Facial expression plays an important role to communicate through emotions. By the help of facial expression, we also recognize mood of person and also recognize the mental condition of human.
Different types of human emotions are – Joy, Sadness, Fear, Disgust, Surprise and Anger.
The aim of this paper is to detect the human emotion thought facial expression. In this paper we proposed Introduction of used Library and Steps for finding emotions through different facial expression.

Keywords- Emotions, Facial Expression, OpenCv, Deepface.

1. Introduction

In order to determine a person's emotions condition, Facial Emotion Recognition analyses facial expressions in both still photos and moving videos.

Humans can typically convey their intentions and emotions nonverbally through gestures, facial expressions, and unconscious languages. This method can be a very effective nonverbal communication instrument for people. The system's ability to accurately identify or extract facial emotion from an image is key. Due to its potential use in a number of fields, including lie detection, medical evaluation, and human-computer interaction, the technique is becoming more and more popular.

Obtaining photos, analyzing them, and identifying emotions are all steps in the process of creating an emotion recognition system. Extracting the expression features from faces. There are three main steps in the System. The first stage is to recognize the face region in the acquired image, and then the image is preprocessed to reduce environmental and other changes. Extraction of expression features is the following phase, while the third step involves classification. The output of the recognized expression is provided by the classifier.
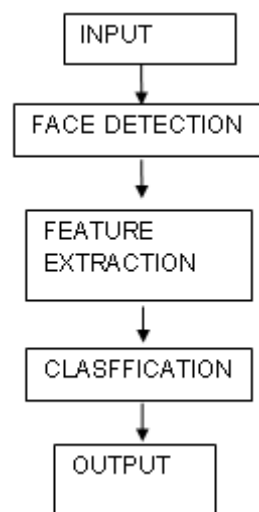

Fig. 1- STEPS FOR FACIAL RECOGNITION [1]

2. Face Detection: During the face detection process, the facial region is distinguished from the background. Recognizing facial emotions in input photos with complicated

backgrounds and various lighting situations can be difficult. Separating distinct facial characteristics from an uncontrolled background is required.

2.1 Pre-processing of Image: The image pre-processing step affects facial expression recognition. Unwanted components like noise might be present in raw photos. If the test image's lighting is different from the images from the training set, the facial expression recognition may not function properly. The picture has undergone pre-processing to smooth out environmental and lighting variations.

To create images with normalized intensities so that changes in lighting and the surroundings have no effect, the picture preprocessing step aims to produce images.

2.2 Feature Extraction: Feature extraction is the process of converting the features from the input image into a specific collection of features. Feature extraction assists in minimizing the enormous reducing the amount of data to tiny data, which boosts computing effectiveness. A selection of points is made to depict the features of the human face. Utilizing characteristics like pixel intensities, the mouth, corners, and brows of the face are recognized.

3. Literature Review

1. In a paper, Rituparna Halder et al. suggest developing a facial emotion recognition system that identifies feelings using machine learning and image processing as a foundation. They use neural network with image processing tools to classify the six fundamental human emotions. [2]

2. In their article, Hsi-Chieh Lee et al. suggest using neural networks and image processing to recognize facial expressions. They adopted an old-fashioned strategy. They began by removing the face from the image file, and then they removed the important features needed for facial categorization, such as the eyes, mouth, and eyebrows. [2]

3. In this paper Manasa B et.al suggest method for emotion recognition is Face Feature Extraction method and for that Region based segmentation Techniques are used.

4. This Deepika Ishwar et.al suggest Feature Extraction Method and in this she use eye and mouth for feature. In this Skin color, region-based segmentation Techniques is used.

5. A.D. Chitra et.al suggest Edge detection method and for that edge-based segmentation Techniques are used.

6. Xiaoming CHEN et.al suggest Edge Detection and color space method are used and edge-based segmentation techniques are used.

7. Rashmi S. Deshpande suggest Local feature-based match and Gabor filter methods are used and filtering techniques are used.

8. Prasad M et.al suggest Facial feature and extraction method are used and segmentation Susan threshold edge detection techniques are used.

9. Monika Dubey, Prof. Lokesh Singh suggest feature extraction method and region-based segmentation techniques method.

4. Necessary Libraries

4.1 OpenCv: One of the most well-liked computer vision tools is OpenCV. For computer vision, machine learning, and image analysis, there is a sizable open-source library called OpenCV. Programming languages such as Python, C++, Java, and many others are supported by OpenCV. It can analyse pictures and videos in order to recognize items, faces, and even human handwriting. The general color code is RGB but the color code format is used in OpenCV is BGR (Blue Green Red). To install Opencv use command: pip install opencv –python

4.2 DeepFace: A hybrid facial recognition programmed is called Deepface. The models it presently supports include VGG-Face, Google Face Net, OpenFace, Face book Deep Face. A Face book study team developed the deep learning facial recognition system known as

DeepFace. In digital images, it recognizes human features. The software was trained on four million images submitted by Face book users and uses a nine-layer neural network with over 120 million connection weights. Deepface also includes a powerful facial attribute analysis module that makes

predictions for age, gender, facial expressions like anger, fear, neutral, sadness, disgust, and astonishment. To install DeepFace library use command: pip install deepface

4.3 Matplotlib: A tool for visualizing data, Matplotlib is a low-level graph plotting toolkit written in Python.

To install Deepface on your system, run the following pip command: pip install matplotlib

5. Images Used For Emotions Detection

Fig. 2- Images used for emotion detection

6. Steps for emotion detection using Opencv python
1.   Import opencv.
2.   Import deepface library
3.   Define the image name which is in jpg format.
4.   Import matplot library.
5.   Plot image
6.   Change color BGR into RGB
7.   DeepFace analyze
8.   Find Prediction.
9.   Find dominant emotion.

7. Result
In this paper, the accuracy of the emotions is above 90% by using the approach.
Accuracy of different human emotions-----

Table 1- Accuracy of different emotion

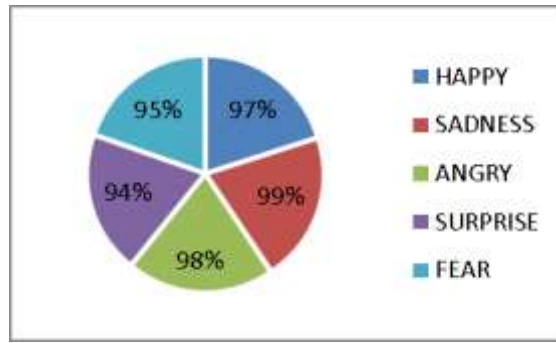| S.NO.	EMOTION	ACCURACY
01	HAPPY	97%
02	SADNESS	99%
03	ANGRY	98%
04	SURPRISE	94%
05	FEAR	95%

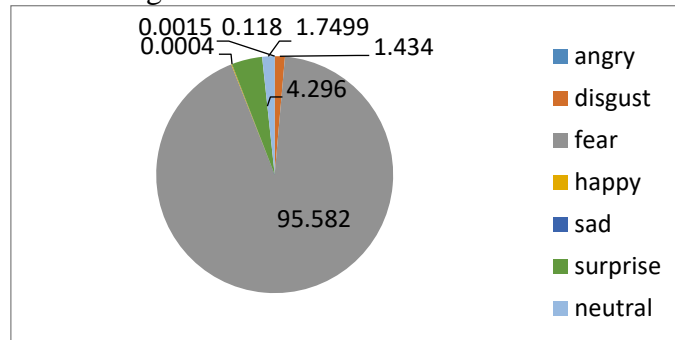Fig. 3- Pi chart of different emotion

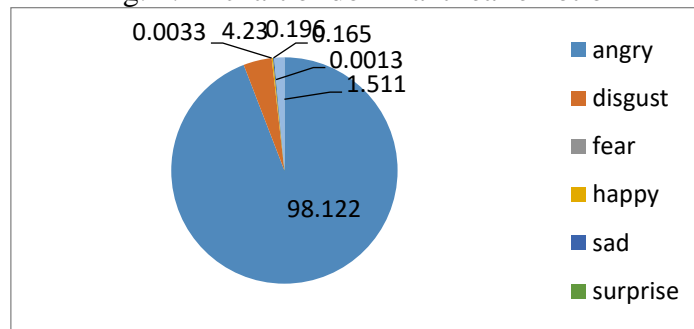Fig. 4: Pi chart of dominant fear emotion
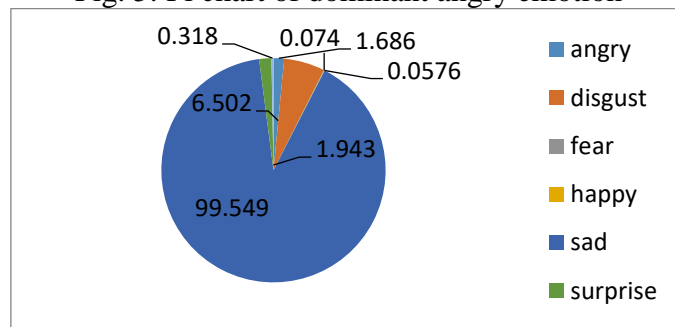

Fig. 5: Pi chart of dominant angry emotion
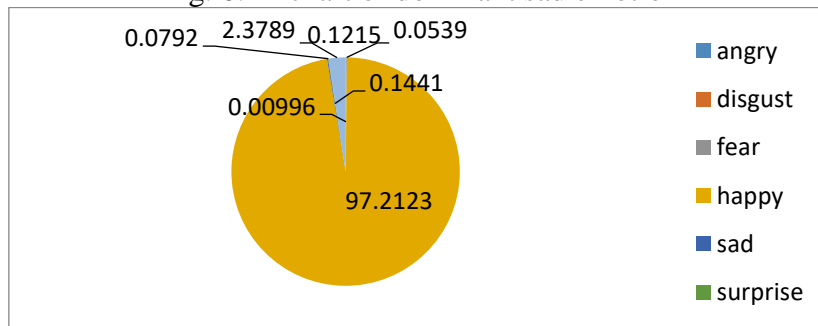

Fig. 6: Pi chart of dominant sad emotion

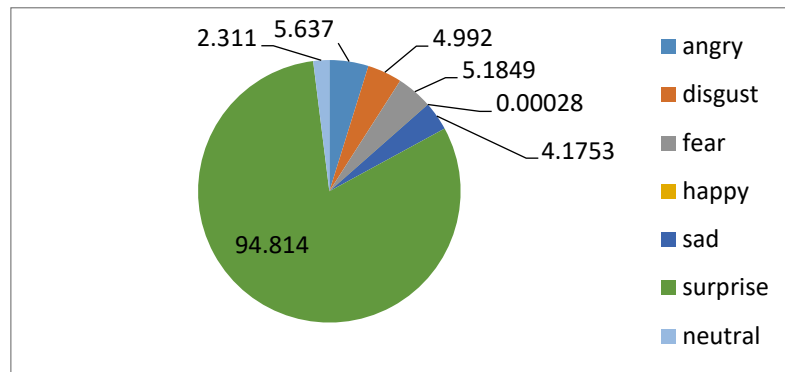Fig. 7: Pi chart of dominant happy emotion

Fig 8: Pi chart of dominant surprise emotion

8. Conclusion

We suggested a strategy for accurately classifying human emotions in this. In order to model and forecast the five fundamental human emotions, the system makes use of image processing. Happiness, sadness, anger, surprise, disgust and fear are six universal emotions. Most of the time, the suggested system accurately distinguishes emotions. Face recognition work is currently made

easier by the fact that many leading technical companies and industries are linked to face recognition systems. It is a simpler and more practical tool or system that anyone may create in accordance with their needs thanks to the usage of Python programming and OpenCV. Many people will benefit from the suggested system presented in this project because it is user-friendly and economical. Thus, a face recognition system may be created using Python and OpenCV for a variety of uses.

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