

EMOTION DETECTION SYSTEM USING MACHINE LEARNING

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Abstract

This paper describes an emotion detection system based on real-time detection using image processing with human-friendly machine interaction. Facial detection has been around for decades. Taking a step ahead, human expressions displayed by face and felt by the brain, captured via video, electric signal, or image form can be approximated. To recognize emotions via images or videos is a difficult task for the human eye and challenging for machines thus detection of emotion by a machine requires many image processing techniques for feature extraction. This paper proposes a system that has two main processes such as face detection and facial expression recognition (FER). This research focuses on an experimental study on identifying facial emotions. The flow for an emotion detection system includes the image acquisition, preprocessing of an image, face detection, feature extraction, and classification. To identify such emotions, the emotion detection system uses KNN Classifier for image classification, and Haar cascade algorithm an Object Detection Algorithm to identify faces in an image or a real-time video. This system works by taking live images from the webcam. The objective of this research is to produce an automatic facial emotion detection system to identify different emotions based on these experiments the system could identify several people that are sad, surprised, and happy, in fear, are angry, etc.

Keywords - *Emotion Detection, Haar Cascade, KNN, Face Detection, Machine Learning.*

INTRODUCTION

Human Emotion Detection is applied in many areas where additional security or data about the person is a big requirement. To set up, the second layer of security gives the opportunity to not only detect face with

emotion but can be useful to verify whether is it a 2-dimensional representation or a particular person standing in front of the camera. Besides this, another advantage of using EMS using machine learning is for business promotions. Many large-scale businesses thrive on customer responses to their services or products such as OTT platforms, movie theaters, etc.

The objective is to create a GUI which can capture the facial expression of the person and based on that calculate, produce the output. The result can be calculated based on real time image. Currently the camera need to be *placed exactly* in front of the person mentioned in the software, so that software works correctly. Based on this if everything goes write it will give us the output.

Humans can easily understand emotions but machines can't do that very well. So we are trying to detect the emotions which are not based on only facial expressions.

The ubiquitous computing paradigm is becoming a reality, with an automation level in which people and devices interact seamlessly. Ironically, one of the main challenges is the the difficulty of users interacting with these systems due to their increasing complexity. Endowing machines with the ability to be aware of user emotions (especially frustration, fear or dislike) is thus of major importance for the next generation of user interfaces.

LITERATURE SURVEY

1) Human Emotion Detection System

Author: Dilbagh Singh

In this paper I am going the purpose a system (by using an existing simulator) which is capable for achieving up to 97 percentage result and easy than Emotion recognition using brain activity system. This purposed system depend upon human face as we know face also reflect the human brain activities or emotion. In this paper I have also tried to use neural network for better result by using a existing system simulator

2) Emotion Detection From Facial Expression

Author: S.Srivastav, S.Agrawal, V.Saxena

The project aims to develops automatic emotion detection system using machine learning algorithm for facial expression recognition.

3) A Literature review on Emotion Detection Recognition For various Facial Emotion Extraction

Author: G.Kalaivani, S.Sathyapriya, Dr.D.Anita

The main aim of this research work is to classify the emotional expression from the mouth region of the human face. As the initial task is to extracted the mouth region from the facial image, a survey on various existing research works to segment the face expression image is reviewed and discussed.

4) Literature survey on face and face expression recognition

Author: J.Anil, L.Padma Suresh

In this paper some of the tailor made face expression Recognition algorithm are presented. This paper also gives a brief insight into a feature extraction method of these face expression recognition.

5) Literature survey on facial expression recognition Techniques

Author: G.Rajeswari, P.IthayaRani

In this paper, various technique and databases used in the discussed for facial expression recognition. Many researchers are interested to do research in facial expression. Because by the Quote "One person could be judge by their reaction not by actions" like that. Persons mood can be easily identified by their emotions rather than their words.

Existing System :

- In the existing system, classification is done through simple image processing to classify images only.
- Existing work includes the application of feature extraction of facial expressions with the combination of neural networks for the recognition of different facial emotions (happy, sad, angry, fear, surprised, neutral, etc..).
- Humans are capable of producing thousands of facial actions during communication that varies in complexity, intensity, and meaning. The existing system is capable of analyzing the limitations of the existing system of Emotion recognition using brain activity.

METHODS AND TECHNIQUE

In this work, two machine learning algorithms such as KNN, and Haar Cascade are used to identify and classify facial emotion.

1) KNN

KNN is a simple nonlinear classifier model that classifies data points based on similar points. KNN algorithm is often used in image recognition technology, decision-making models, and simple recommendation systems. KNN is a non-probabilistic learning algorithm used to classify unknown test data based on the majority of similar data among the k-nearest neighbors closest to test/anonymous data. KNN algorithm works on deeply rooted mathematical formulas that are used for classification. When implementing KNN, the foremost step is to transform data points into feature vectors, or a certain mathematical value. Then the algorithm processes it by finding the distance between the mathematical values of these points.

2) Haar Cascade Algorithm

Haar Cascade Detection algorithm is a machine learning-based approach where a cascade function is trained using lots of positive and negative images and then used to detect objects in other images. Haar Cascade is an object detection algorithm to identify faces in an image or real-time video. It uses edge or line detection features.

$$d(\mathbf{p}, \mathbf{q}) = d(\mathbf{q}, \mathbf{p}) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \dots + (q_n - p_n)^2}$$

$$= \sqrt{\sum_{i=1}^n (q_i - p_i)^2}$$

PROPOSED SYSTEM

- I. The methodology for detecting the emotions of human involves several tasks of images .
- II. First Phase is the acquisition phase of face .
- III. The second phase images preprocessing and extraction is completed.
- IV. In the third phase, extracted images of faces are checking database.
- V. In the third phase, extracted images of faces are checking to datasets

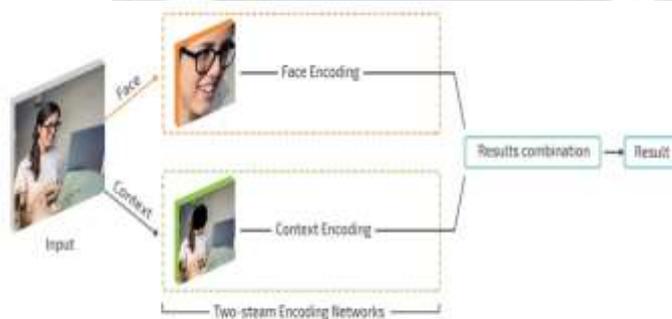


Fig. Capturing of Context of Images

- VI. After this step some algorithmic and statistical part processed based on the images input in the phase machine learning takes place to detect emotions
- VII. Finally, result show the emotions of persons.

CONCLUSION

So we conclude that with the help of ML, we can make our computer more powerful to understand human emotions. Facial expressions captured in reality to detect emotions may have various hurdles such as face posture, occlusion, and blurring. To address this concern, as future work, we will investigate more robust models which satisfy real conditions. The given proposed EMD system using machine learning can detect face-to-state classifications accurately. In particular, the paper discussed machine learning algorithms like KNN and Haar-Cascade for image identification and classification. The system is also scalable for handling huge amount of facial expressions.

Future Scope:

The project allows user to interact directly with the system via input devices. It will help to understand one's mind thoughts.

This project can be accessed from anywhere so it is robust and can work properly.

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