FACIAL EMOTION RECOGNITION AND ANALYSIS

Team 35

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Abstract

Facial emotion recognition system is implemented using Convolution Neural Network (CNN).CK+ and FER2013 facial emotion dataset with seven and eight facial emotion labels respectively are used in the project . The system achieved higher accuracy with CK+ dataset.

Overview

If businesses could sense emotion using tech at all times, they could capitalize on it to sell to the consumer in the opportune moment. Sounds like 1984? The truth is that it's not that far from reality. Machine emotional intelligence is a burgeoning frontier that could have huge consequences in not only advertising, but in new startups, healthcare, wearables, education, and more. Facial Emotion recognition is a AI technology being used in a variety of applications that identifies human faces in digital images and classify it into respective emotion .

Our project,Facial Emotion Recognition and Analysis incorporate technologies that capture the human emotional quotient through unique solution tailored to meet the end users' environment. These comprise of a combination of various technologies, such as facial emotion recognition by using concepts of deep learning , neural network and image processing.

Goals

1. Face Detection and from the from a given image
2. Emotion classification using Convolution Neural Networks.

Model Description

Data Preprocessing

The dataset is read using Glob. Images are represented in the form of numpy array. The images in the dataset were in the form of RGB. These were then converted to grayscale and reshaped for better representation and computational feasibility.The quality of images is enhanced by adjusting the contrast and brightness of the images to make the model illumination invariant to some extent.The images were labelled and dataset was split into training and testing data. The images were normalised and one hot encoded according to the respective classes. This marks the end of preprocessing of the data.

Face Detection Using Feature Extraction

The first step of Facial emotion recognition is face detection.This task is accomplished using Viola- jones's algorithm. There are some similarities in all human faces, we used this concept as a haar feature to detect face in image. It is ML based approach to classify images with and without faces. Python image processing library, OpenCV contains this classifier.

CNN Model

Emotion classification is achieved using the Convolution Neural Network with 6 convolution layers and 2 dense layers.To avoid overfitting Dropout layers were used.To ease computation max pooling and batch normalisation layers were added.

Results

Dataset : CK+

Train accuracy-95.05%
Test accuracy-94.64%
Loss-0.155

Dataset : FER2013

Train accuracy-96.9%
Test accuracy-56.86%
Loss-2.72

Challenges Faced

The CK+ dataset is highly biased.So initially the emotion were falsely classified.The optimum solution was either oversampling or undersampling.We implemented undersampling techniques.

Future Perspective

We will use Linear Binary Patterns for facial feature extraction and SOM based classifier to further enhance the results.

References

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