

Facial Expression Recognition with Machine Learning

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Dataset:

<https://www.kaggle.com/c/challenges-in-representation-learning-facial-expression-recognition-challenge/data>

Description:

The purpose of our project is to create an algorithm capable of analyzing people's facial expressions in a photograph and categorizing each face based on the emotion shown in one of seven classes (angry, disgust, fear, happy, sad, surprise, and neutral).

Facial expressions and other nonverbal forms of communication correspond to two-thirds of human interaction. These signals supplement speech by helping the listener understand the intended meaning of the words spoken.

Facial expression recognition (FER) systems extract and analyze information from an image and deliver real and unbiased responses regarding emotions as data. This can provide valuable information to companies about the emotion of a target audience towards a marketing message, brand, or product. Also, in some neurological disorders like Alzheimer's or Parkinson's, there is a degeneration of the

FER, which may be a sign of an alteration in cognitive areas such as perception, memory, and attention. Therefore, FER systems can also be helpful in the diagnosis of these diseases in a timely manner.

Software Architecture:

In our case, with the gathered dataset, we have a pool of thousands of 48x48 grayscale images (low size to reduce the background noise and for the program to focus on the facial landmarks).

After the preprocessing step (noise reduction and normalization), we can then define the key points to proceed for feature extraction. In FER research various models have been proposed to detect the basic emotions [1]. The state-of-the-art approach relies on convolutional neural networks (CNN) [3] to build and train models. In the end, to verify the model efficiency, some evaluation metrics should be applied with a new test set, like accuracy and F-measure.

References/Papers to read:

[1] Deep Facial Expression Recognition: A Survey - Shan Li and Weihong Deng

This paper provides a review of the methods used more recently and using deep learning for Facial Expression Recognition.

[2] Deep Learning for Human Affect Recognition: Insights and New Developments - Philipp V. Rouast

This is also a recent review that complements the previous one.

[3] Facial Expression Recognition using Convolutional Neural Networks: State of the Art - Christopher Pramerdorfer, Martin Kampel

This article describes the methods and results of a project with the same goal and the same FER2013 dataset.