
COSE474-2020F: Final Project Proposal

“Face Expression Recognition”

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Abstract

This paper analyzes how to use deep learning model to classify human facial expressions from the image. To be specifically, use Convolution Neural network architecture(CNN) model to build and train the model for Emoji image.

1. Introduction

Emoticon has become one of the essential part of online chatting. For example, Apple company designed a new facial detection algorithm and it can be converted into cute emoticon by just taking a picture with your iPhone. Nowadays, with advancements in computer vision and deep learning technology, it is possible to recognize human emotions by simply looking at the camera. The general idea is that to classify human expressions to map and filter the corresponding emoticon.

1.1. Motivation

Psychology: In psychology, to help doctor know the patient well. Doctors can use the camera on their mobile device to test patient's real expression. Sometimes, one patient can be handled easily, but what if there is a disaster? There are lots of people need to be treated, but the doctor doesn't know which patient needs help, we can use this technology to know patient's emotion easily.

1.2. Related works

This kind of technology is not widely used yet, but hospital is willing to use it if this is full-functional with 100 percent accuracy.

1.3. Challenges

Body language: Use both body language and facial expression to identify user's emotion. Use CNN model to recognize user's facial expression will be fundamental step, but the expression on user's face is not always true. The user may feel angry or sad inside their mind. It is better to test user's body language too than the real emotion can be tested.

Emoticon: After we test user's facial expression, the next step is to recognize the emotion and fit user's face to a emoticon. It's not a problem whether user's facial expression is posed or spontaneous because if it is exaggerated or not doesn't matter in chatting using emoji with others.

2. Datasets

FER2013: Face Expression Recognition. It consists of 48*48 pixel grayscale face images.

3. Goals to achieve the throughout this project

Goals

- Be able to recognize user's expression by testing their face.
- Be able to recognize user's expression by testing their face and body language.
- Be able to produce a emoticon by using user's facial expression and emotion.

4. Brief schedule

4.1. Implement a CNN classifier

First, we have to implement and train a corresponding neural network that classifies the FER2013 data appropriately. Fine-tuning hyperparameters is also included.

4.2. Contrive an emoticon generator

A vector can be obtained from the network that expresses a probability of each emotion. Using such probabilities, we can try another neural network to pick a corresponding emoji, or a network from which we can get parameters that slightly modify parts of emoji and train such parameters. The latter would be more pioneering because the former has been already tried by other people.

5. Roles

Youngwun Kim: Implement a corresponding neural networks.

Minhyuk Choi: Optimize models and hyperparameters of those.

6. Comparison with SOTA (state-of-the-art)

Pantic and Patras, 2005 : Recognizes 27 AUs. Invariant to occlusions like glasses and facial hair.

Pantic and Patras, 2006: Recognition of temporal segments of 27 AUs occurring alone or in combination.

Kotsia and Pitas, 2007: Recognizes either the six basic facial expressions or a set of chosen AUs.

Dornaika and Davoine, 2008 : Proposes a framework for simultaneous face tracking and expression recognition.