

Project Proposal - Name this expression

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1. Context (What)

Data science has experienced tremendous growth in the past few years. One area that has received significant attention is computer vision. Computer vision is about how computers can make sense of pictures and videos to extract a high-level understanding.

Computer vision's recent growth has been compounded by the interest in drones, robots and self-driving cars. Computer vision has also made great progress due to the help of neural networks and deep learning.

The growth has not been limited to these frontier applications of technology, but is also being used in existing industries. One such application that is continually being improved is facial recognition. This includes use cases such as auto focusing in cameras, facial recognition technology in surveillance and border control, as well as facial recognition technology for unlocking the iPhone X.

Children on the autism spectrum have difficulties recognising facial expressions, body language and tonality of voice. However, by practicing social skills such as identifying facial expressions in a context with less pressure allows children build confidence in these skills for use in daily life.
<http://luxai.com/2017/11/29/improve-emotion-recognition-understanding-children-autism/>

2. Goal (Why)

Build a tool that correctly identifies facial expressions (limited to neutral, happy, sad, surprised, angry, and disgusted) from photographs, this tool can then be included in a game or app for the child.

3. Data & Sources (From Where & When)

The Cohn-Kanade AU-Coded Facial Expression (CK and CK+) database includes posed and spontaneous expressions with metadata. The expressions have discrete labels (neutral, sadness, surprise, happiness, fear, anger, contempt and disgust) and are mostly grey. There are 593 image sequences of which, 327 sequences are labeled.

The Japanese Female Facial Expressions (JAFPE) database are annotated images of 60 Japanese female subjects. The emotions are mean semantic ratings for 6 expressions (sadness, surprise, happiness, fear, anger, and disgust) rated using 1-5 scale.

The CMU Face Images Dataset consist of grey images of 20 individuals with 4 head positions (straight, left, right, up), 4 facial expressions (neutral, happy, sad, angry), 2 eye states (open, sunglasses). A good description of the dataset can be found [here](#).

4. Approach (How)

This exercise explore a range of computer vision techniques.

- i. Image acquisition (from dataset)
- ii. Pre-processing (e.g. noise reduction, contrast enhancement, scale space, grey scale)
- iii. Feature extraction (convert to numerate values)
- iv. Facial detection (e.g. detect and align face)
- v. Facial expression recognition (i.e. use a deep net to classify expression)
- vi. Evaluate model performance

5. Tech & packages (How)

Language: Python

Packages: TBD

6. Deliverables

- code (GIT)
- Slide deck
- Report

7. Personal learning objectives

- Explore methods used in an computer vision problem