**CS 461/661 Computer Vision**

**Final Project Proposal - Facial Expression Detection**

**Group members**

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**Project Description**

We wish to build a model to identify the emotion from a human face, broadly categorized into the seven universal emotions: disgust, anger, fear, sadness, happiness, contempt, and surprise. The model may be extended to identifying the emotions from the faces of multiple people (a crowd) in the same image, or tracking how a person’s emotions change in a video. Another possible interesting application of our classifier, if the basics prove successful, may also be identifying microexpressions in a video. A microexpression is an involuntary and brief emotional response, often lasting less than half a second.

Some approaches we’ve discussed include using a convolutional neural network (CNN) in a supervised learning approach, or using existing facial recognition algorithms in combination with a CNN. Essentially, we want to first process the input into grayscale images, and then be able to identify the face(s) from those images. For each face, then, we want to use our classifier to identify the emotion.

For training, we primarily intend to use the [Extended Cohn-Kanade Dataset (CK+)](http://www.consortium.ri.cmu.edu/ckagree/). It contains 593 image sequences, 327 of which have discrete emotion labels in the seven emotions mentioned previously, as well as “neutral.”

To aid in developing our model, we have identified a few previous works that may prove helpful. [An article on Towards Data Science](https://towardsdatascience.com/face-detection-recognition-and-emotion-detection-in-8-lines-of-code-b2ce32d4d5de) describes how to use Python’s face recognition library and a 6-layered CNN to detect emotions from faces. Developments from [Xin Guo et al.](http://dx.doi.org/10.1145/3242969.3264990) and [Mirza Waqar Baig et al.](https://link.springer.com/chapter/10.1007/978-3-319-08864-8_32) also describe methods to determine emotions in a group. There is also a paper by [Radu Danescu et al.](https://www.intechopen.com/books/intelligent-video-surveillance/detecting-micro-expressions-in-real-time-using-high-speed-video-sequences) about microexpression detection.

**Team Member Assignments**

Ruby - Proposal, applying classifier to video (basic video processing)

Wally - Video processing, facial overlays using classifiers and bounding boxes

Taha - Classification via Transfer Learning Models on CNN architectures from literature (e.g. VGG, ResNet)

Sally - Classification via Baseline Model (2-layer CNN), Facial recognition algorithm

Kevin - Input processing for crowd images

**Sources**

Papers:

Priya Dwivedi, 2019. [*Face Detection, Recognition and Emotion Detection in 8 lines of code!*](https://towardsdatascience.com/face-detection-recognition-and-emotion-detection-in-8-lines-of-code-b2ce32d4d5de)Towards Data Science.

Xin Guo et al., 2018. [*Group-Level Emotion Recognition Using Hybrid Deep Models Based on Faces, Scenes, Skeletons and Visual Attentions.*](http://dx.doi.org/10.1145/3242969.3264990) ACM Digital Library.

Radu Danescu et al., 2018. [*Detecting Micro-Expressions in Real Time Using High-Speed Video Sequences.*](https://www.intechopen.com/books/intelligent-video-surveillance/detecting-micro-expressions-in-real-time-using-high-speed-video-sequences) InTechOpen.

Deng, Jia, et al. [ImageNet: A Large-Scale Hierarchical Image Database](http://www.image-net.org/papers/imagenet_cvpr09.pdf). 2009 IEEE Conference on Computer Vision and Pattern Recognition, 2009, doi:10.1109/cvpr.2009.5206848.

[Wikipedia: Microexpressions](https://en.wikipedia.org/wiki/Microexpression)

[Wikipedia: Facial Expression Databases](https://en.m.wikipedia.org/wiki/Facial_expression_databases)