

The background is a dark teal color. It features several thin, light-colored lines that form abstract geometric shapes, including triangles and polygons, scattered across the slide. A central rectangular box with a thin orange border contains the title text.

Emotion Detection

By Eric Swanson

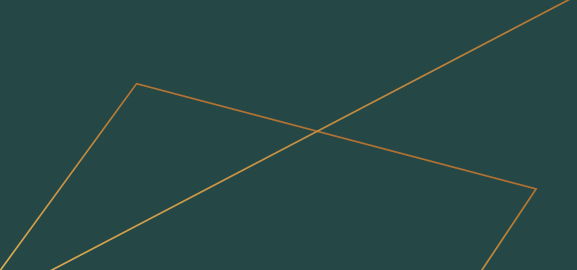
Oct. 2021 General Assembly DSI

Introduction

- The Problem: How do we come across in online interactions
- Solution:
 - Build a CNN to classify facial expression
 - Successfully apply this model to predict live facial expressions
- Success will be measured on accuracy of the model and by a working web application
- Who will use this - If you are looking for a score if you come across as more positive or negative facial expressions, great for practicing presentations and job interview



Steps

- 
1. Collect data
 2. Build a classifier model
 3. Detect a face
 4. Live video feed through and app
 5. Output the predictions

Data Collection Used the fer2013 dataset

Happy	8989
Neutral	6198
Sad	6077
Fear	5121
Angry	4953
Surprise	4002
Disgust	547

Dataset from Kaggle
Train set: 28,709 images

Test set: 7,187 images

7 categories:

- Happy
- Neutral
- Sad
- Fear
- Angry
- Surprise
- Disgust

Images 48X48 grayscale of faces
140 MB

Positive	19,189
Negative	16,628

[Link to Dataset](#)

Example Images

Angry



Happy



Surprise



Neutral



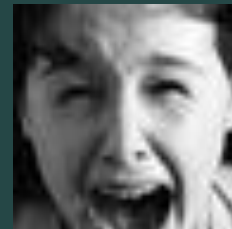
Sad



Disgust

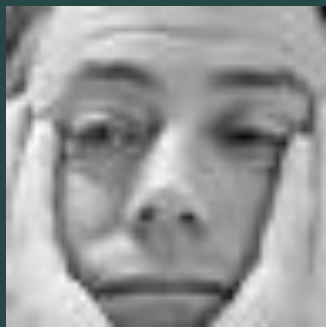


Fear



Some difficult images in EDA

Angry



Angry



Cartoon



Side image

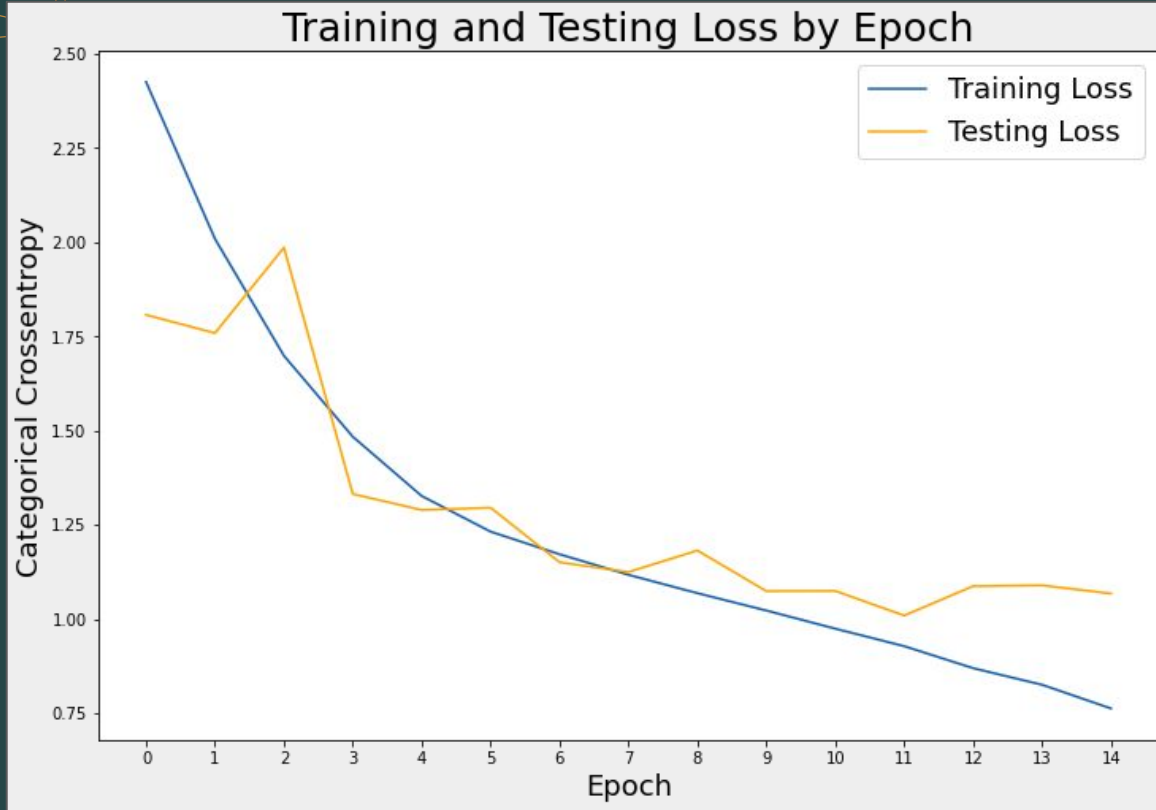


Types of Models

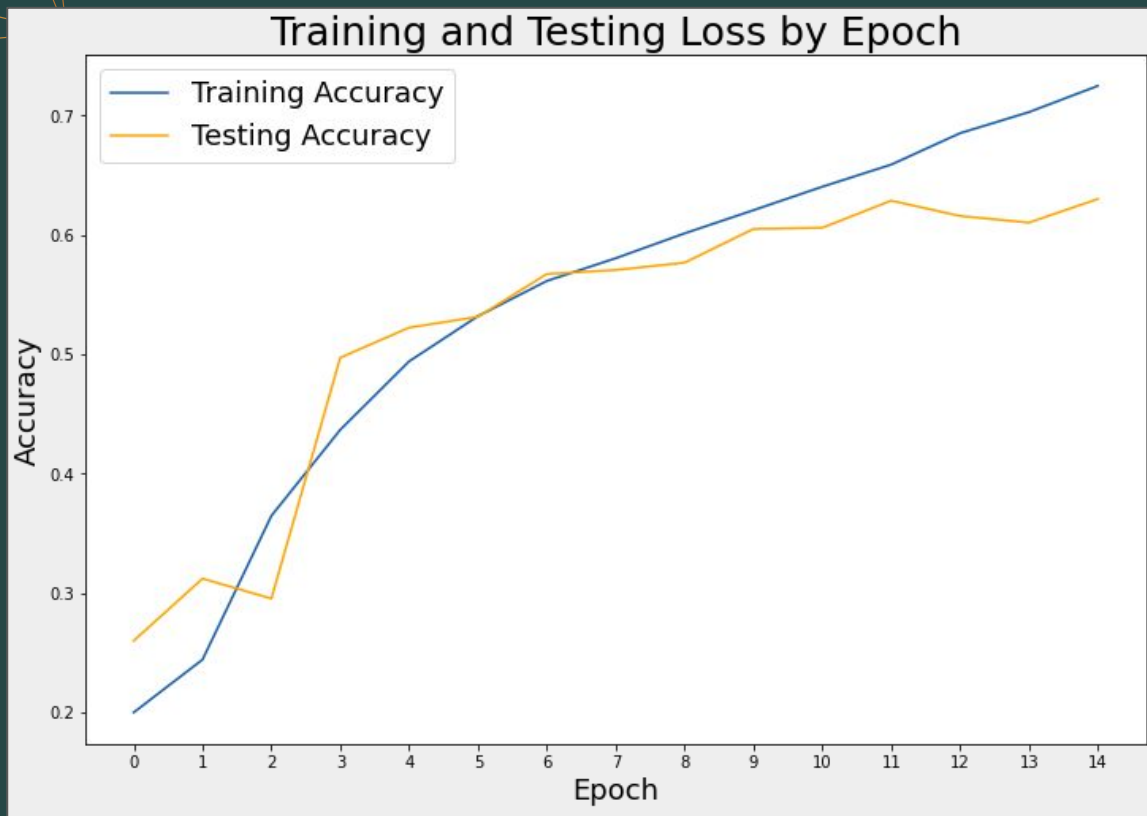
CNN

- Best accuracy 61%
- Utilized ImageDataGenerator to read in data
- Built a Sequential Model with 4 layers and filter size 64 to 512
- Activation relu
- Loss was categorical cross entropy
- Metrics was Accuracy
- Total params 4,347,655
- Ran 15 epochs

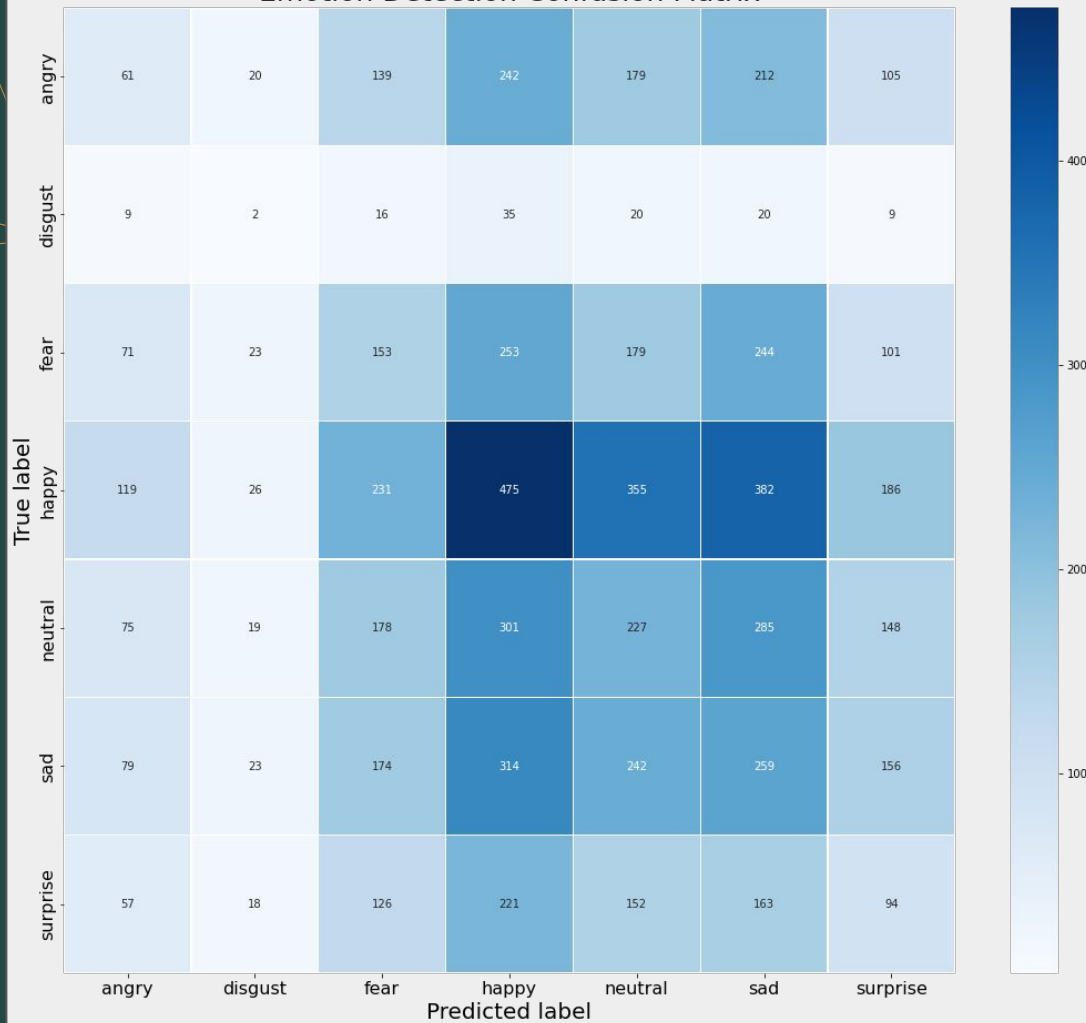
Categorical Crossentropy



Accuracy



Emotion Detection Confusion Matrix



Results of models

Building the App

- Built in Streamlit
- Used OpenCV library for face detection
- The detected face is cropped out, converted to gray scale, and resized to fit in the model
- Once the prediction is ready the prediction and a box around the detected face is added to the output image
- The prediction is also recorded to a file and ready for viewing when you finished your session.

Conclusion

- Add better/more emotion recognition data
 - Better dataset to train on
 - Color images
 - Continue to develop transfer learning
- Depending on direction of project can add:
 - Speech recognition
 - Detecting other objects like hands