Emotion Detection

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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

Positive	19,189
Negative	16,628

Link to Dataset

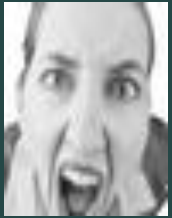
Dataset from Kaggle
Train set: 28,709 images
Test set: 7,187 images
7 categories:

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

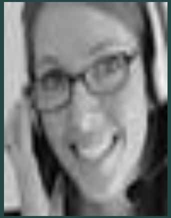
Images 48X48 grayscale of faces
140 MB

Example Images

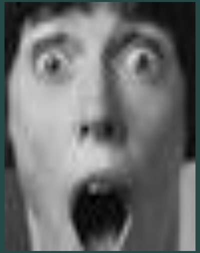
Angry



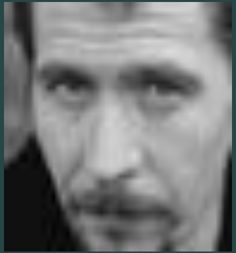
Happy



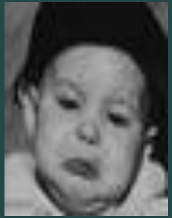
Surprise



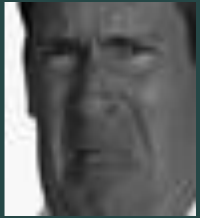
Neutral



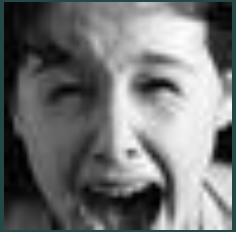
Sad



Disgust

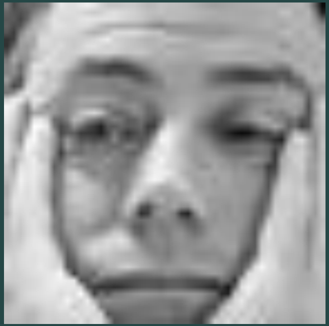


Fear

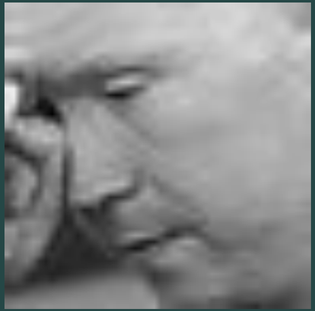


Some difficult images in EDA

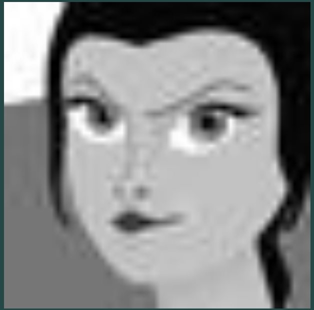
Angry



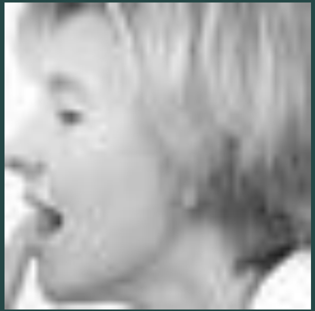
Angry



Cartoon



Side image

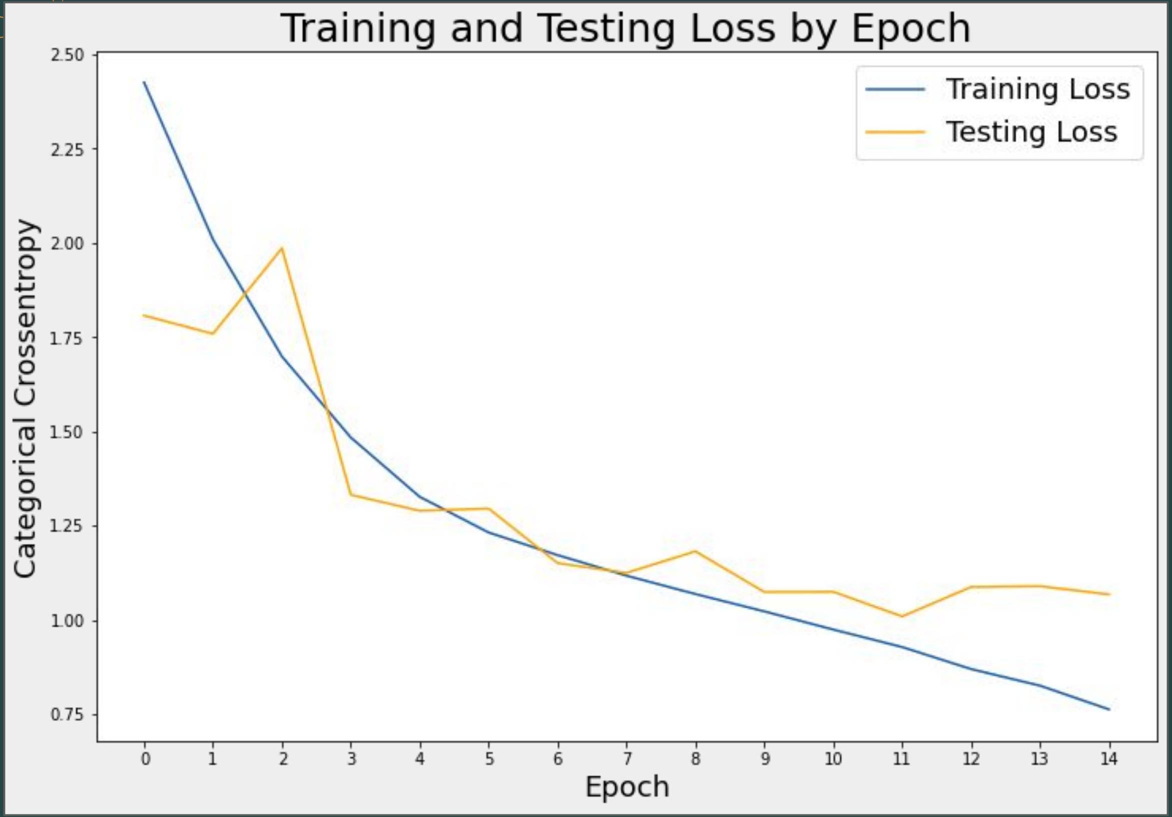


Types of Models

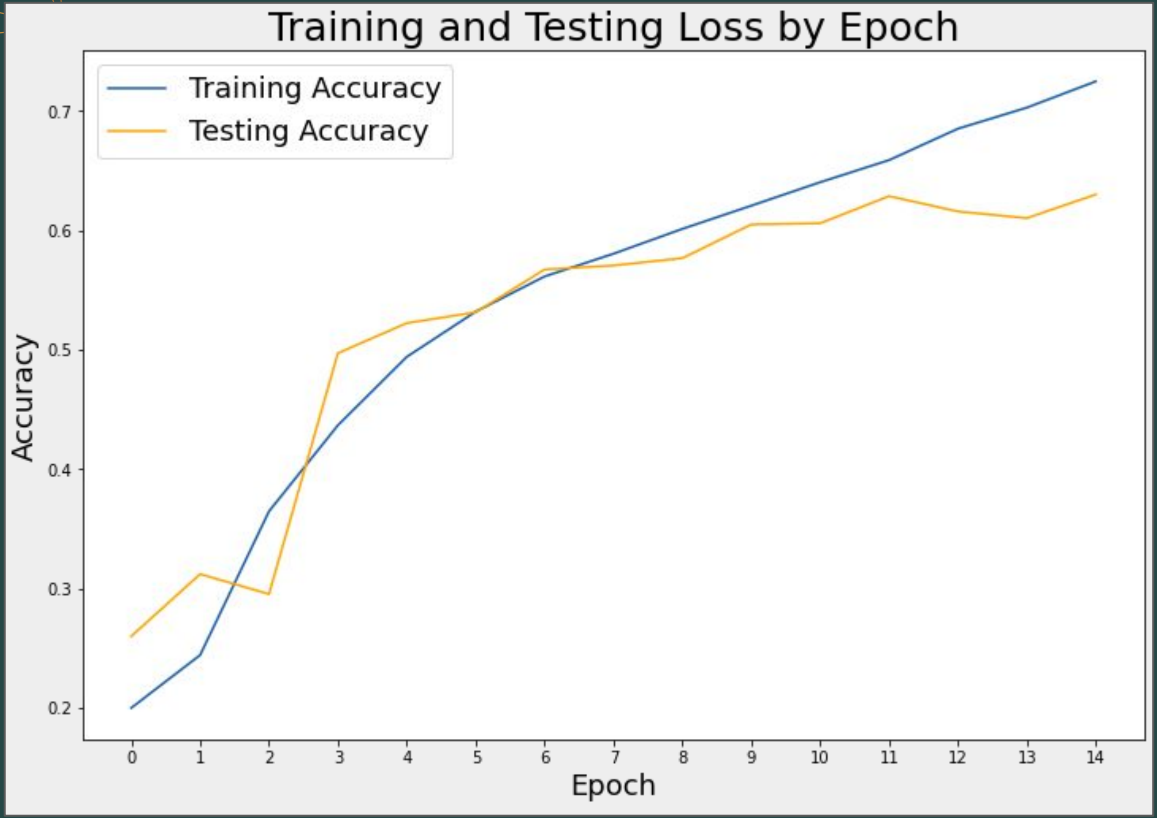
CNN

- 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

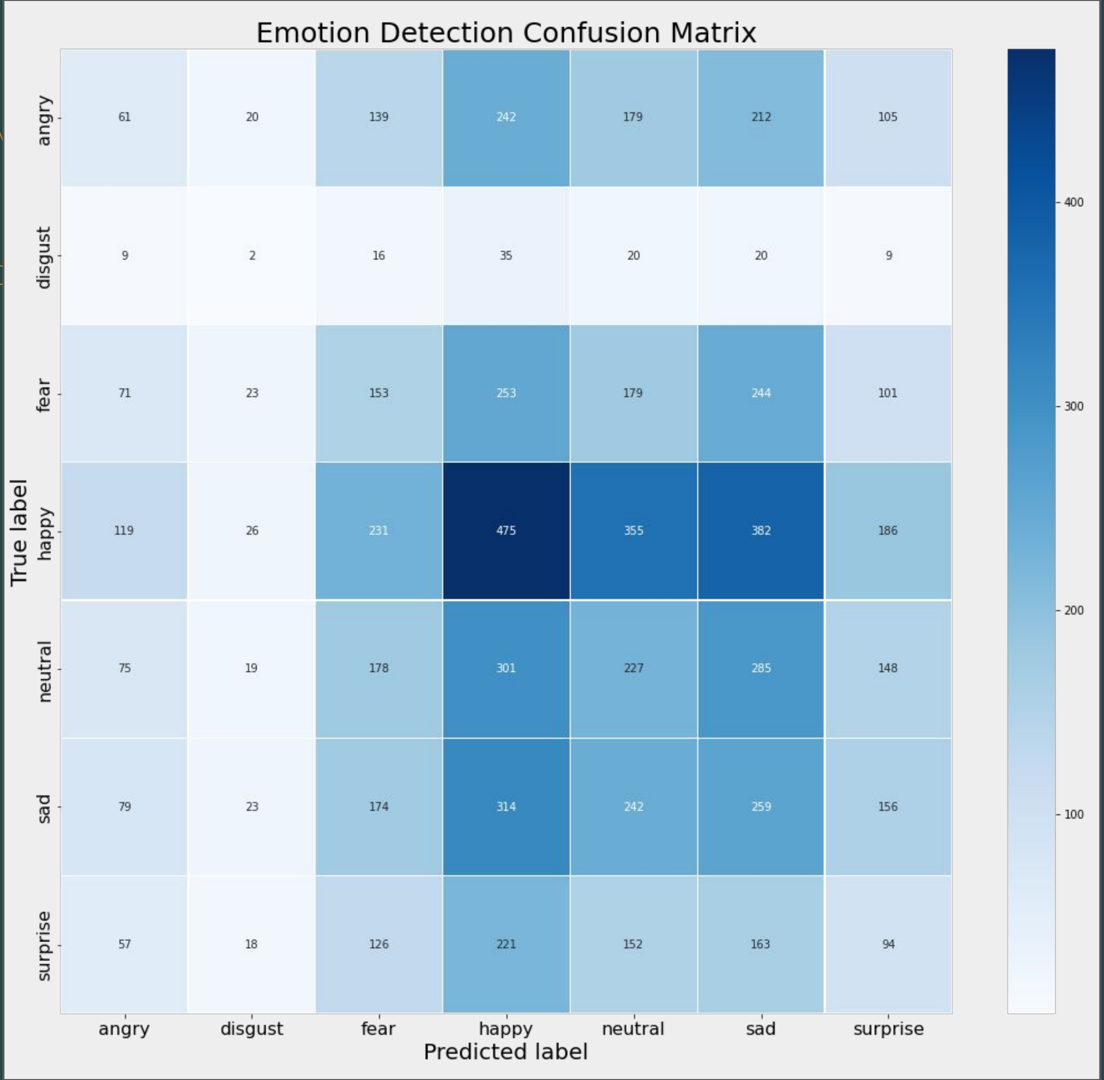
Categorical Crossentropy



Accuracy


Training and Testing Loss by Epoch
Training Accuracy
Testing Accuracy
Accuracy
0.2
0.3
0.4
0.5
0.6
0.7
Epoch
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Results of models



Emotion Detection Confusion Matrix

	angry	disgust	fear	happy	neutral	sad	surprise
angry	61	20	139	242	179	212	105
disgust	9	2	16	35	20	20	9
fear	71	23	153	253	179	244	101
happy	119	26	231	475	355	382	186
neutral	75	19	178	301	227	285	148
sad	79	23	174	314	242	259	156
surprise	57	18	126	221	152	163	94

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