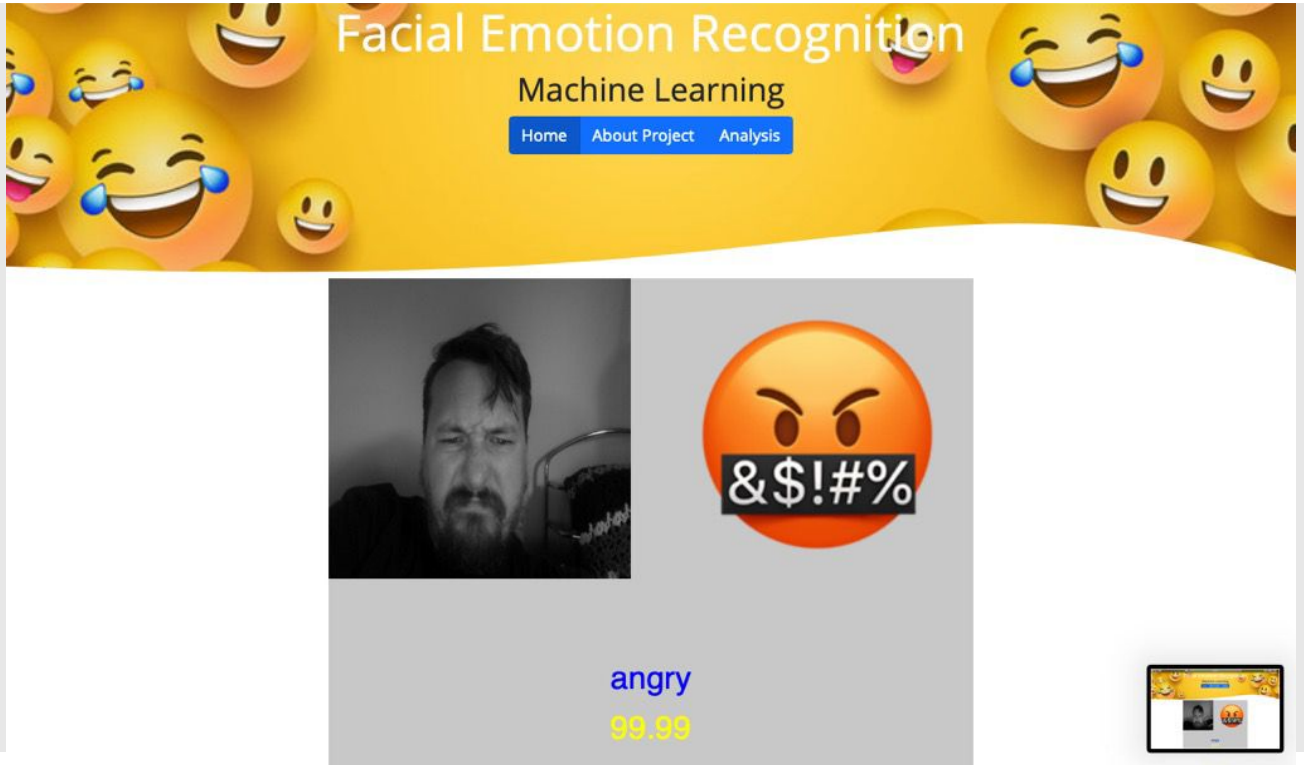
Emojify Facial Recognition with Machine Learning Classifier



Team Members

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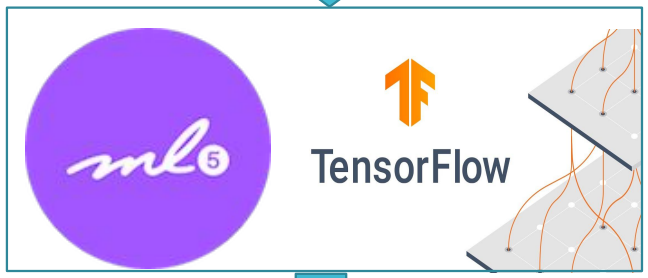
Dataset

The data consists of 48x48 pixel grayscale images of faces. The faces have been automatically registered so that the face is more or less centered and occupies about the same amount of space in each image. The task is to categorize each face based on the emotion shown in the facial expression into one of seven categories (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, 6=Neutral). The training set consists of 28,709 examples and the public test set consists of 3,589 examples.

ETL Process

Google AI

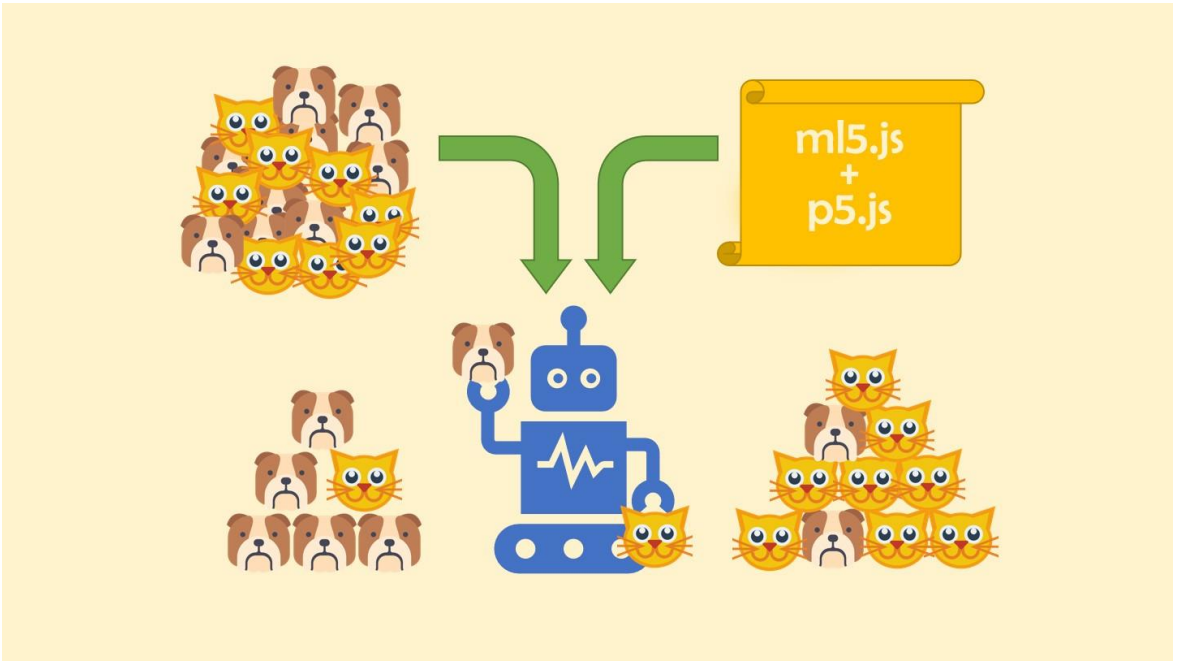


Classifier Model

You can use neural networks to recognize the content of images.

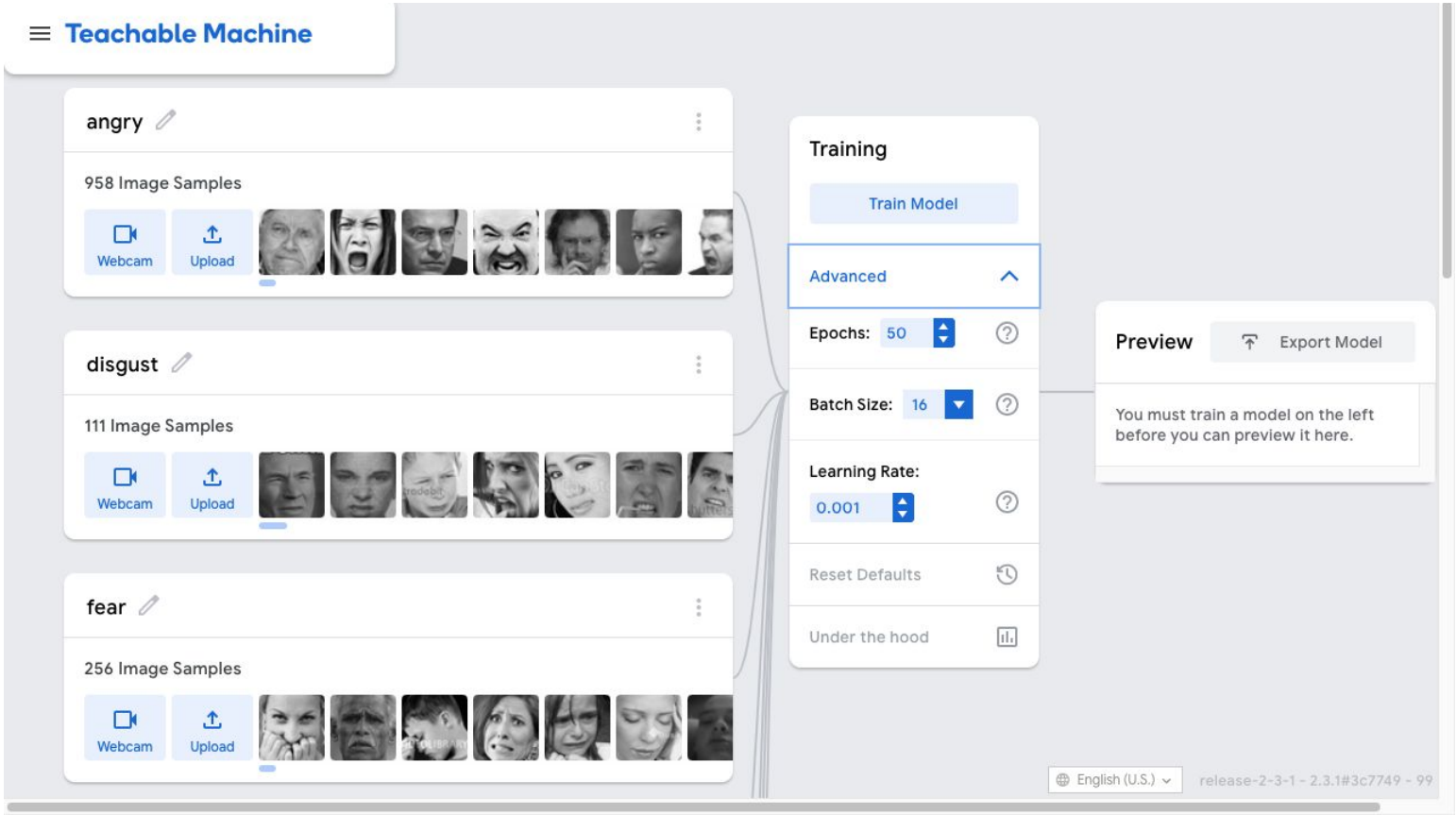
ml5.imageClassifier() is a method to create an object that classifies an image using a pre-trained model.

```
classifier = ml5.imageClassifier(model, ?video, ?options, ?callback);
```



Teachable Machine

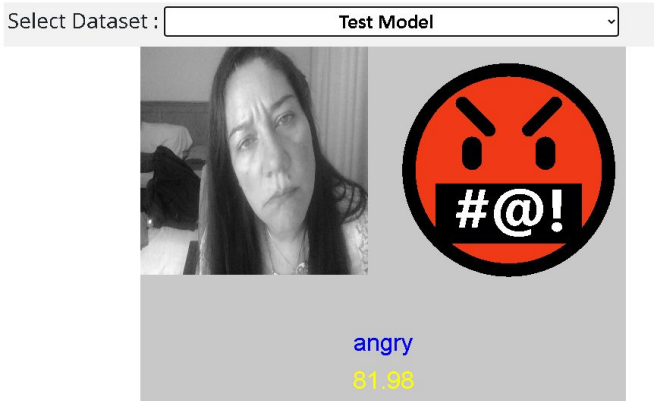
We initially trained our model utilizing Google's **"Teachable Machine"** program. It is a GUI built on top of a Tensorflow pretrained model that took in over 14 million images, and classified them. We **"Re-Trained"** the model utilizing a Kaggle dataset of images that had been classified, and separated in folders. We uploaded the testing set to see if we could train the model.

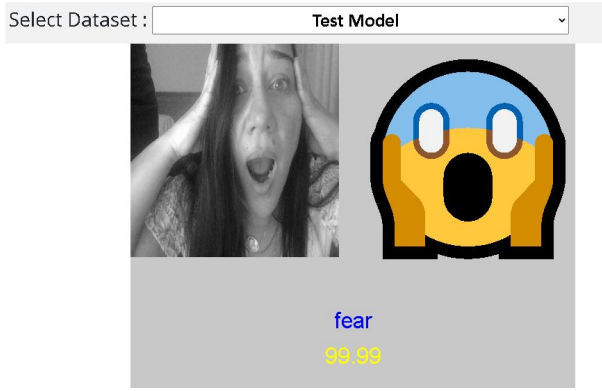


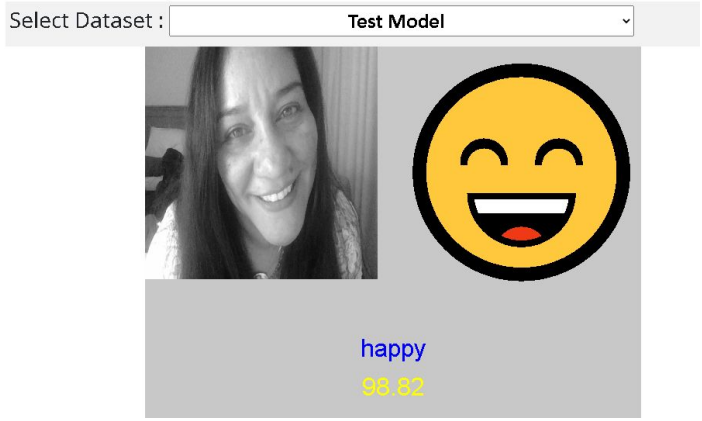
Testing the Model

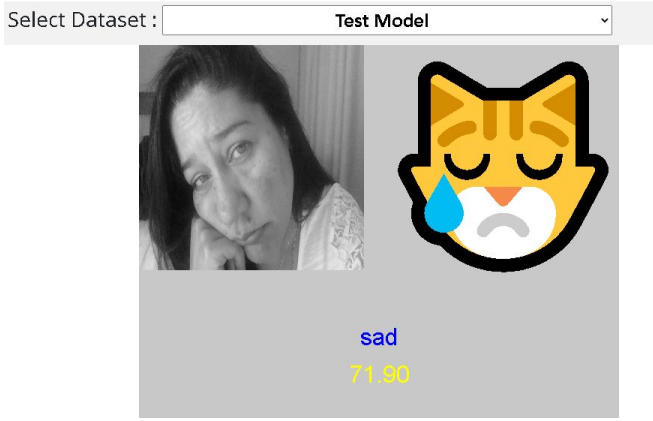
Our initial model seemed to be almost always **"Angry"** regardless of actual emotion projected.

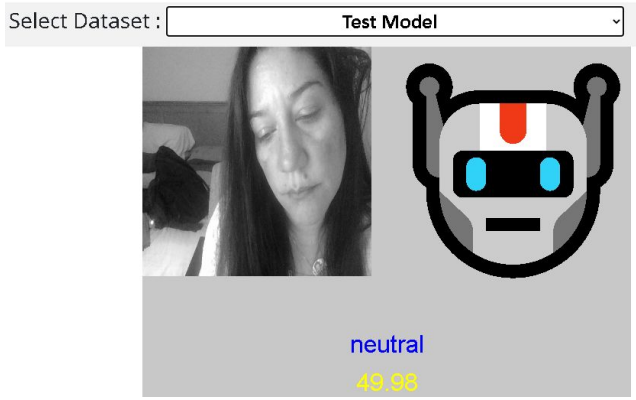
Our initial video stream was capturing in color, and our model was trained in black & white. We added a grey filter to the video stream to try to correct this.







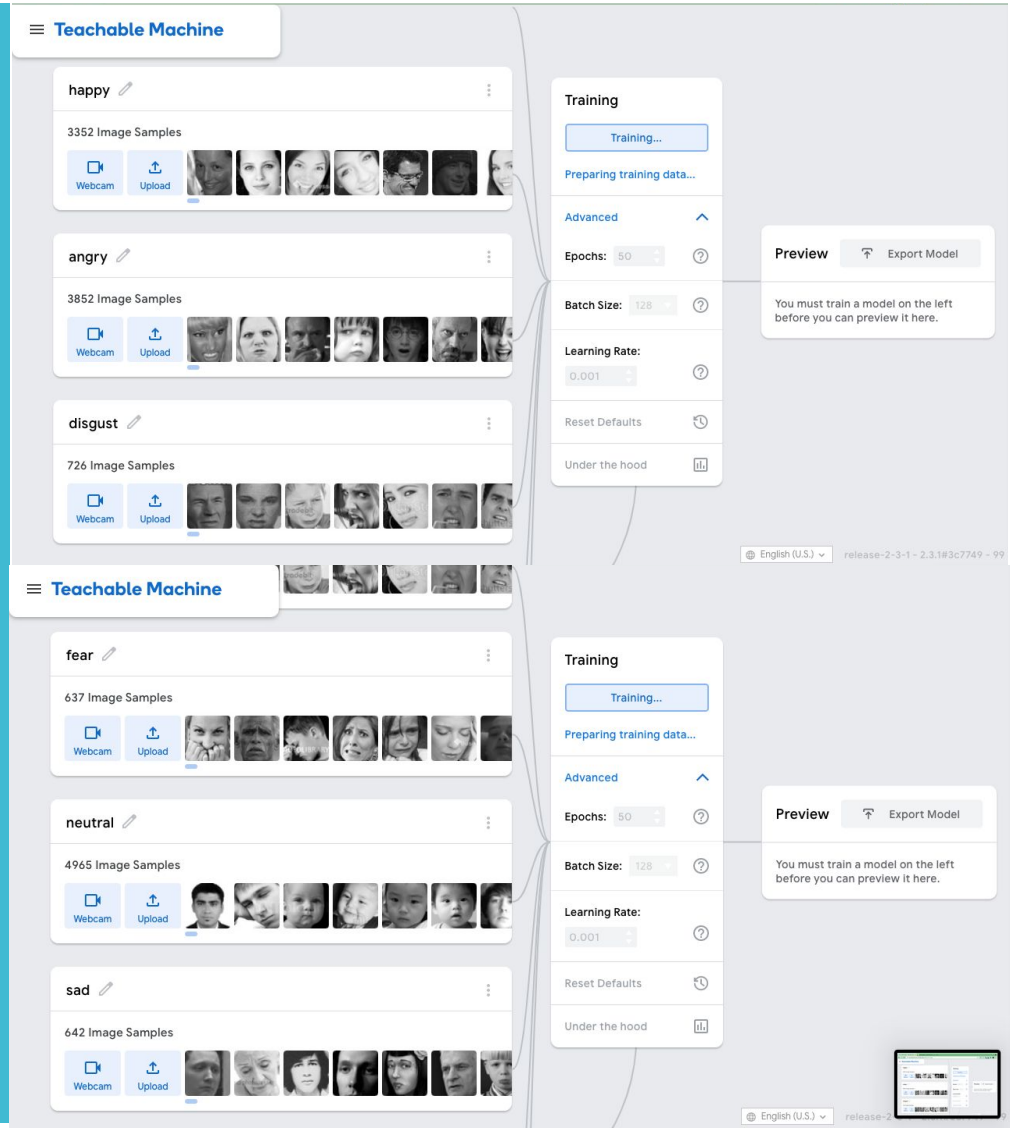




After reviewing our training model, we noticed that it work but it seems that the surprise and disgust emotion is not detected and presents various pattern errors.

We decided to retrain the model with another data sample.

Retraining

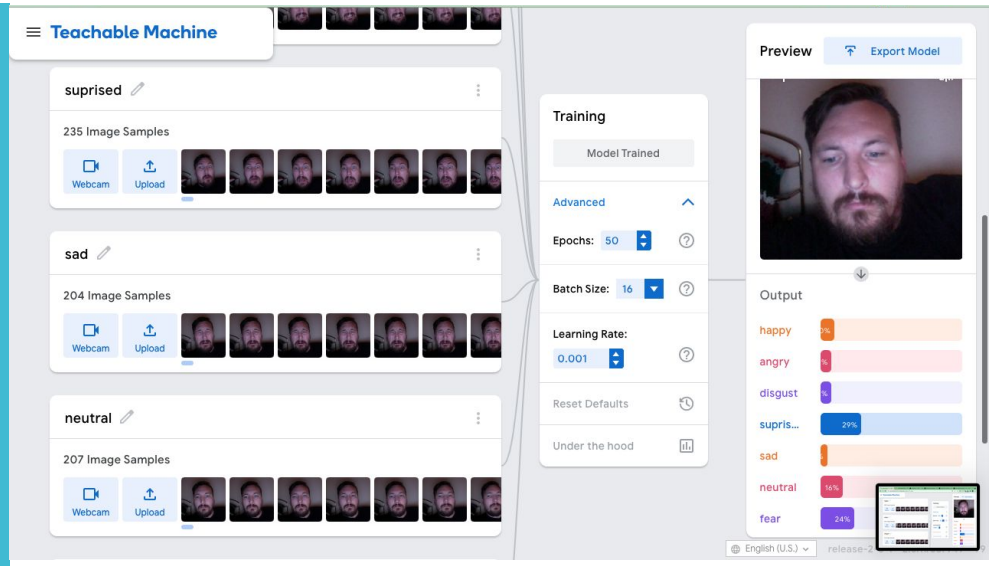


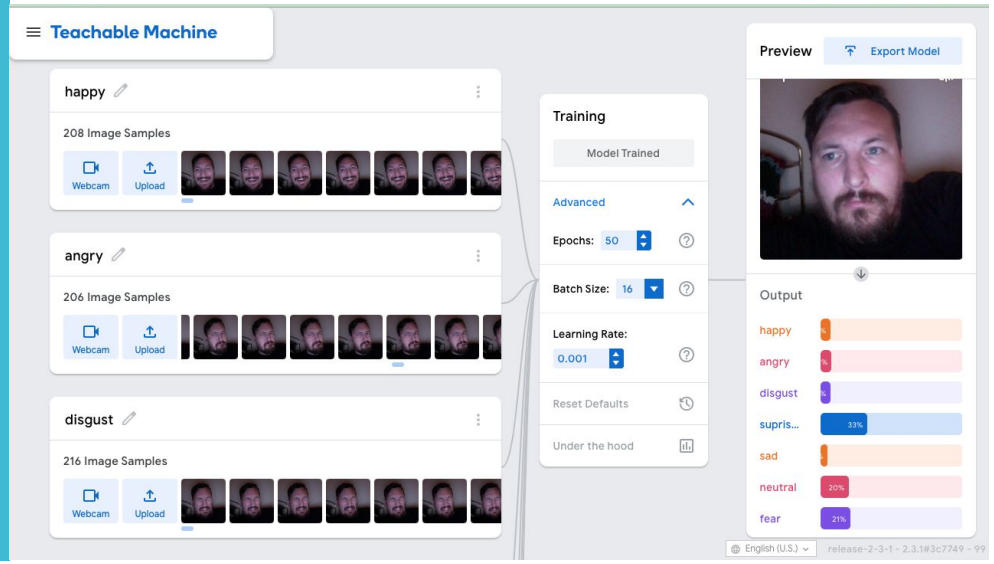
We then decided to "Re-train" the model with all of the available images that had been pre-classified. Some emotions had datasets upwards of 4,000 images, while others had as little as 600.

Teachable Machine uses a combination of your browsers Graphics Processor in-browser to train your model. The first batch took several hours to process, and the second attempt crashes constantly, likely due to the increased size of the datasets.

After several attempts, we abandoned the larger dataset model, in favor of training the model with images we captured from our web camera instead.

Final training





After 2 previous models, we decided to utilize **Teachable Machine's** Webcam functionality to create a fresh & uniform dataset with a similar amount of images processed within each emotion.

These images were also captured with the same lighting, and in-color on the same camera in order to minimize noise / variation in the newly trained model.

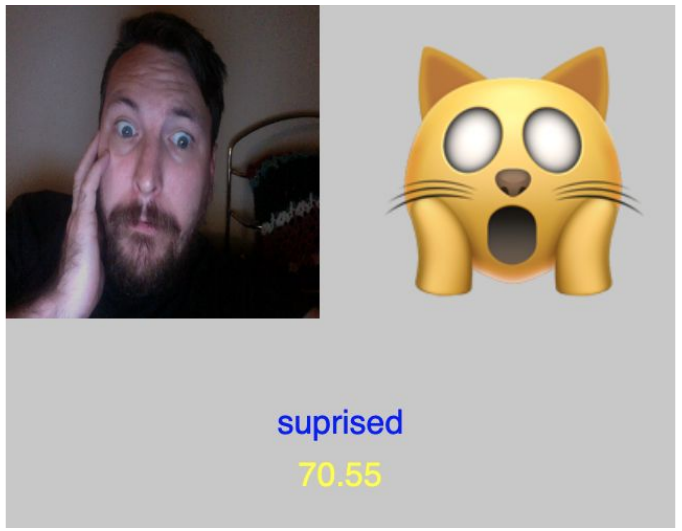
We found this model to be more accurate with it's predictions, but still not perfect.

In future projects to create more accuracy, we would add additional images with more variation in the position of subject's face, as well as additional modifications to the facial expressions captured. We would also filter / remove some images from the data set that are too similar to other emotions to create a more distinct cluster to be classified.

Final Model

Our final model was able to distinguish between more emotions, but heavily favored happy & disgust.

Our training dataset must have been very similar as you can see both surprised and fear can be similar, with high confidence intervals, but different out comes.



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