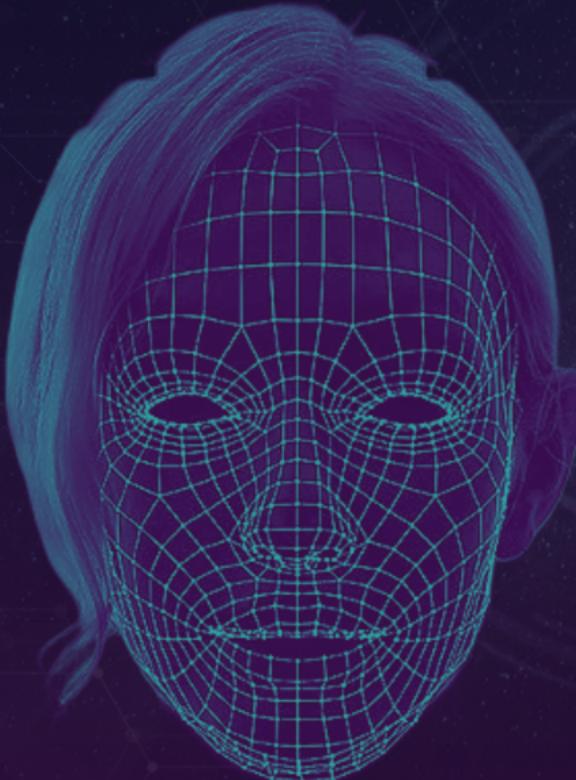


# Facial Emotion Detector

Anna Cho

June 2023



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**Problem Statement**

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**Methodology**

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**Analysis**

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**Conclusion**



# Problem Statement

Recognizing facial emotions is crucial in everyday social interactions.



However, there are individuals who have difficulty recognizing facial emotions due to visual impairments, autism, or face blindness.

Prosopagnosia



Image Source

"That's why I stay home"  
-Brad Pitt, Esquire 2013

Potential  
Solution

# Potential Solution

Develop a machine learning model that can detect and classify facial emotions.



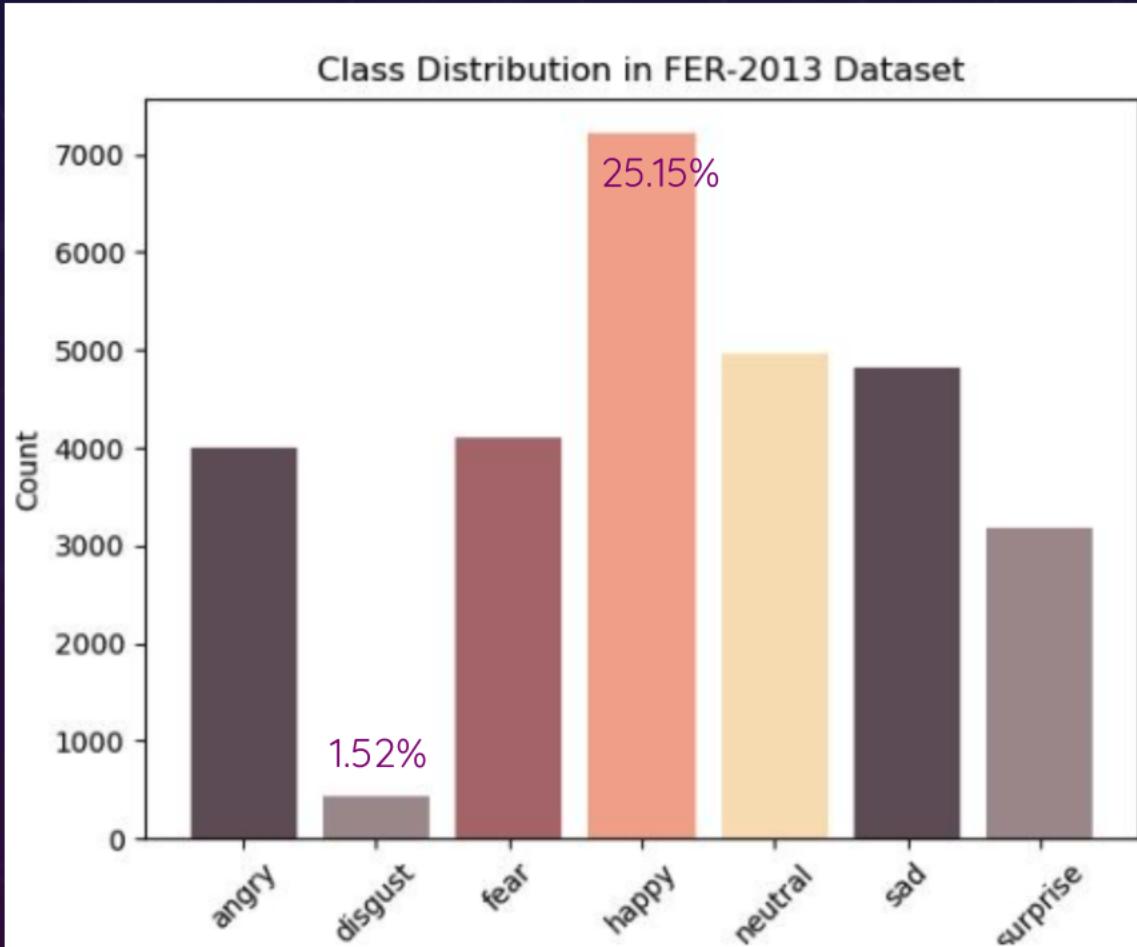


Data  
**SOURCE**

- 1.) FER-2013
- 2.) AffectNet



# FER-2013



- class imbalance

Clean



- Preprocess and augment to match FER-2013 images.
- 8 classes: drop contempt class
- Combine with FER-2013 dataset



96 x 96

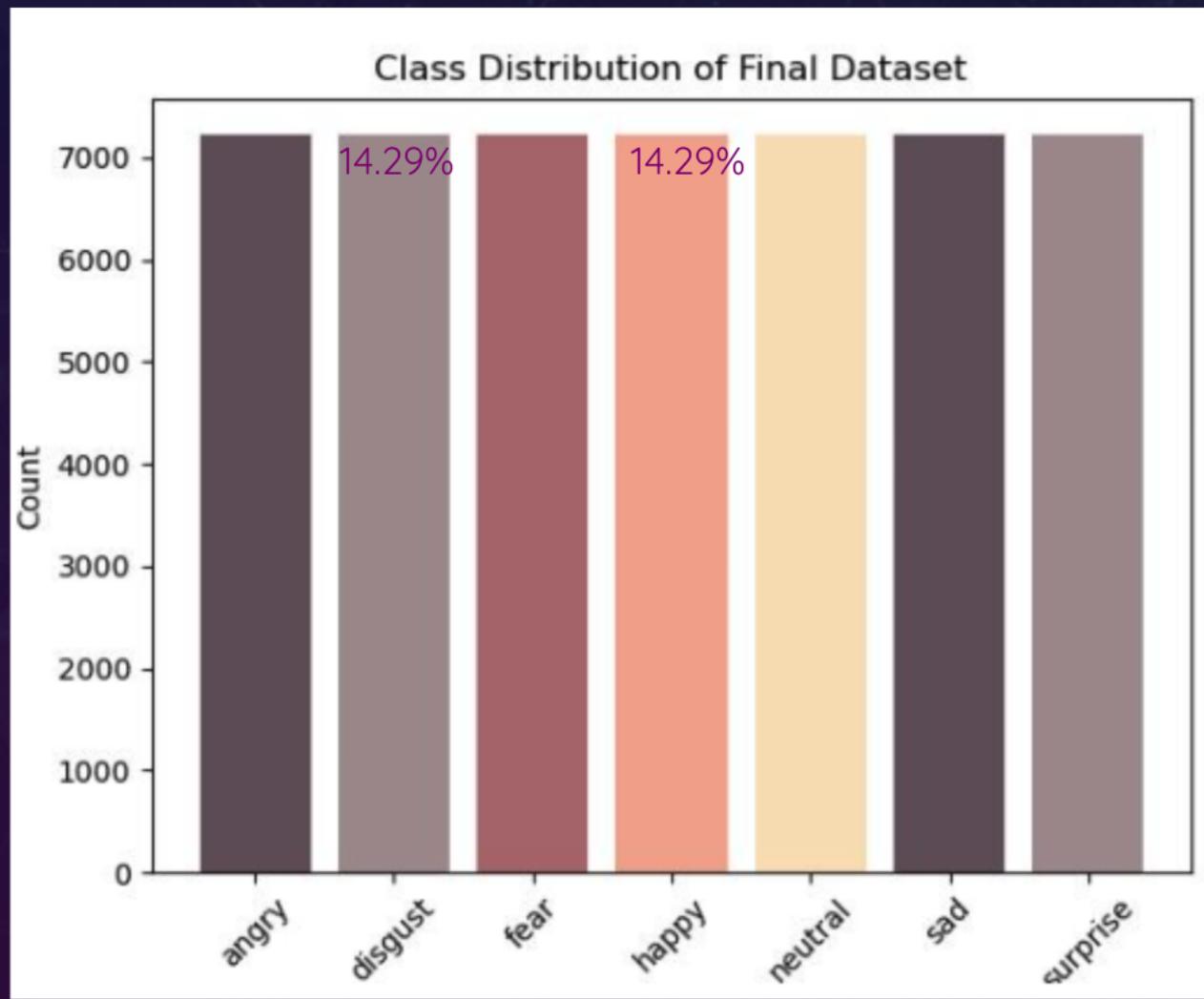


46 x 46

AffectNet

Final

# Final Dataset



Each class has ~7215  
images

# Modeling



**Baseline:** Always predicting majority class



Trained **8 CNNs**



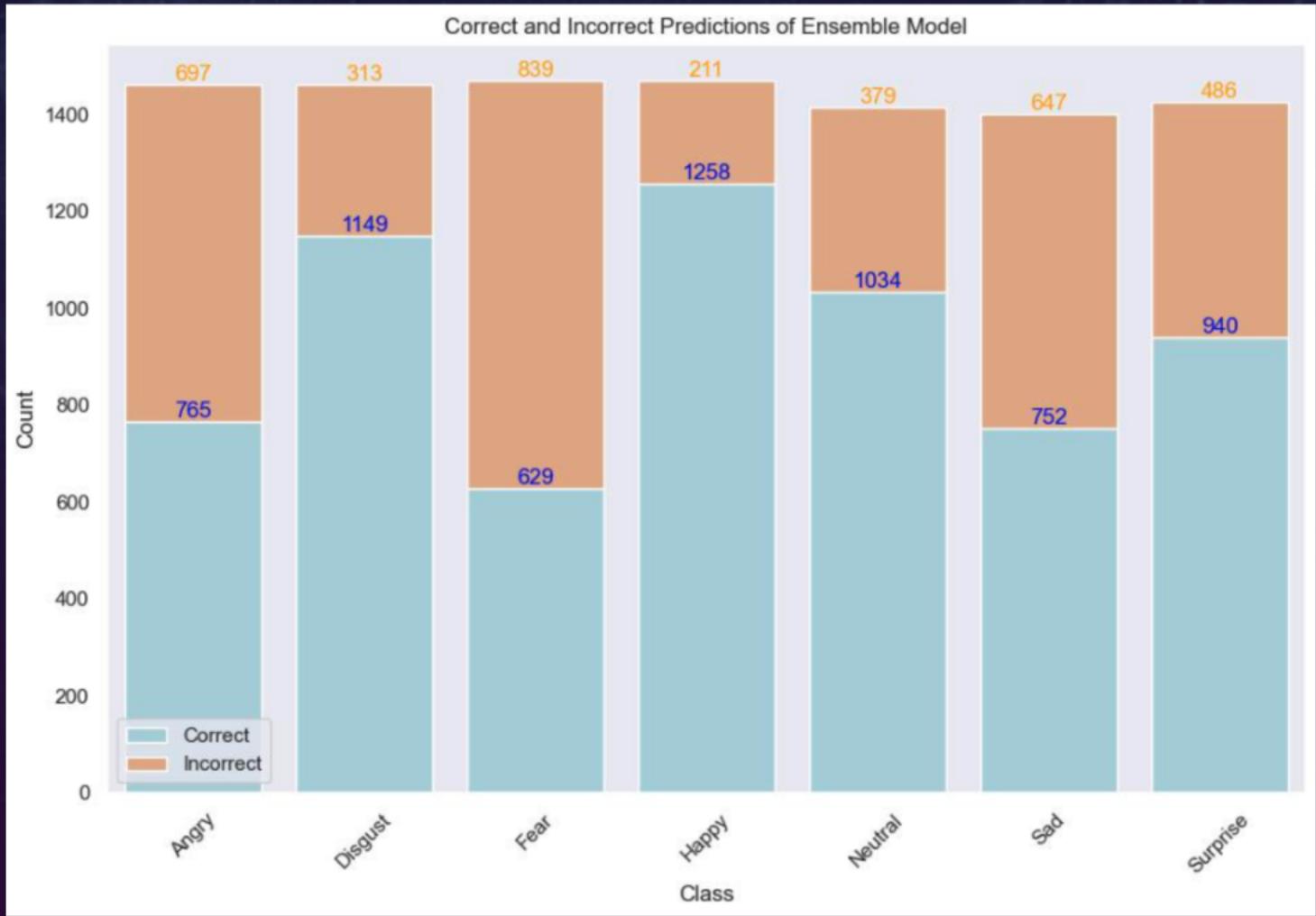
Evaluate and aggregate **final model**

# Analysis

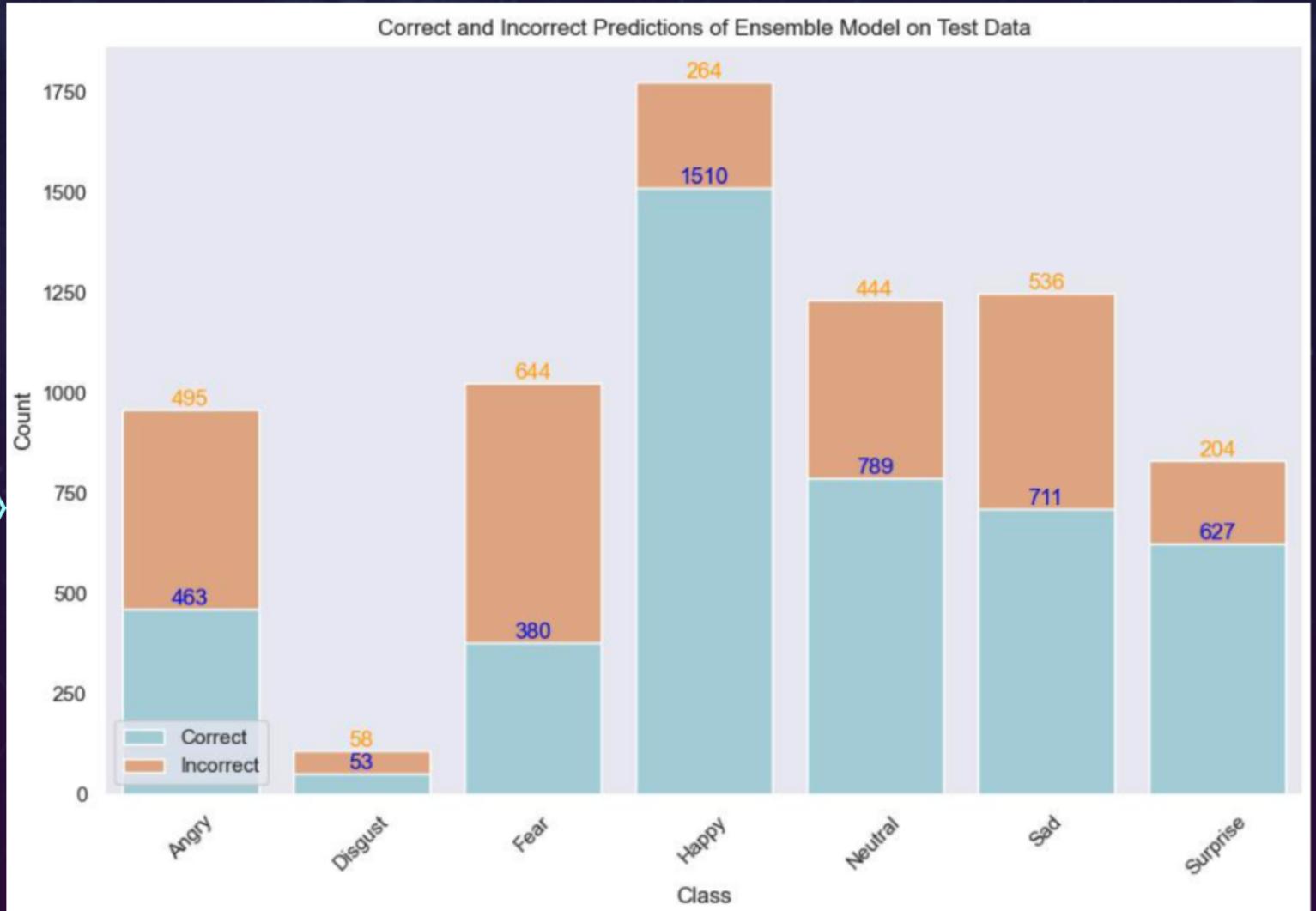
Baseline: 14.40% (majority class: sad)

Models	Train Loss	Train Accuracy	Validation Loss	Validation Accuracy
CNN Model 2	0.6844	76.29%	0.9869	63.09%
CNN Model 3	0.6391	75.11%	0.9745	63.13%
CNN Model 4	0.6605	75.11%	0.9612	64.46%
Ensemble	0.5205	81.84%	1.0003	64.63%

# Ensemble Model



# Ensemble Model



# Streamlit

## Room for improvement!

### Facial Emotion Detector:

What Facial Emotion is depicted?

Upload your own image here:

Drag and drop file here  
Limit 200MB per file • JPG, JPEG

[Browse files](#)

image0030413.jpg 5.9KB

[Submit](#)



Angry, Confidence 0.92

Wrong: sad class

### Facial Emotion Detector:

What Facial Emotion is depicted?

Upload your own image here:

Drag and drop file here  
Limit 200MB per file • JPG, JPEG

[Browse files](#)

image0030763.jpg 4.9KB

[Submit](#)



Fear, Confidence 0.79

Wrong: anger class



# Conclusion (Recommendations)

OpenCV with  
pre-trained Haar  
Cascade  
Classifier



Best model was a  
custom CNN model:  
Ensemble Model



A lot of room for  
improvement!  
- Higher resolution images  
- Color images  
- Diverse facial expressions



Real-time input and  
output

Questions?

**THANK YOU!**

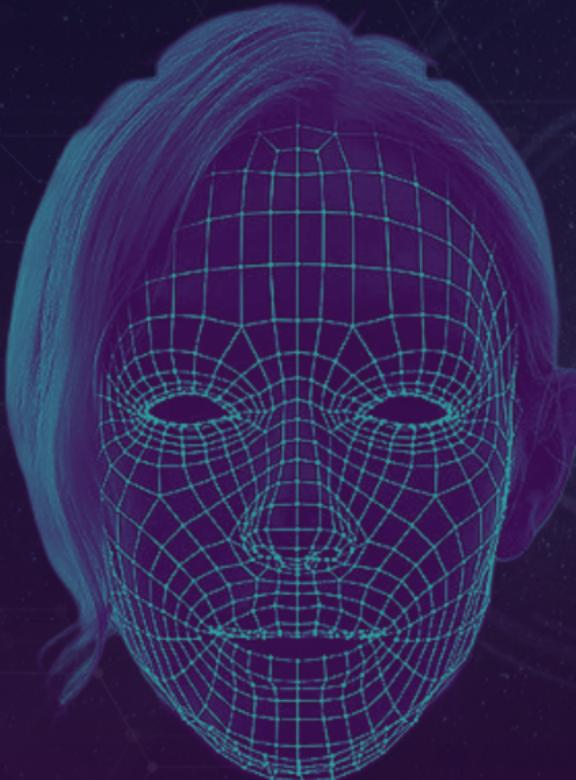


*Questions?*

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