

DOG EMOTIONS

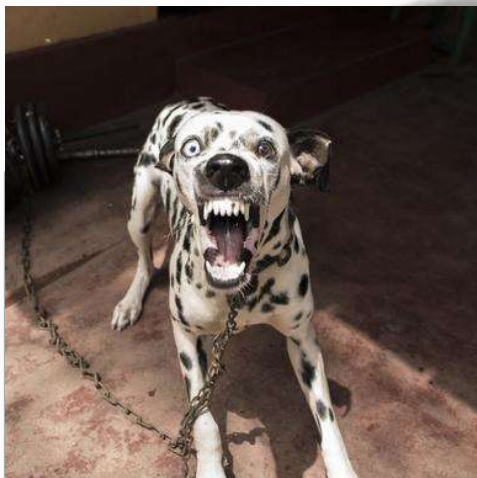
A TRANSFER LEARNING PLAYGROUND PROJECT

SUNNY LIU



OVERVIEW

CLASSIFIER FOR FOUR TYPE OF EMOTIONS – ANGRY, HAPPY, RELAXED, SAD



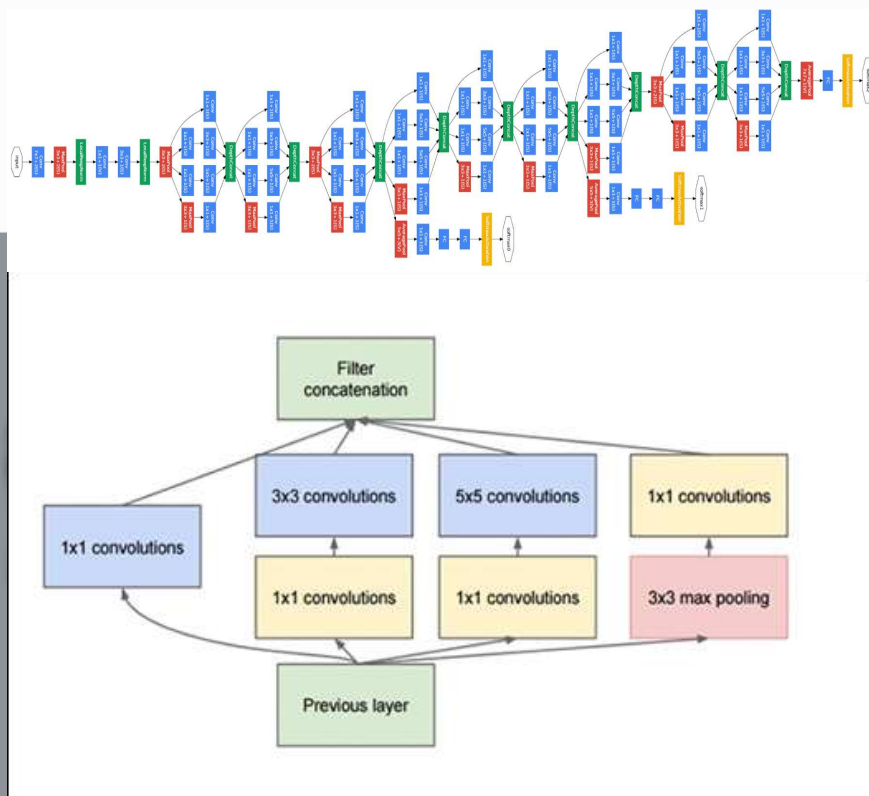
MODEL STRATEGIES

- Transfer learning using two pre-trained models
 - InceptionV3
 - VGG16
- Saving best performing model across epochs
- Regularization
 - Data Augmentation
 - Dropouts
- Pooling – Global Average Pooling 2D

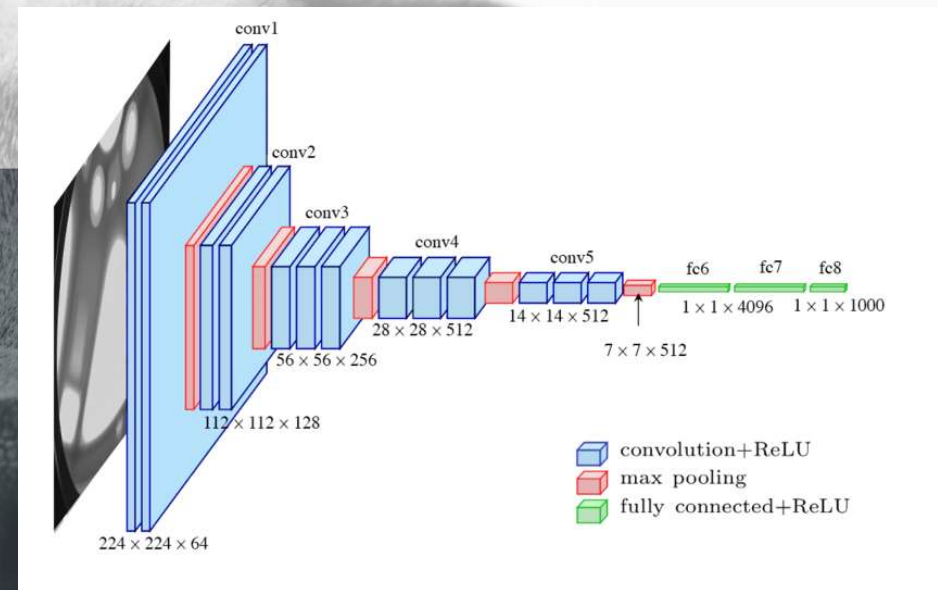


INCEPTION V3 VS. VGG 16 ARCHITECTURE

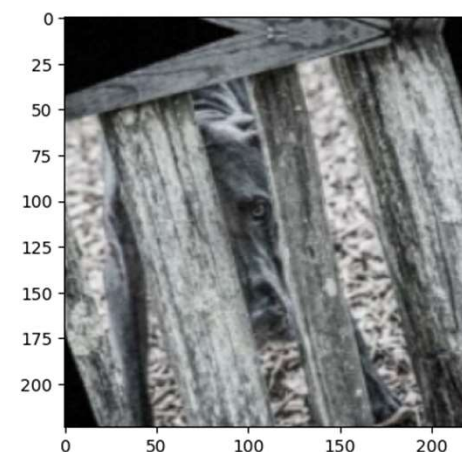
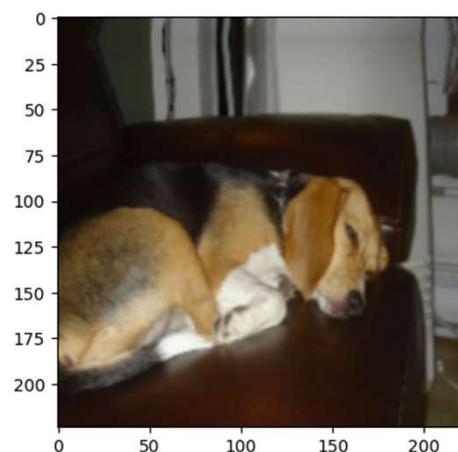
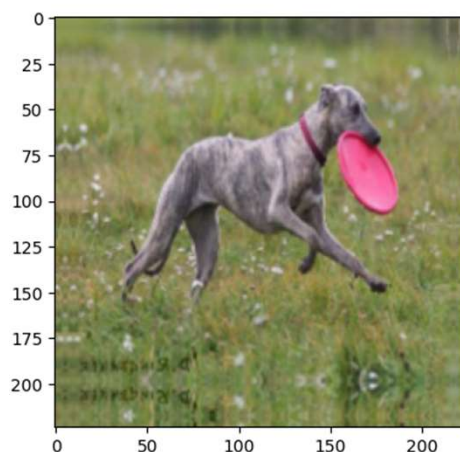
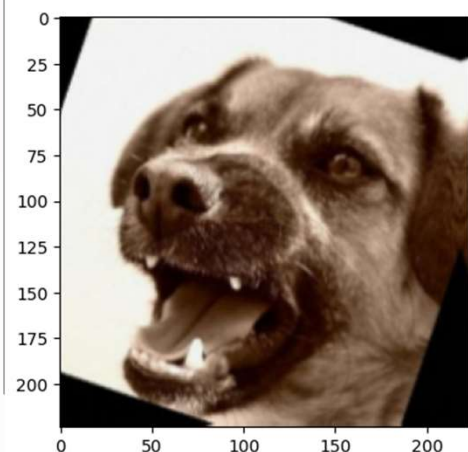
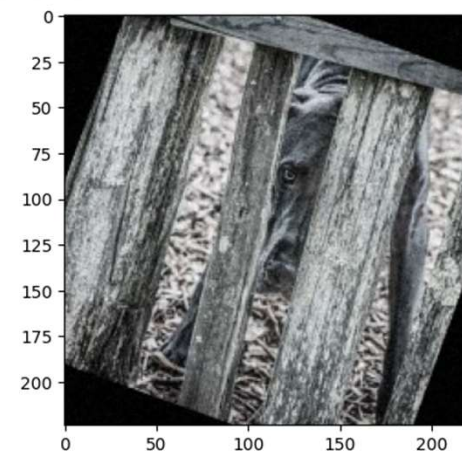
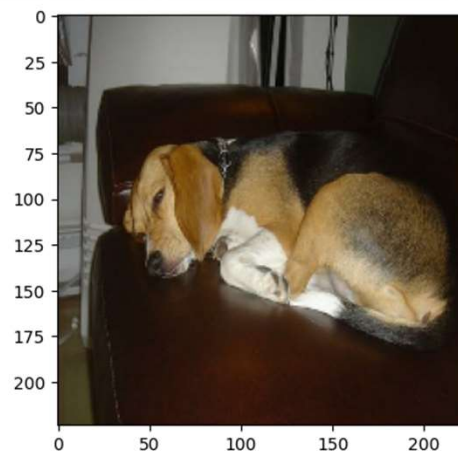
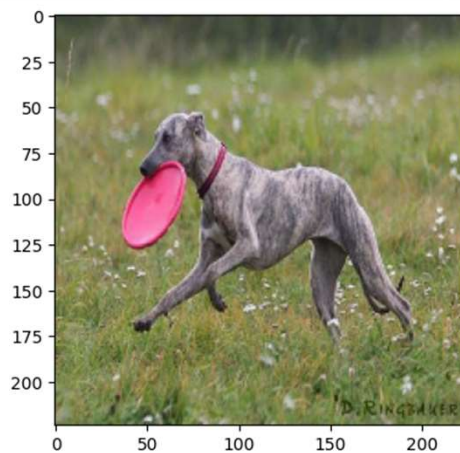
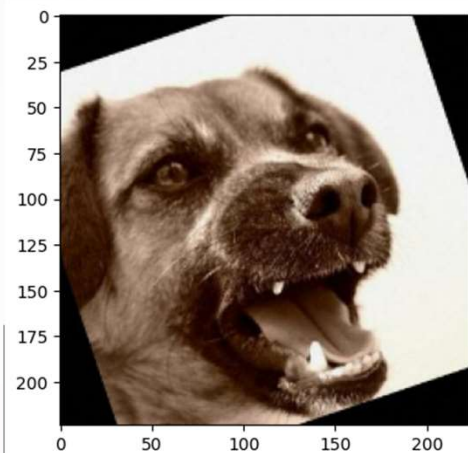
INCEPTION V3



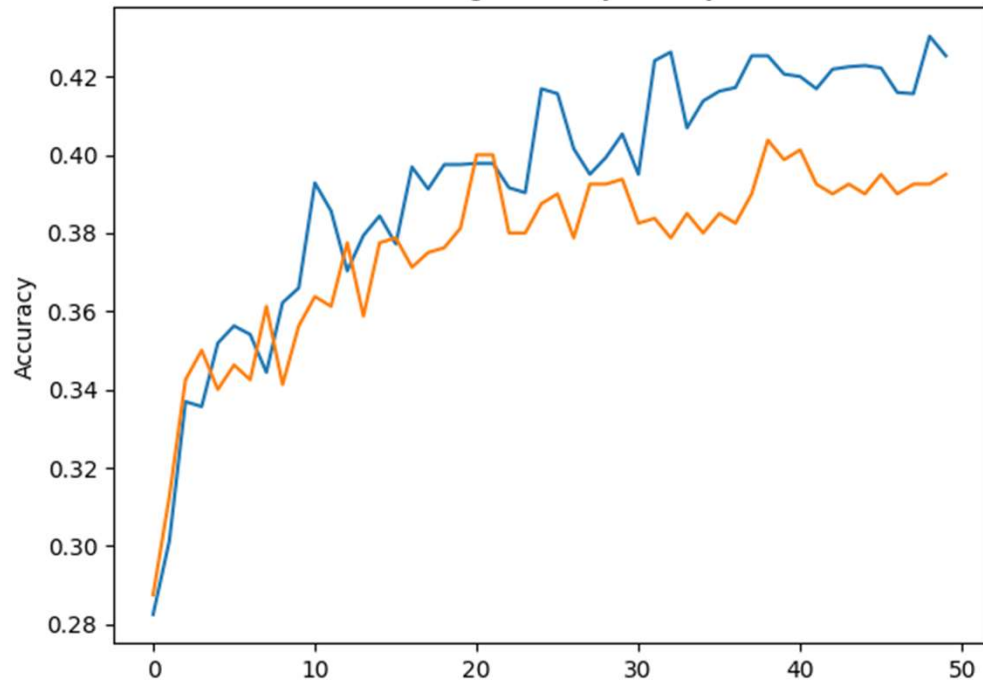
VGG 16



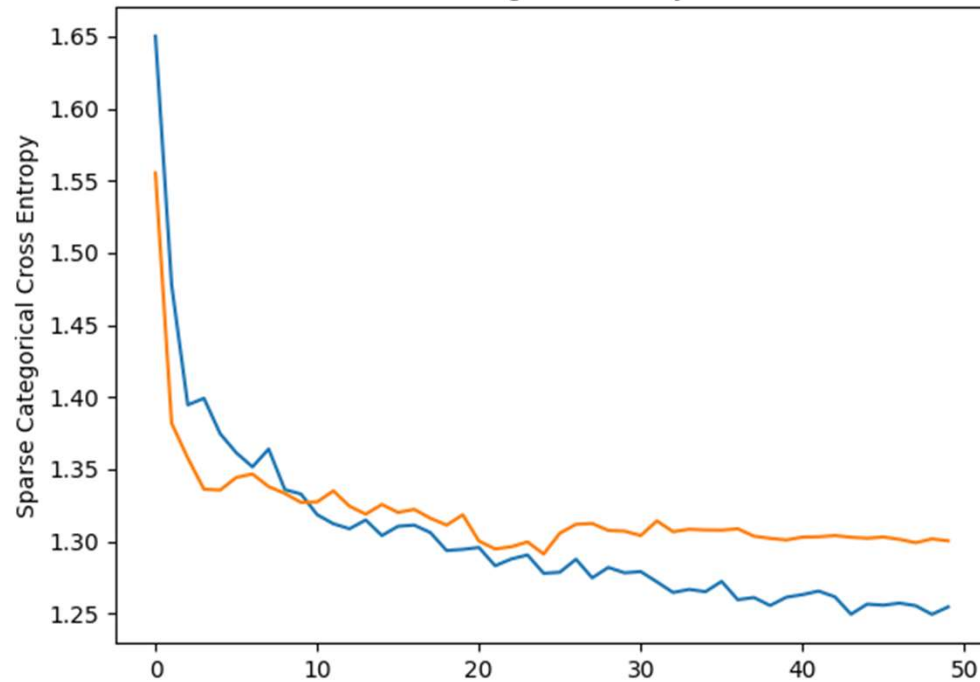
DATA AUGMENTATION



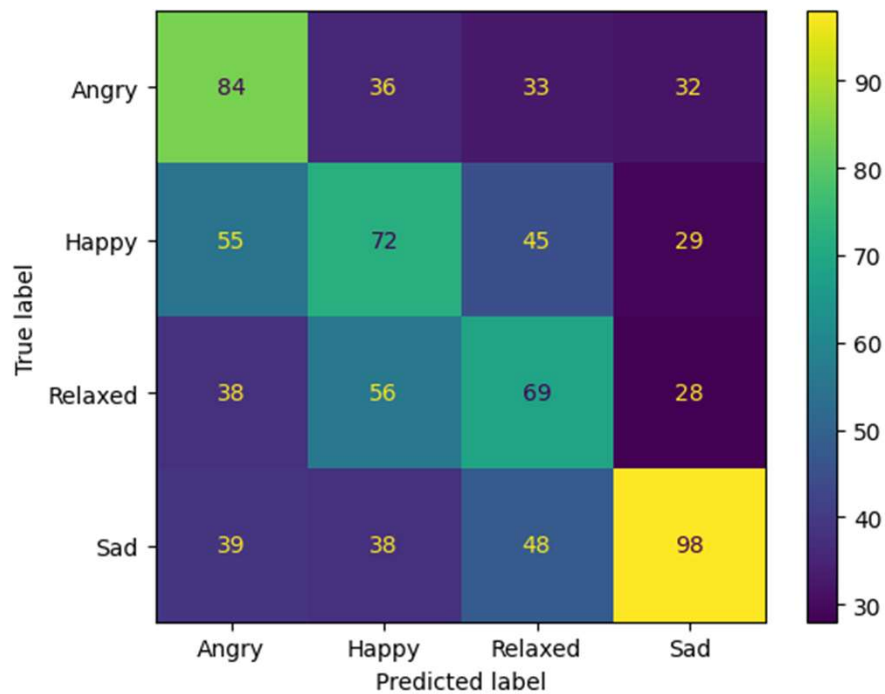
Training accuracy history



Training loss history



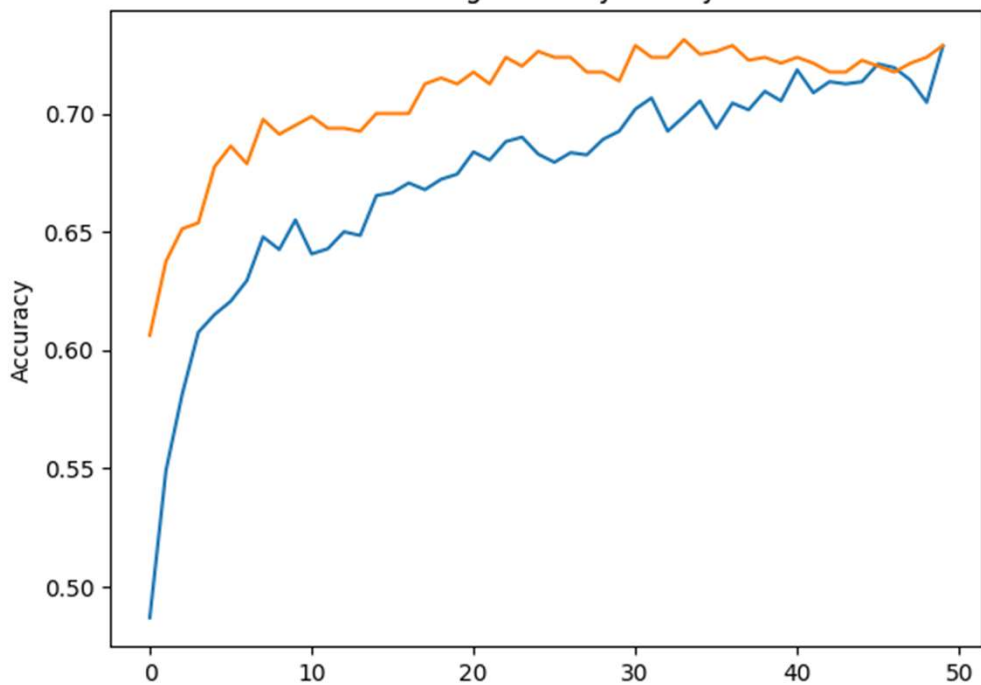
BEST INCEPTIONV3 RESULTS



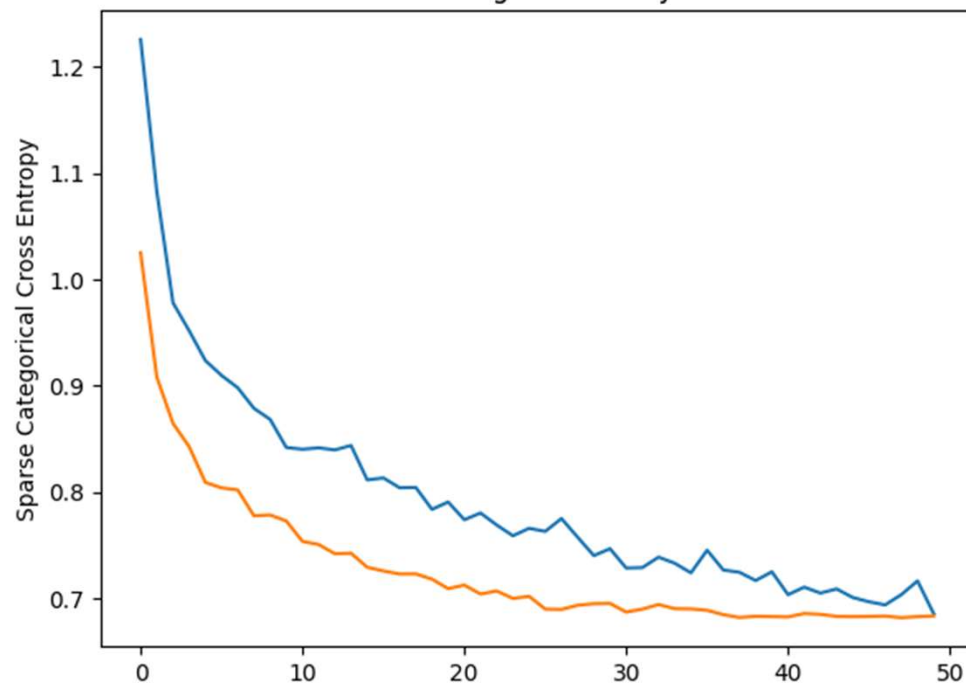
| class | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| Angry | 0.39 | 0.45 | 0.42 | 185 |
| Happy | 0.36 | 0.36 | 0.36 | 201 |
| Relaxed | 0.35 | 0.36 | 0.36 | 191 |
| Sad | 0.52 | 0.44 | 0.48 | 223 |
| accuracy | | | 0.40 | 800 |
| macro avg | 0.41 | 0.40 | 0.40 | 800 |
| weighted avg | 0.41 | 0.40 | 0.41 | 800 |

BEST INCEPTION V3 RESULTS

Training accuracy history



Training loss history



BEST VGG16 RESULTS




| class | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| Angry | 0.82 | 0.66 | 0.73 | 185 |
| Happy | 0.72 | 0.74 | 0.73 | 201 |
| Relaxed | 0.59 | 0.71 | 0.65 | 191 |
| Sad | 0.83 | 0.80 | 0.81 | 223 |
| accuracy | | | | 0.73 |
| macro avg | | | | 0.73 |
| weighted avg | | | | 0.73 |

BEST VGG16 RESULTS

CONCLUSIONS & NEXT STEPS

- VGG 16 works better than Inception V3 in this particular case
 - A less complex model as features extractor is better as important features are concentrated in a dog's face instead of the full image
- Visualizing feature extractions in the convolutional layers to tune further





Thanks!
Questions?