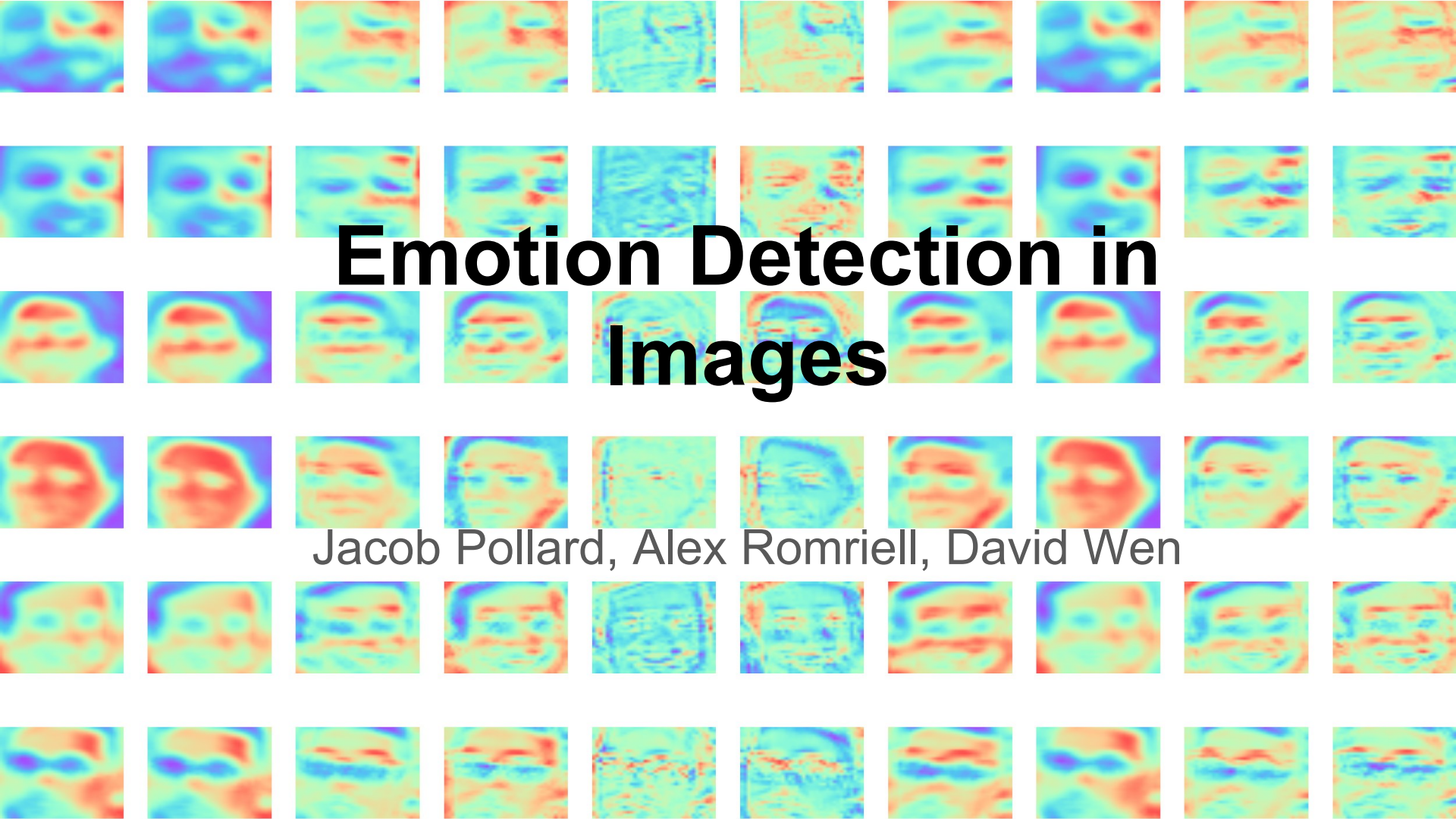


Emotion Detection in Images

Jacob Pollard, Alex Romriell, David Wen

Overview

- Train a neural network to classify emotions from static images

- Models:
  - Convolutional Neural Network
  - Support Vector Machine

- Binary Emotion Classification

Seven Emotions

Angry

Disgust

Fear

Happy

Neutral

Sad

Surprise

Data Preprocessing

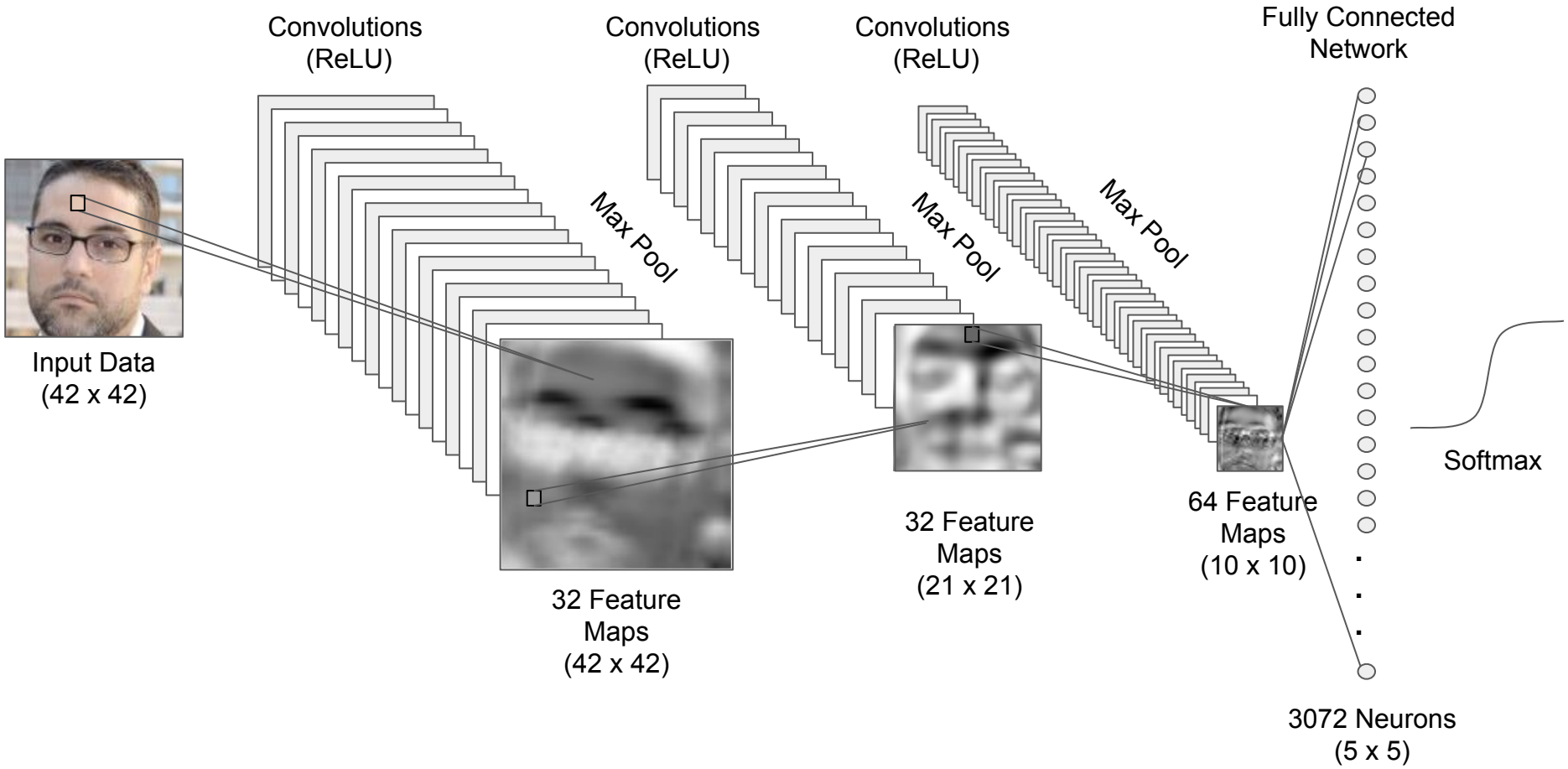
Initially: 37,422 Images, from the following data-sets:

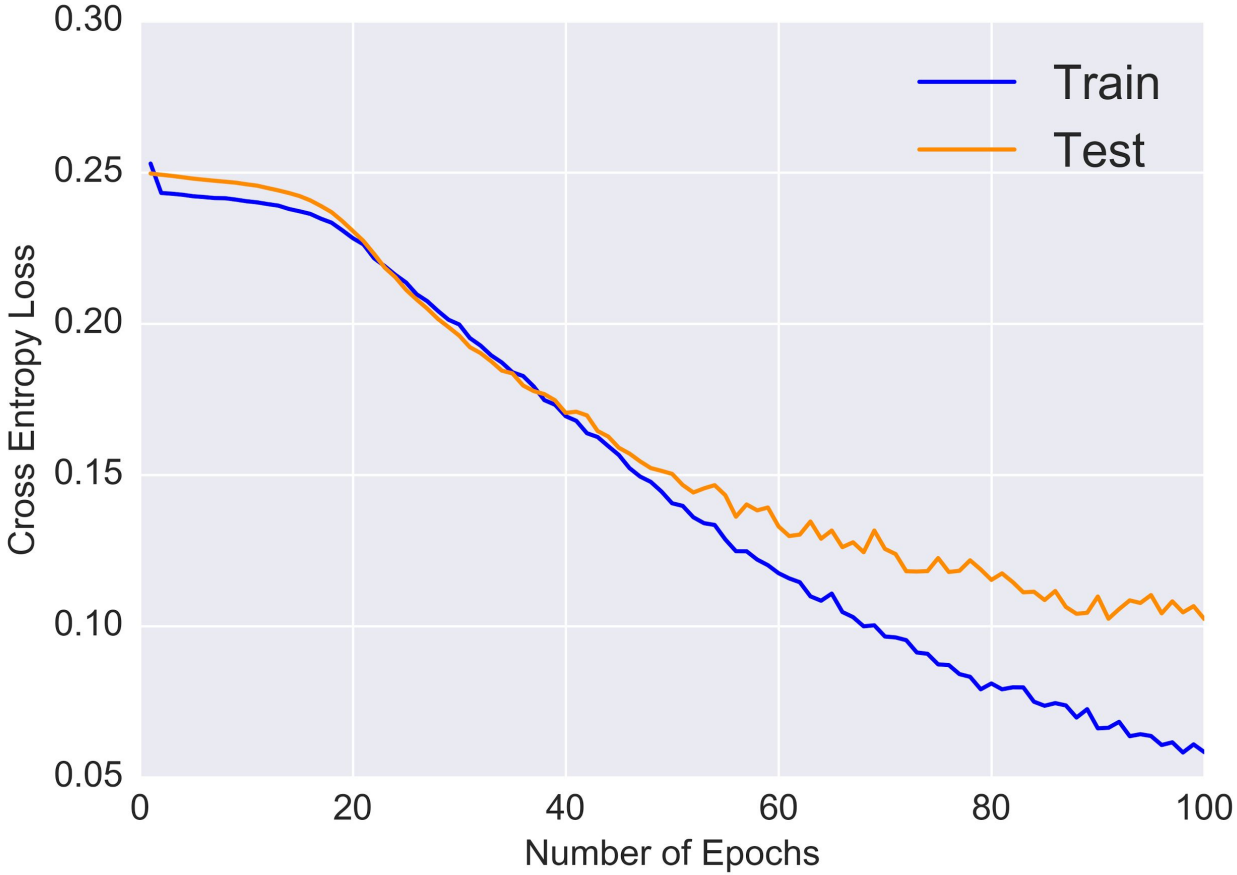
- Static Facial Emotions in the Wild
- Japanese Female Facial Expression
- Facial Expression Recognition

Doubling our data:

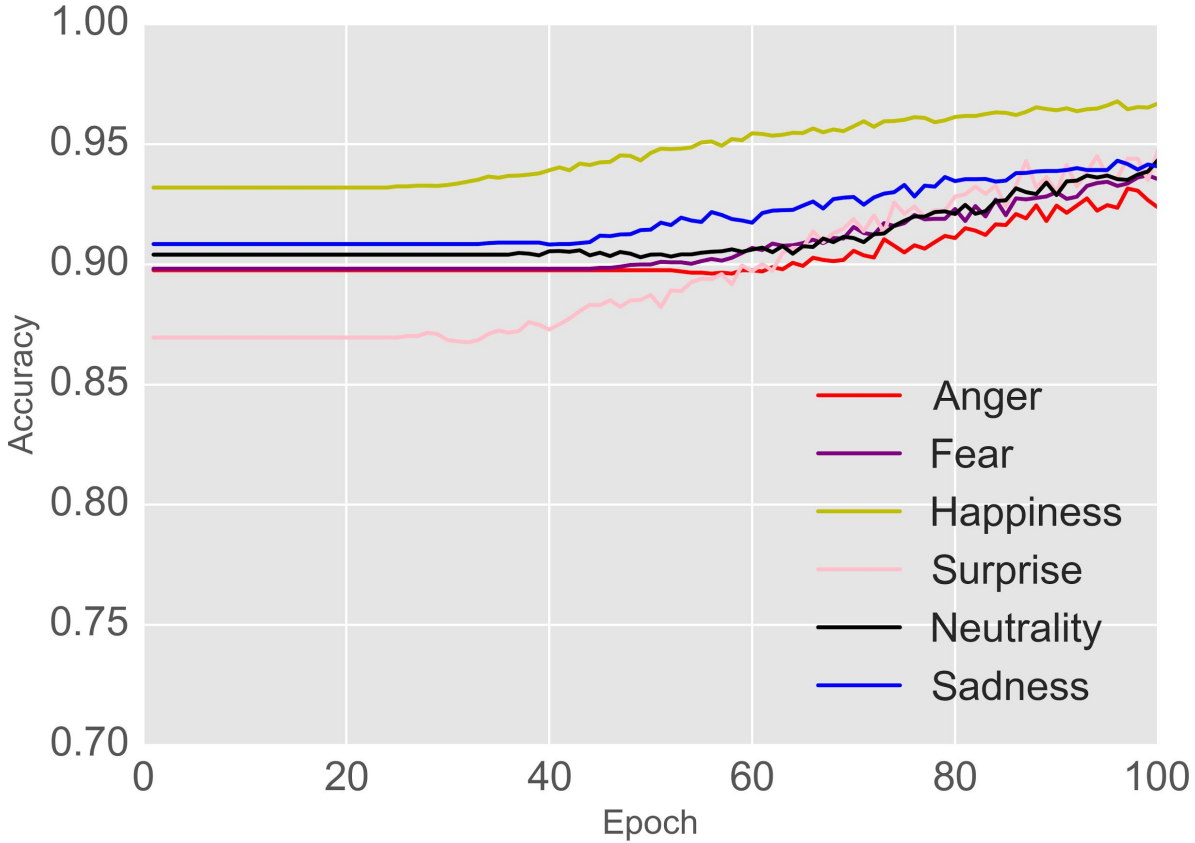
- Copy and distort the images to bring the total number of images to 74,844

CNN Model

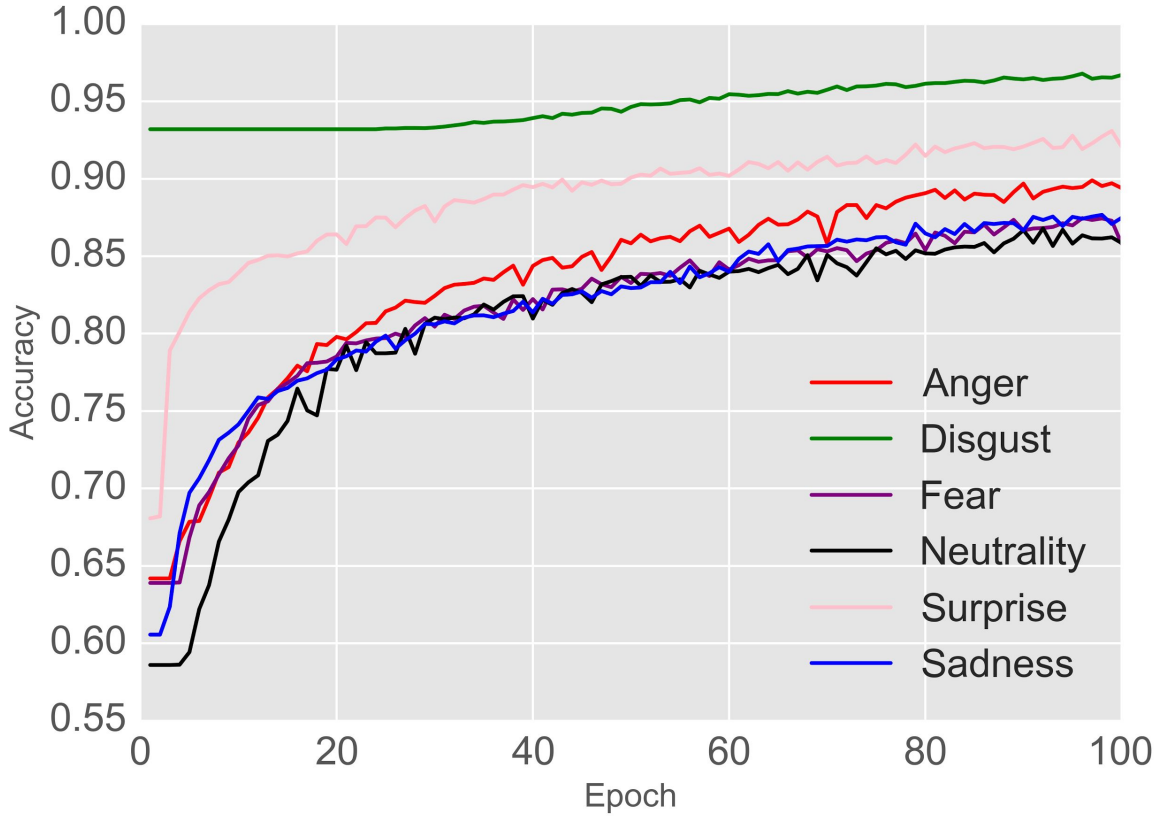

Convolutions
(ReLU)
Convolutions
(ReLU)
Convolutions
(ReLU)
Fully Connected
Network
Max Pool
Max Pool
Max Pool
Input Data
(42 x 42)
32 Feature
Maps
(42 x 42)
32 Feature
Maps
(21 x 21)
64 Feature
Maps
(10 x 10)
Softmax
3072 Neurons
(5 x 5)


Validation Curves for CNN Classifying Happy vs Disgust
Train
Test
Cross Entropy Loss
0.30
0.25
0.20
0.15
0.10
0.05
0
20
40
60
80
100
Number of Epochs

Accuracy Classifying Disgust vs. Other Emotions

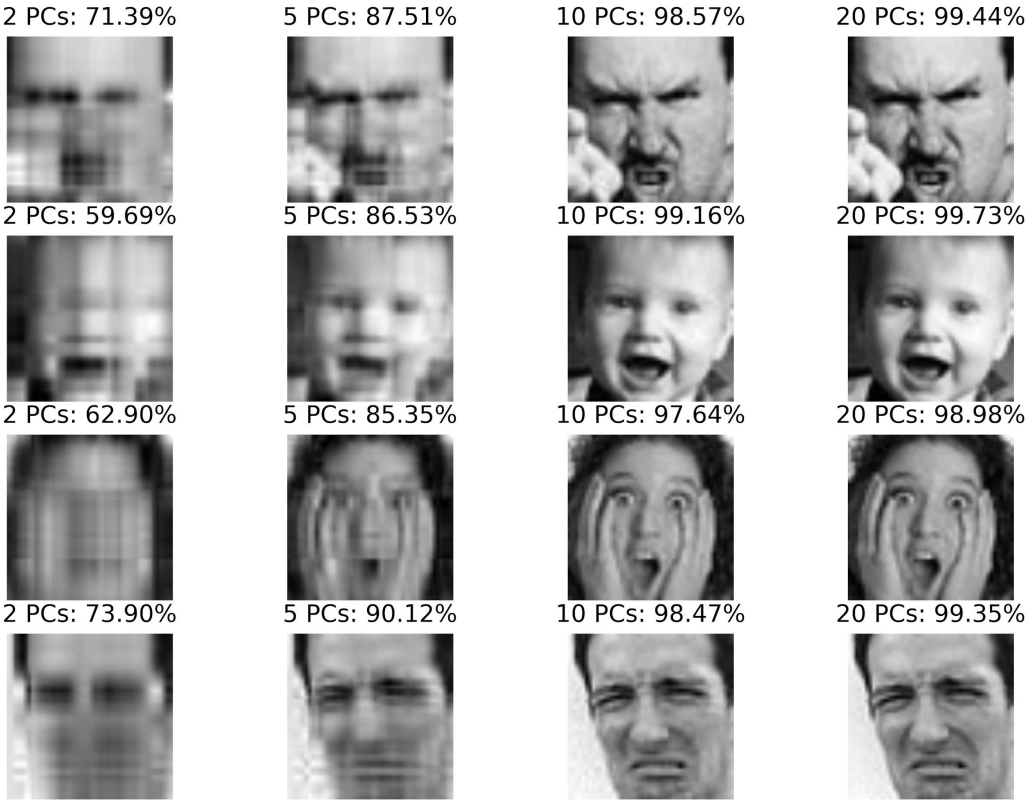


Accuracy Classifying Happiness vs. Other Emotions



Support Vector Machines and Principal Component Analysis

- Gaussian and Quadratic Kernels
- The first 10 PC’s explain well over 90% of the variation in each image
- Used as features to reduce dimensions of inputs to SVM Classifier
- Achieved 94.4% accuracy for binary classification



Speed of SVM and PCA

Tools

SciPy

amazon
web services™

scikit
learn

NumPy

scikit-image
image processing in python

theano

Future Work

- Experiment with different image preprocessing techniques
- Initialize CNN parameter weights differently
- Compete in this year’s Emotion Detection in the Wild Competition

Team Information

Jacob Pollard

jtpollard@usfca.edu, www.linkedin.com/in/jtpollard

Alex Romriell

asromriell@usfca.edu, www.linkedin.com/in/alexromriell

David Wen

djwen@usfca.edu, www.linkedin.com/in/davidjeffwen