



Emotion Detection in Images

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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

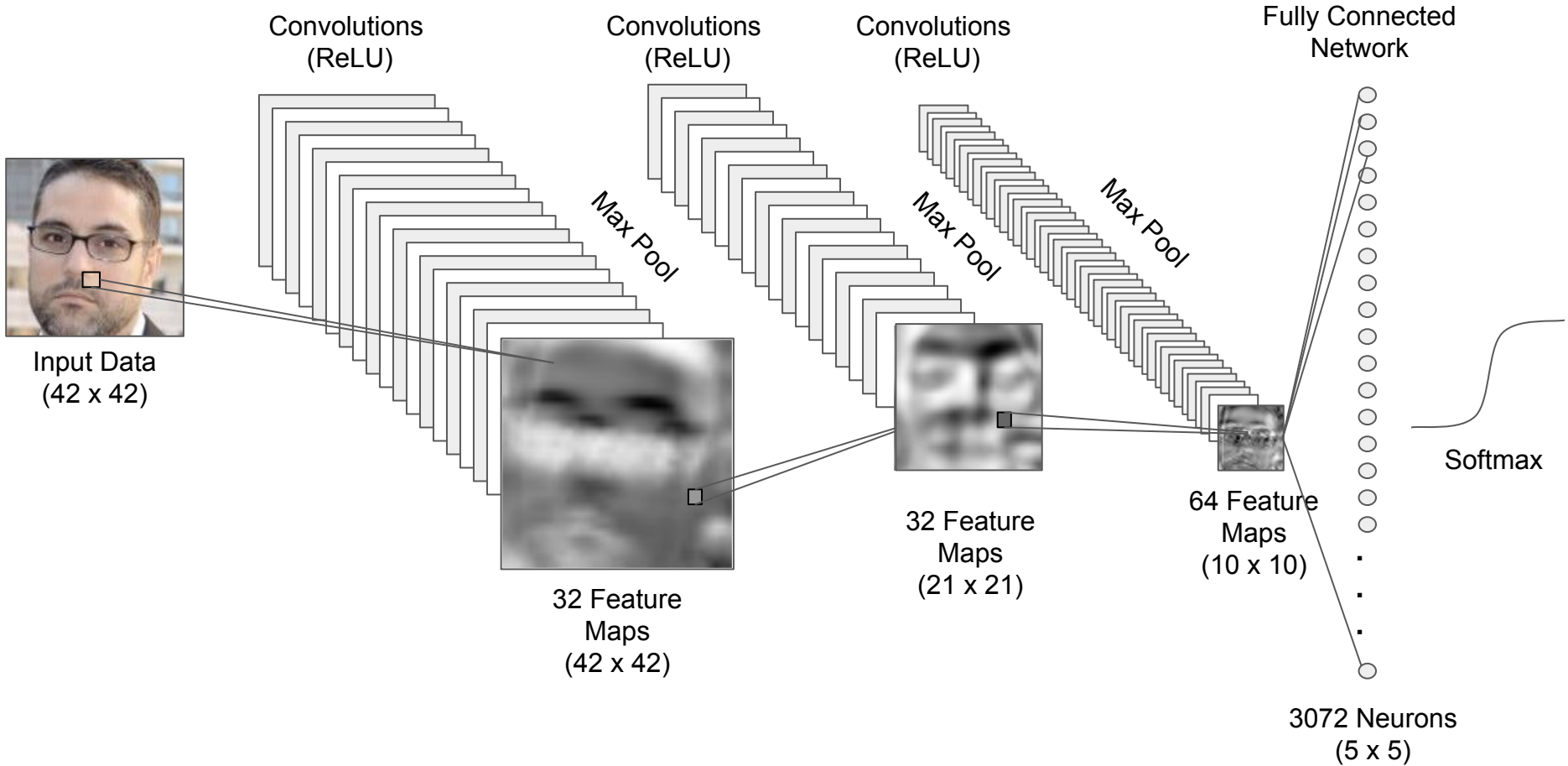
Initially: 37,422 Images, from the following data-sets:

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

Doubling our data:

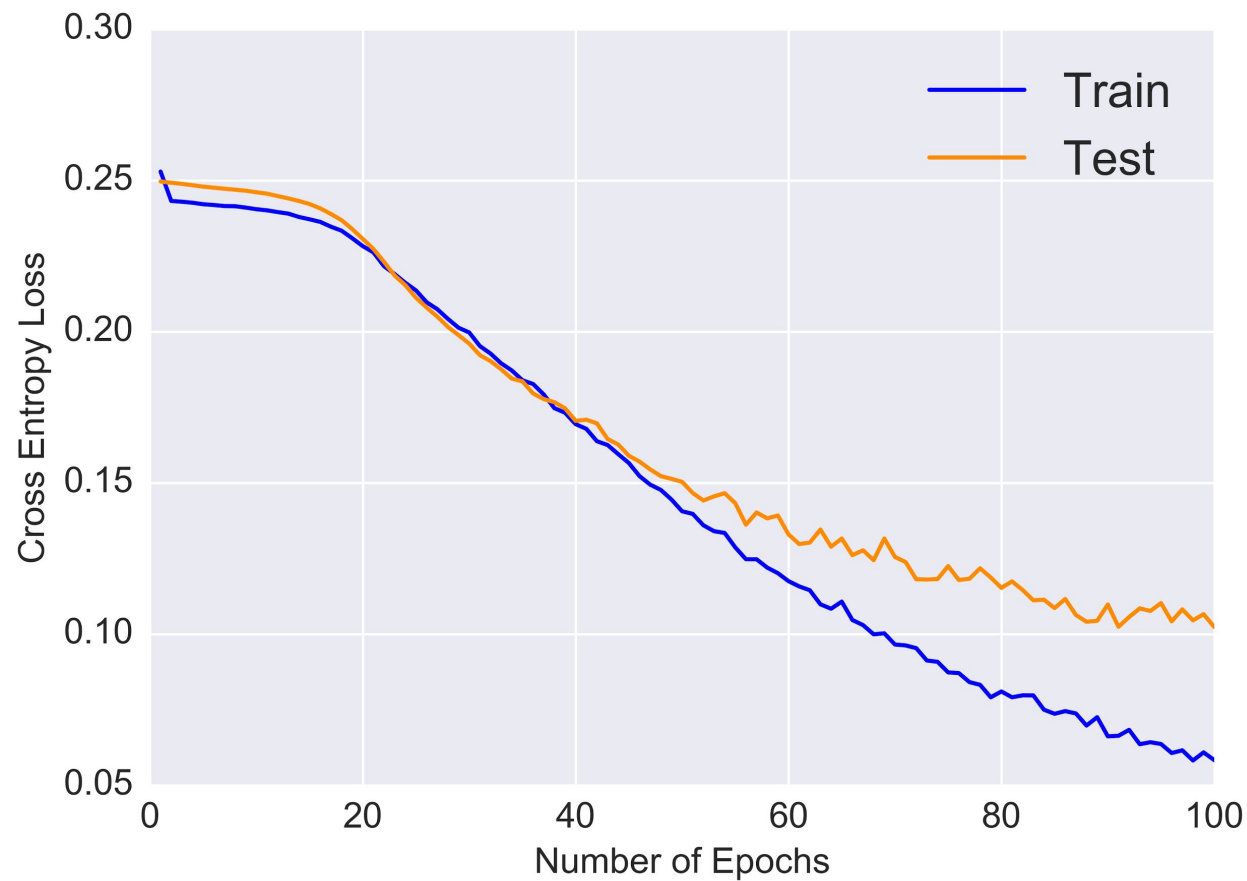
- Copy and distort the images to bring the total number of images to 74,822

CNN Model

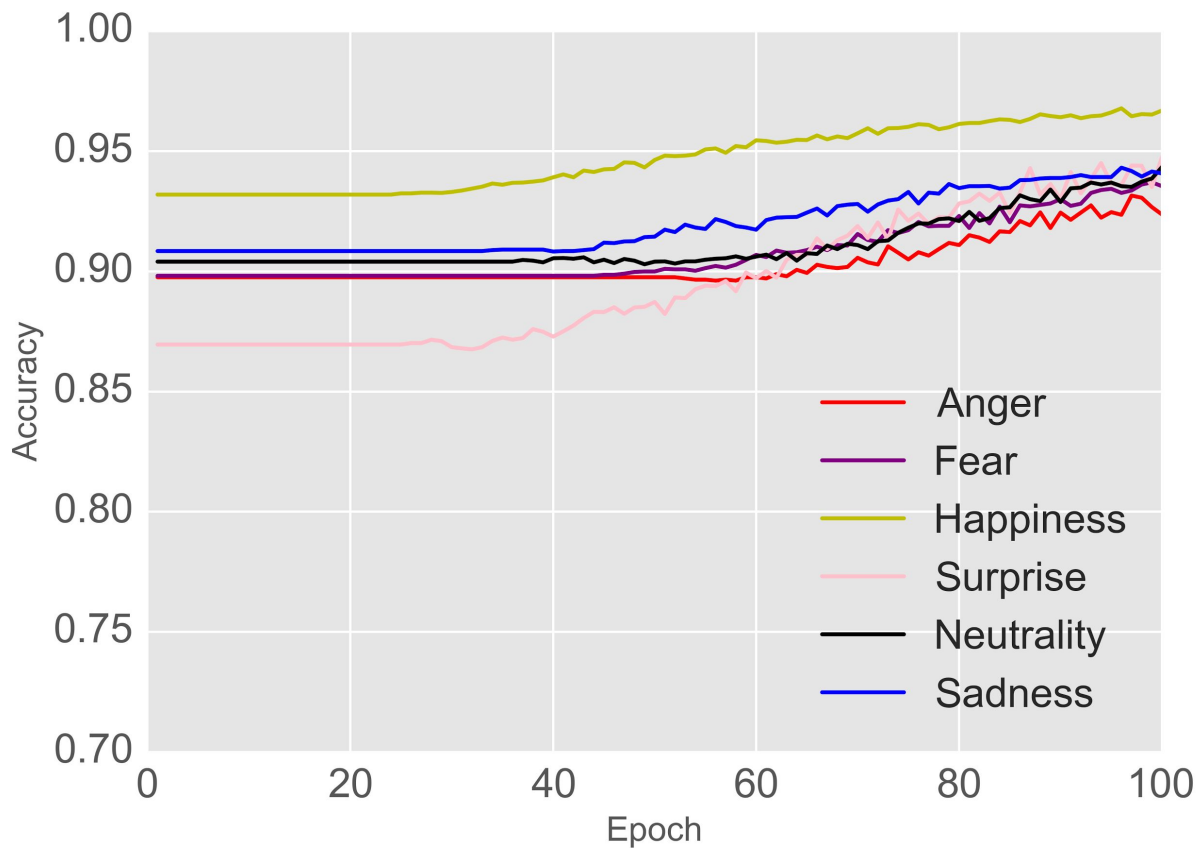




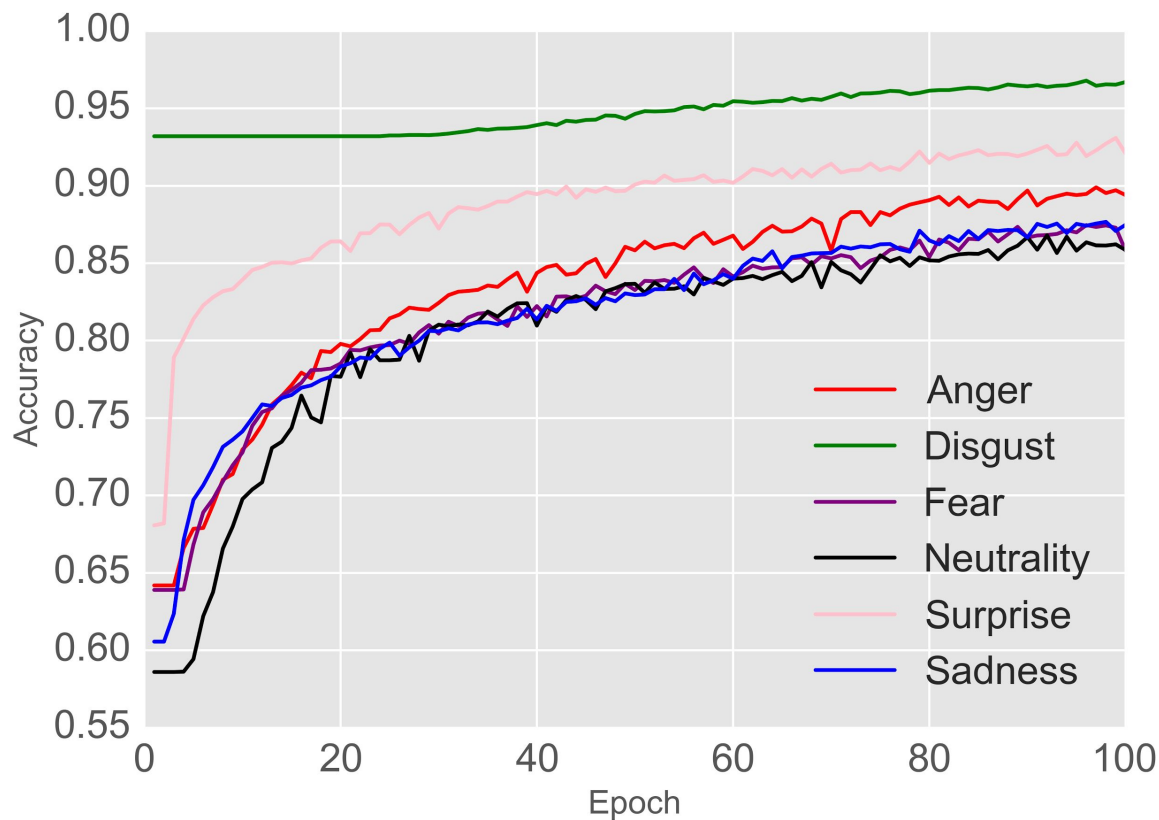
Validation Curves for CNN Classifying Happy vs Disgust



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

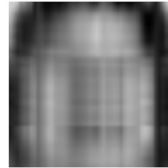
2 PCs: 71.39%



2 PCs: 59.69%



2 PCs: 62.90%



2 PCs: 73.90%



5 PCs: 87.51%



5 PCs: 86.53%



5 PCs: 85.35%



5 PCs: 90.12%



10 PCs: 98.57%



10 PCs: 99.16%



10 PCs: 97.64%



10 PCs: 98.47%



20 PCs: 99.44%



20 PCs: 99.73%



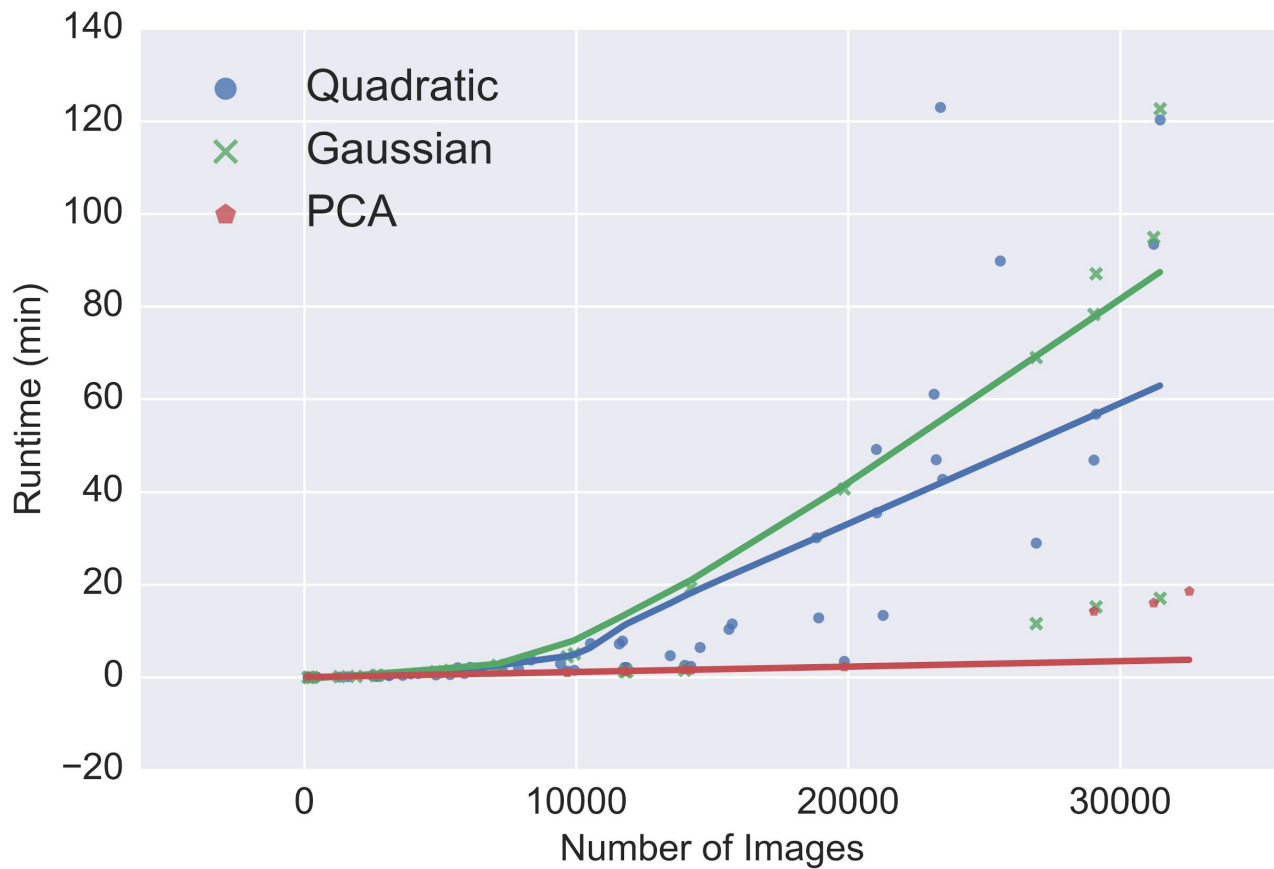
20 PCs: 98.98%



20 PCs: 99.35%



Speed of SVM and PCA



Tools



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

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