Robot Vision

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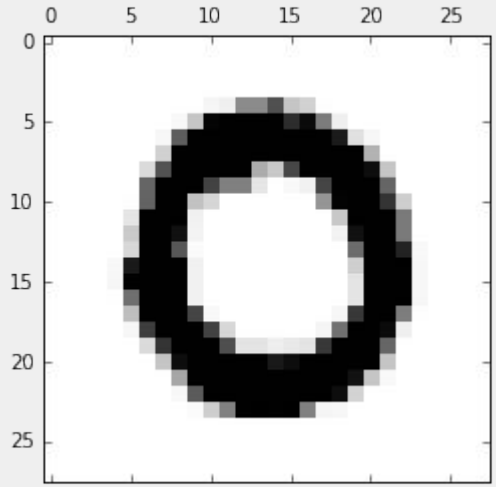
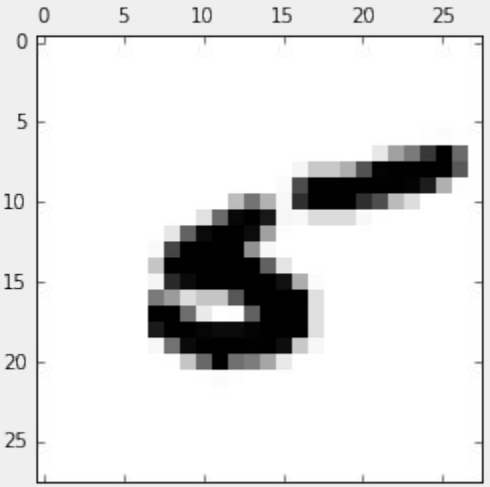
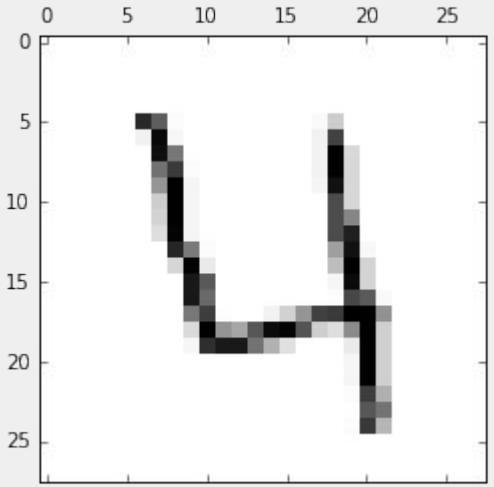
Michael Lai

Goal

Predict Numbers ~ Consider Speed and Accuracy

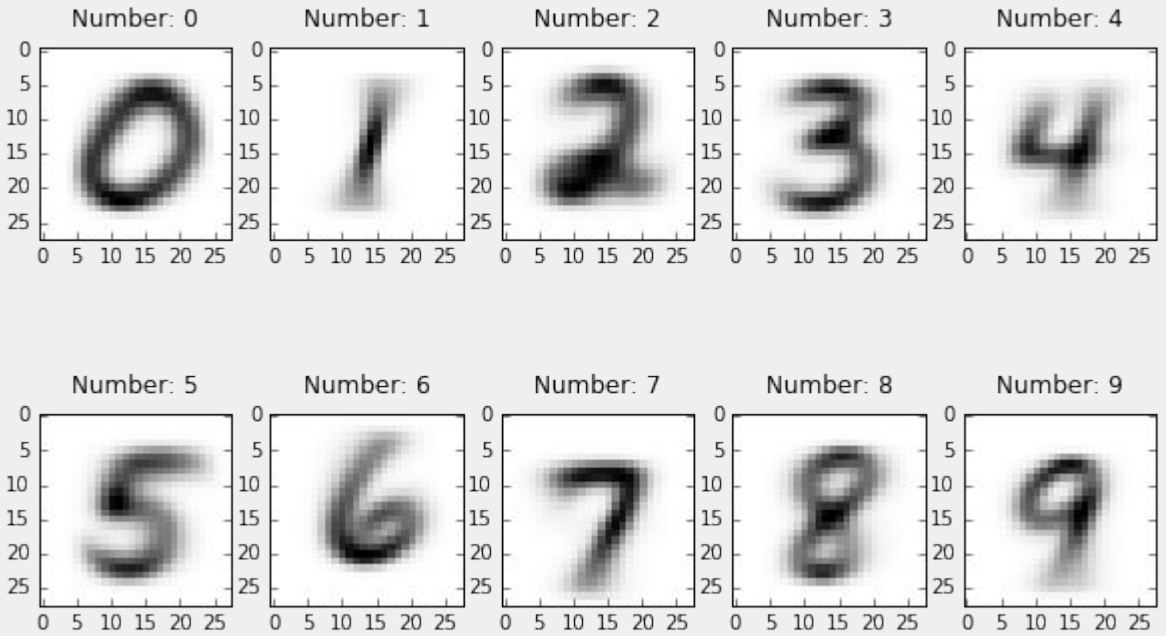






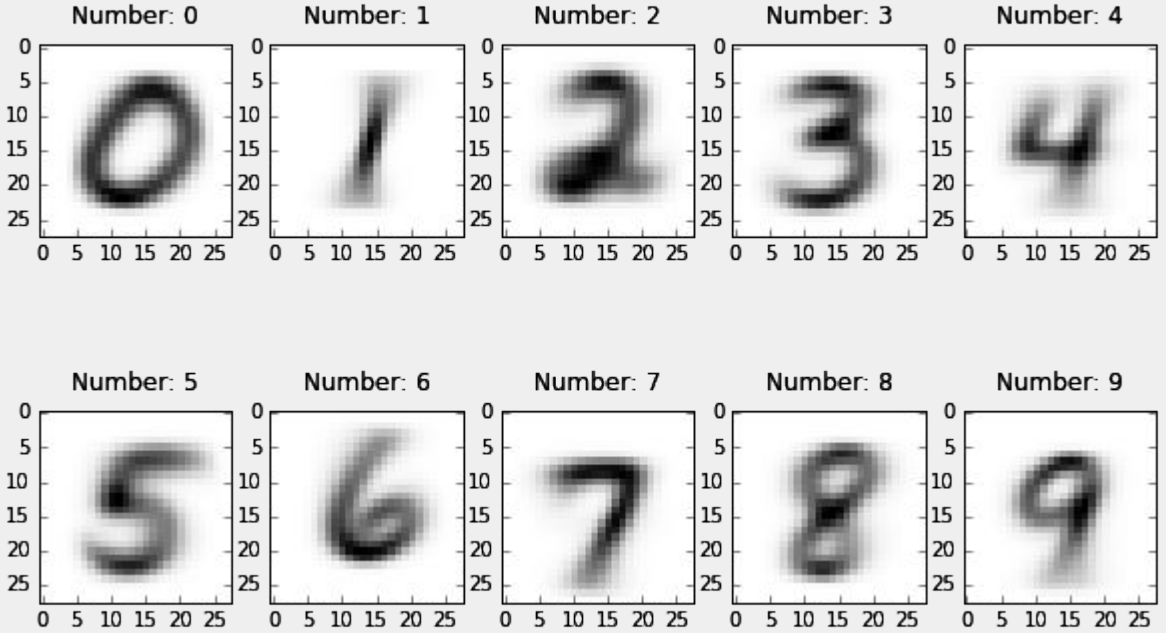
Data Details

- MNIST Data Set
- 42,000 Images
- Handwritten
- Labeled 0-9



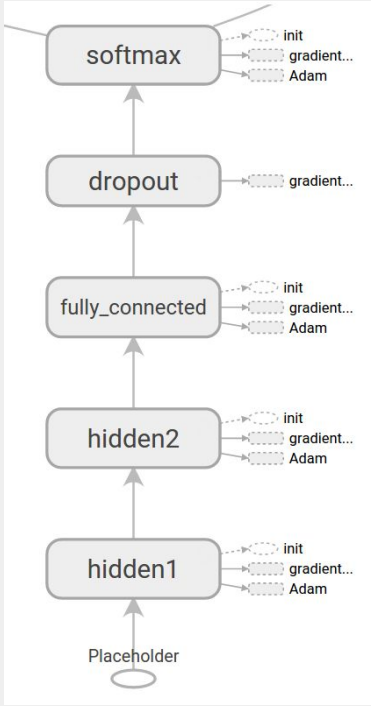
Methods: K Nearest Neighbors

- Pros
  - Fast Training
  - Interpretability
- Cons
  - Pre-Processing
    - Rotation
    - Bounding Box
  - Accuracy (97%)
  - Slow Predictions



Methods: Convolutional NN with TensorFlow

- Pros
  - Accuracy (99+%)
  - Quick Predictions
- Cons
  - Interpretability
  - Slow Training



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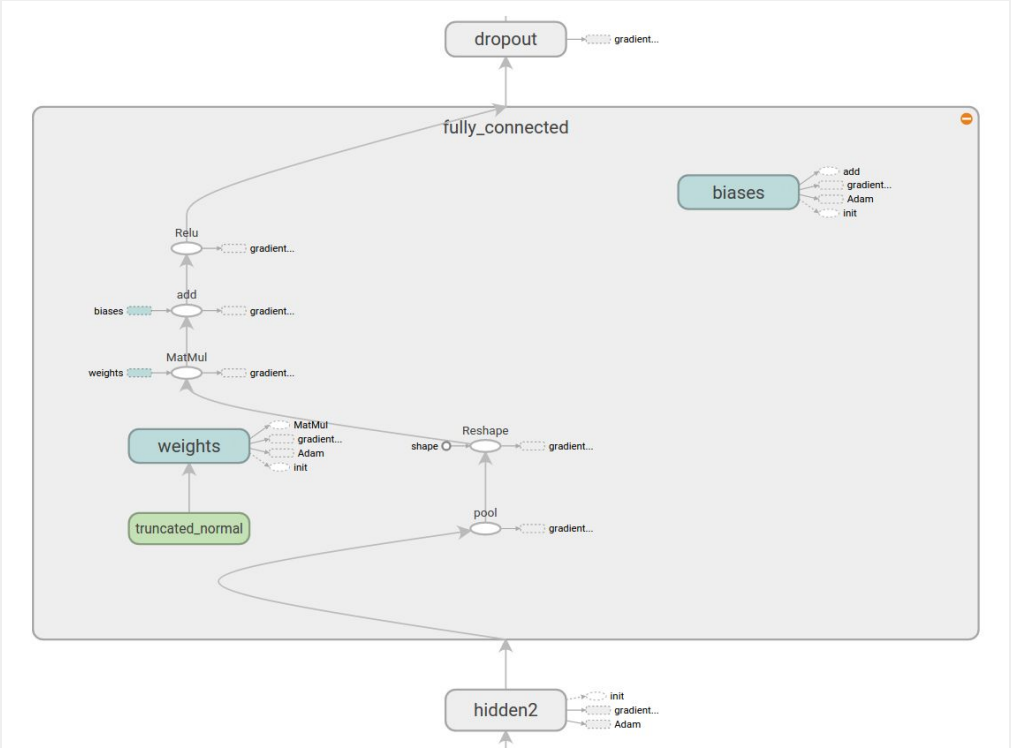
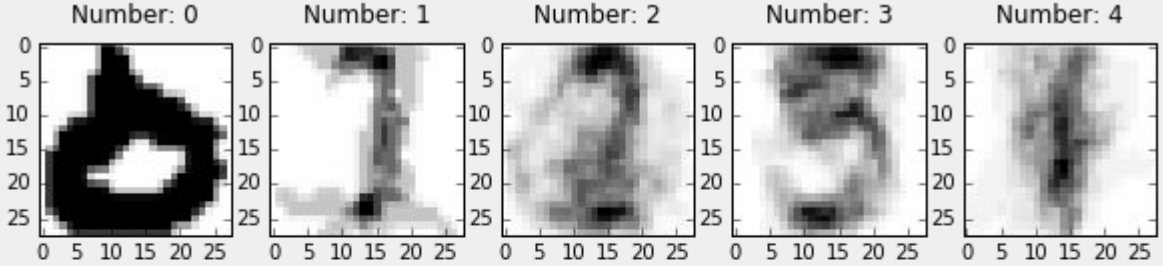
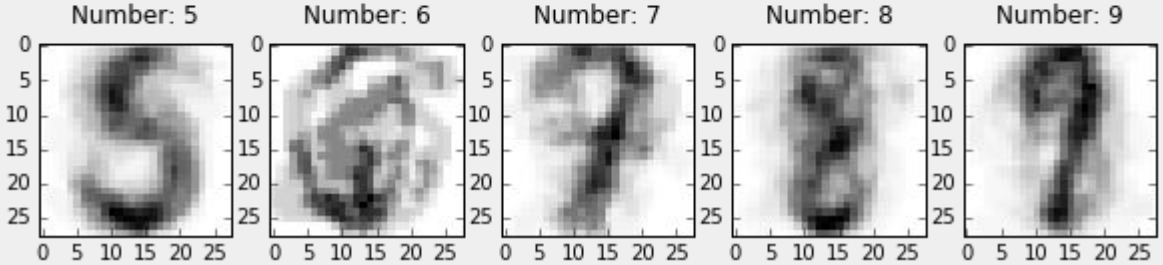


Results: K Nearest Neighbors

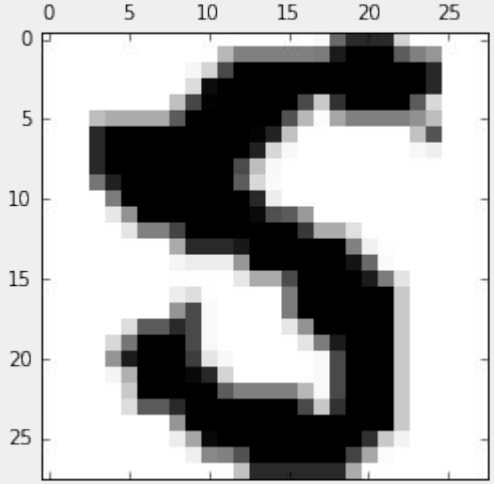
Averages of Incorrect Classification



Overall Accuracy 97%

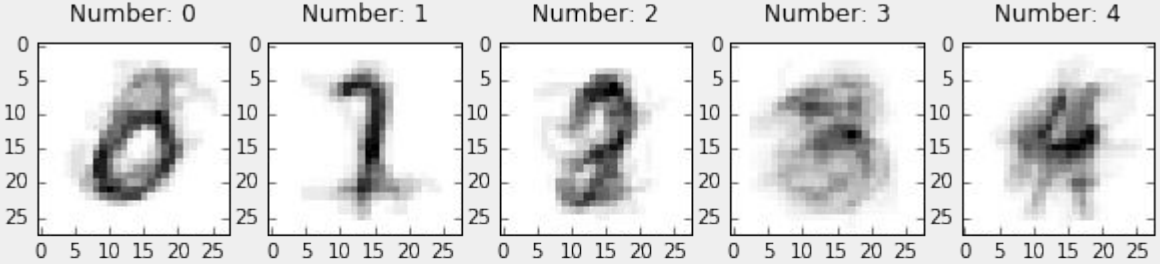


Actually: 5 Predicted: 6



Results: Convolutional Neural Network

Averages of Incorrect Classification



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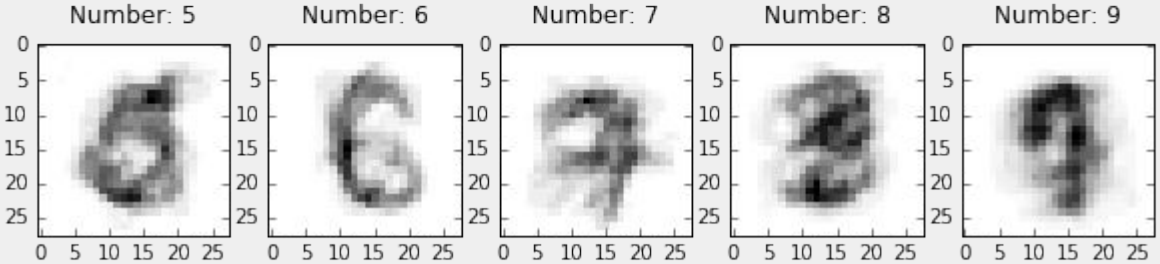
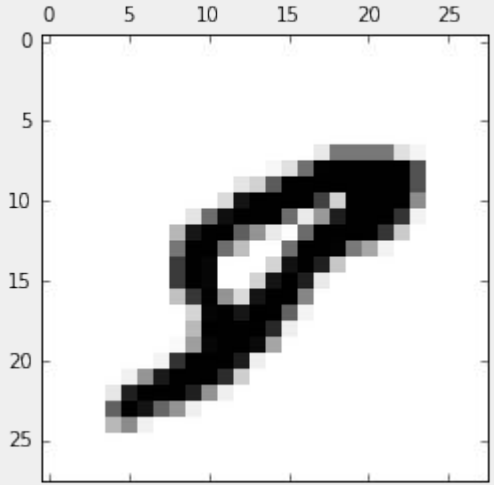
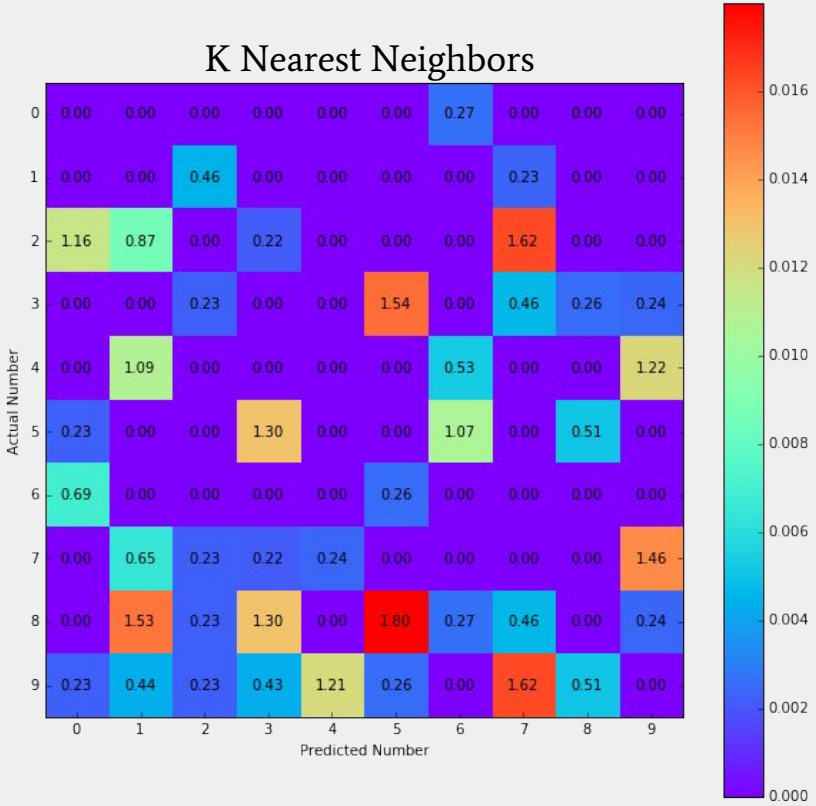


Actually: 8 Predicted: 9

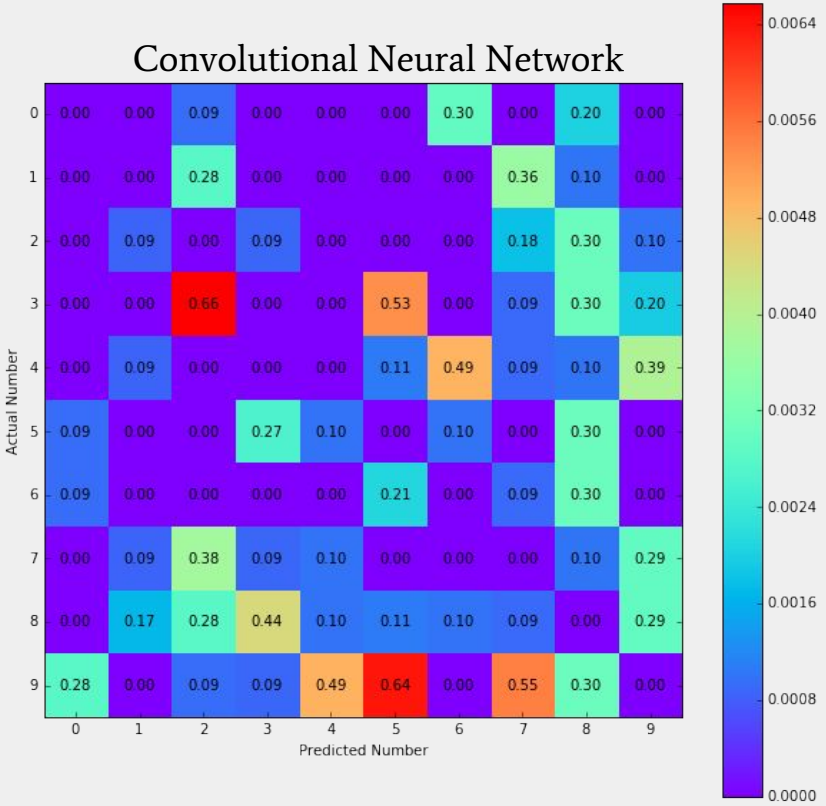


Results: Confusion

K Nearest Neighbors



Convolutional Neural Network



Decision

Use Neural Networks

99% Accuracy

66% Fewer Errors Compared to KNN

Quick Prediction Speed