

Project Update 1

Timeline Given in Initial Proposal

November 4th: K-Nearest Neighbor algorithm completed

November 17th: Project Update with K-Nearest Neighbor complete, Least Squares nearing completion

November 20th: Least squares Algorithm Complete (This will line up with when we are learning neural networks so starting neural networks at this point makes sense).

December 4th: Neural Network Complete

December 8th: Any additional cross-validation, statistics of error rate and comparison between algorithms complete.

December 12th: Final Report Due

Done

In Progress

Not Started

Current Project Overall Status

Link to github page where notebooks with results can be found:

https://github.com/mgiordano12/ece532_final_project

Pre-Processing

- Same for KNN and Least Squares
- Took first 712 singular values to represent the MNIST image based on seeing a drop-off in significance in singular values from the chart below.
- Trained on SVD-reconstructed data based on 712 singular values

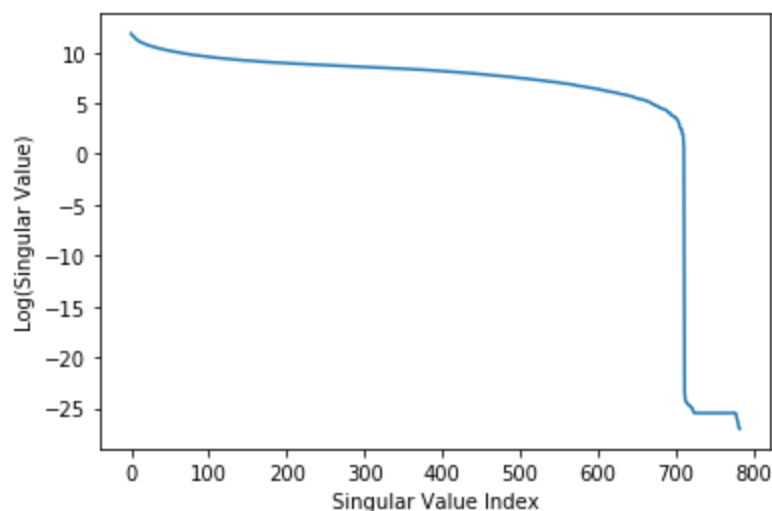


Figure 1: Graph of SVD Value vs. Index for 784 Pixels in MNIST Images Training Data

KNN

- Complete, error rates of [0.0309, 0.0309, 0.0338, 0.0347, 0.0396] for values of $k = [1, 5, 9, 13, 27]$

Least Square with Regularization

- Complete, minimum error rate of .1424 for $\lambda = 10e7$
 - λ 10e-7 through 10e9 were evaluated
 - Most error rates for λ were $\sim .147$

Todo Prior to Next Update on December 1st

- Write most of the Neural Network

Todo Before Final Submission

- Complete Neural Network
- Cross-Validation
- Comparison of Algorithms
- Clean-up Code
- Write Report