

# Project Proposal

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## Overview:

This project is aimed to use three different types of classification algorithms to classify images which contain binary images of handwritten digits. The dataset is a bench mark dataset of MNIST. The classification algorithms are least squares algorithm, SVM and Neural Networks.

## Project Dataset:

In this project, the MNIST dataset is used to do the classification. The link of the dataset is <http://yann.lecun.com/exdb/mnist/>. The training set has 60,000 examples. The testing set has 10,000 examples. Each example has a 28 by 28 pixel grayscale handwritten digital image and corresponding labels from 0 to 9. The image pixel value is from 0 to 255. The 60,000 pattern training set contained examples from approximately 250 writers. And the testing set is written by disjoint writers. The first 5000 testing data is cleaner and easier than the last 5000. The goal of the project is to use the training data set with different classification algorithms to train the classifier, to let to classifier can classify the handwritten digital image with an output of 0 to 9.

## Algorithms that will be investigated:

I plan to use the following three types of classification algorithms to train the classifier: least squares methods, SVM and Neural Networks with 2-5 layers. In the data set, each image has 28\*28 pixels of which the value is from 0 to 255 and a label from 0 to 9, which can be used to train the model. The pixel value is used to be the feature. Since we have the testing data set, I plan to use it to evaluate the performance of the different algorithms. By comparing the classification error rates of the algorithms, we can obtain the final performance estimate.

## Project Github:

The link of project github page is <https://github.com/Jiaqichengood/ECE532-Project>.

## Project timeline:

- Oct 22<sup>nd</sup>: Project starts.
- Nov 17<sup>th</sup>: Research on the implement of the algorithms to the project. Finish the first update of the project.
- Nov 20<sup>th</sup>: Finish the classifier design using the least square algorithm and the SVM.
- Dec 1<sup>st</sup>: Finish the second update of the project.
- Dec 5<sup>th</sup>: Finish the classifier design using the Neural Networks.
- Dec 12<sup>th</sup>: Compare the performance of different algorithms. Finish the final project report.
- Dec 12<sup>th</sup>: Review of two projects from the peers.