Exploration of Digit Recognition Algorithms

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1 Proposal

We will explore several different algorithms to determine hand-written digits. Given an image of a hand-written digit, we will attempt to classify the image as a digit between 0 - 9. We will attempt to determine the classification by both support vector machines an k nearest neighbor algorithms. We will adjust any regularization constants by cross validation.

Our initial implementation will only attempt to classify images of a single digit. If successful, and time allowing, we will attempt to classify more complex numerical data such as: fractions, decimals and mathematical operators. A stretch goal is to evaluate a simple mathematical expression based on the input image.

1.1 Dataset

We will be using the Kaggle dataset provided for the Digit Recognizer competition.

1.2 Required Software Solutions

We will write the algorithms required from scratch. We will implement SVM and K-NN algorithms. We will, if we have time, implement a cross validation algorithm to determine regularization constants and to optimize our algorithms.

1.3 Relevant Papers

1. Plamondon, R, and S.N Srihari. "Online and Off-Line Handwriting Recognition: a Comprehensive Survey." Ieee Transactions on Pattern Analysis and Machine Intelligence. 22.1 (2000): 63-84. Print.
2. Jain,Gaurav and Ko, Jason. "Handwritten Digits Recognition", http://individual.utoronto.ca/gauravjain/ECE462-HandwritingRecognition.pdf, 2008

1.4 Team Members

We will be working in a group of two. The team members that comprise this group are:

- Harnoor Singh
- Brian Walker

1.5 Milestone

For the milestone we will have one of the algorithms implemented to completion with some basic benchmark results. We intend to complete the SVM algorithm first since it seems to be the harder of the two algorithms. We will also have some preliminary graphs showing the results from the benchmark data provided by Kaggle.