

Engineering Track: Final Project Proposal

B351

Basic Information:

Project Title: Handwriting Recognition Calculator (E.g. A simplified version of MyScripts calculator)

Team Members for Group 6:

1. Carson Crick
2. Ryan Williams

Problem Space Engineering:

1. Describe the problem space. What are the objectives, challenges, and constraints? What are some of the variations found in the problem space?

Objectives:

Create a program that can visually detect hand-written numbers (0-9) and a select few of hand-written mathematical symbols (e.g. +,-,/,*) to function as a calculator.

Challenges/Constraints:

Our challenges/constraints would be the amount of data we can store, efficiency with larger functions, classifying different handwriting styles and different ways of writing symbols/numbers, and the space to which the user can write numbers/symbols on.

2. What are some historical attempts to tackle the problem space? Include links and references where appropriate.

Multiple apps and websites have done this such as Mathway, MyScript Calculator, Photomath, SnapCalc

Algorithms Engineering

1. What solution are you proposing? How will this compare to historical approaches?

We are going to use the MNIST data set to train our classifier to identify written numbers. We are going to create a training set of data of symbols to train our program to identify user intent for written symbols. We are going to use a K-NN algorithm to classify the data given. Historically other programs use deep learning with neural networks to do the handwriting recognition software.

2. What algorithms will you implement? Include links and references where appropriate.

We will be using a K-NN classifier algorithm to classify numbers and symbols.

Third-Party Libraries and Technologies:

1. What technology will you be using?

Photoshop, Visual Studio Code/PyCharm, GitHub, Google docs.

2. What will it be used for / how will it assist you in your project?

Photoshop will be used to create our training/test data by drawing symbols pixel by pixel. For numbers, we will be using the MNIST data set.

3. How will you demonstrate your knowledge of the topic area despite off-loading work to the third-party technology?

We are using third party libraries right now to make getting and dealing with data easier. For example, we are using the python-mnist package to easily format the MNIST data. We will be creating our own K-NN classifier to classify the data. We might use third party classifiers to see how our classifier performs against others, but we will use our classifier for our calculator's function.

C-range Goals:

Our software will just be able to recognize numbers (0-9) and will not have a calculator functionality.

B-range Goals:

Our software can detect numbers (0-9) and symbols (*, /, +, -) and be able to work as a simple calculator.

A-range Goals:

Our software would be able to recognize multiple digit numbers (e.g. 100, 5556, .001), positive and negative numbers, multiple symbols (*, /, %, +, -, (), .), and work as a functioning calculator.

Timeline:

- First Week:
Complete all of our testing/training data. Start testing with our classifier.
- Second Week:
Have a basic calculator working.
- Third Week:
Start and finish our paper draft. Implement multiple digit numbers and more operations.
- Fourth Week:
Start and complete our presentation and paper.

Acknowledgement:

Instructor Mentor 1: _____

Signature: _____

Instructor Mentor 2: _____

Signature: _____

Team Member 1: Carson Crick

Signature: *Carson Crick*

Team Member 2: Ryan Williams

Signature: *Ryan Williams*