ENGR 421 – HW2 – Report

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Implementation:

First of all, I assigned every images in hw02\_data\_set\_images.csv and labels in hw02\_data\_set\_labels.csv to training sets and test sets. The training set has the first 25 images and labels of each class and the test set has the remaining 14 images and labels.

After that, because of the labels are in alphabetical order, I assigned all of the letters to numbers. I assigned A as 1, B as 2, C as 3, D as 4 and E as 5.

Later, I created the y\_truth as a 5-column matrix and assigned each column according to the numbers in the label train set.

Then, I implemented the sigmoid function and defined gradient functions for w and w0 variables. I assigned random initial values for w and w0, which w is a 5-column matrix and w0 is a 5-row vector, because I assigned my y\_truth matrix with 5 columns.

In the iteration I used the function from Lab 3. First, I predicted y values for the train data using the sigmoid function. Then, I updated the objective values array. Then, I assigned new w and w0 using the gradient functions, and last increased the iteration.

Graphical user interface, application

Description automatically generated

Last, I plotted the errors on the iterations and the result is in the left.

Graphical user interface, application

Description automatically generated

After the plot, I calculated the confusion matrix for the train data and the result is in the left.

Graphical user interface, application

Description automatically generated

Last but not least, I predicted the y values for the test data using the sigmoid function. Then, I calculated the confusion matrix for the test data and the result is in the left.