Project Part 3:Classification Using Neural Networks

and Deep Learning

Objective:

In this project, the main objective is to implement a convolutional neural network to predict handwritten digits using MNIST data.

The main tasks are

1. Run the baseline code and report the accuracy.
2. Changing the kernel size to 5x5, plotting the learning errors along with epoch and report the testing error and accuracy on the test set.
3. Changing the number of feature maps in the first and second convolutional layers, plot the corresponding learning errors and report the testing error and accuracy on the test set.

Running the Baseline Code:

Running the baseline code gave the results as below

Test loss: 0.04259344731596702

Test accuracy: 0.99

Changing the kernel size to 5x5 :

Current Kernel size-5x5

Feature maps in the first convolutional layer: 6

Feature maps in the second convolutional layer: 16
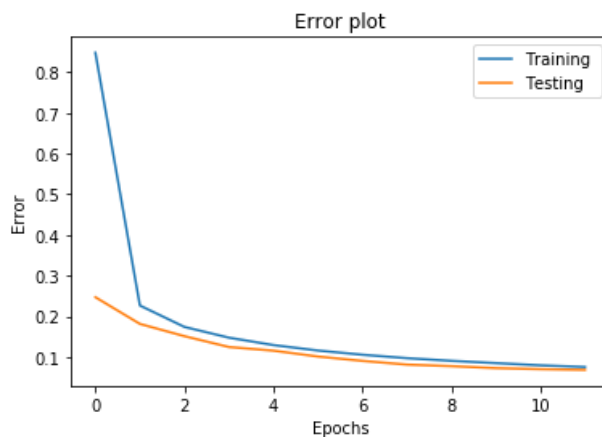
The results are as below

Fig1: Error Plot with kernel 5x5

Test loss: 0.06875620720013977

Test accuracy: 0.978

Changing the Feature Maps and Keeping Kernel Size 3x3 :

Current Kernel size-3x3

First Layer has feature maps 16

Second Layer has feature maps 32
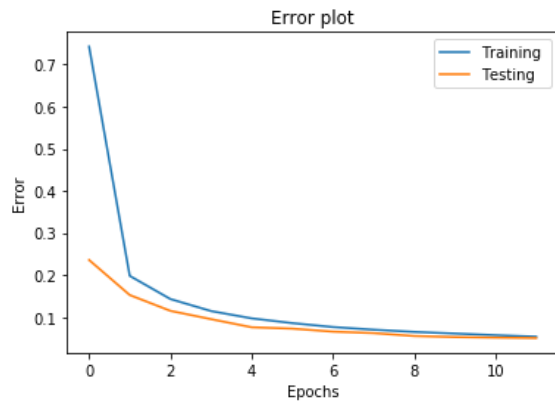
The results are as below

Fig2: Error Plot with changed feature maps

Test loss: 0.05015322856041603

Test accuracy: 0.9828

Changing the Feature Maps and Kernel Size to 5x5 :

Current Kernel size-5x5

First Layer has feature maps 16

Second Layer has feature maps 32
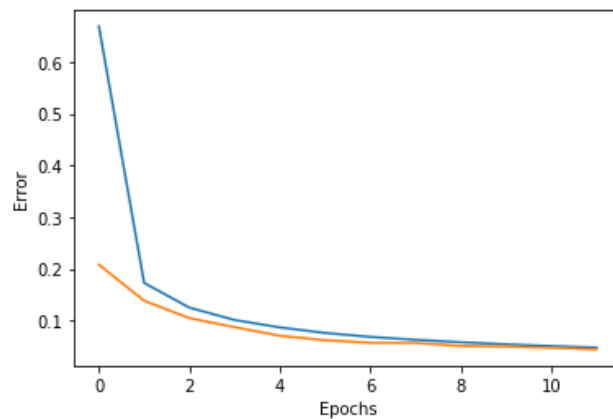
The results are as below

Fig2: Error Plot with changed feature maps

Test loss: 0.04413080759318545

Test accuracy: 0.9871