SML Assignment-4 Report

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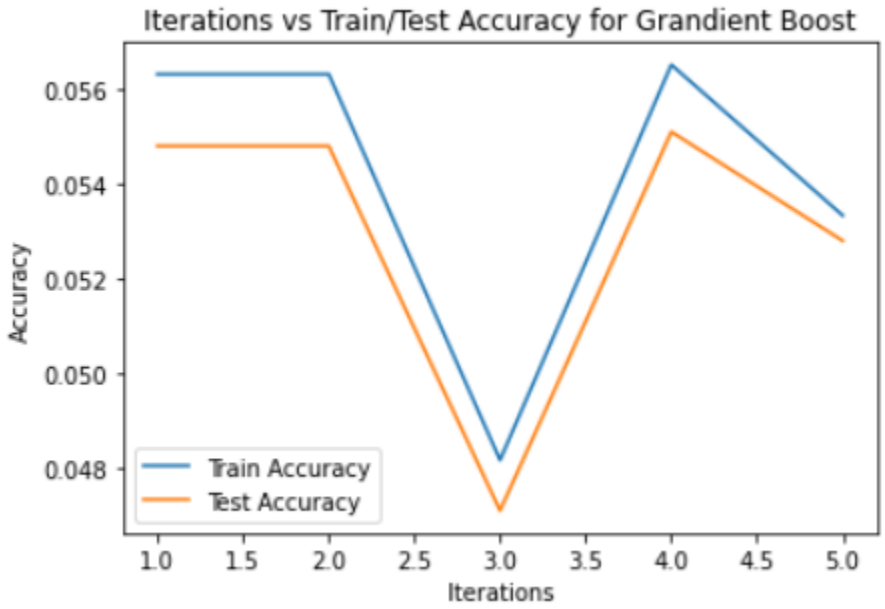
Question 1 -

Assumptions -
learning rate = 0.1 (given)
max iterations = 5 (given)
max depth of base model = 1 (given)



Test Accuracy - 5%

```
Final test accuracy = 0.0528
```

Question 2 -

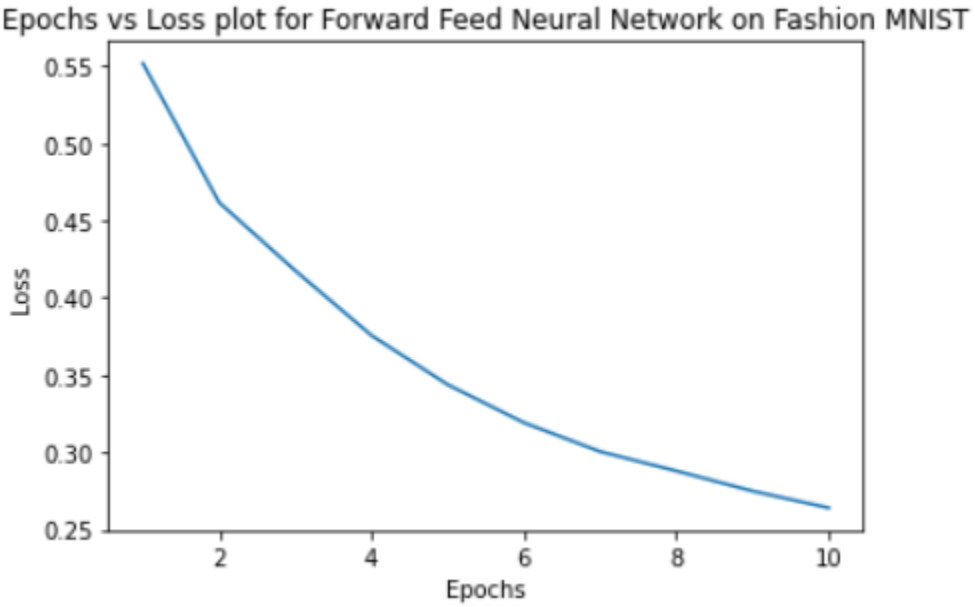
The architecture used by me - 1 input layer, 2 hidden layers, 1 output layer

```
NeuralNetwork(
  (fc1): Linear(in_features=784, out_features=512, bias=True)
  (fc2): Linear(in_features=512, out_features=256, bias=True)
  (fc3): Linear(in_features=256, out_features=64, bias=True)
  (fc4): Linear(in_features=64, out_features=10, bias=True)
)
```

Weight initialisation via Xavier

Hyperparameters used -

```
epochs = 10
learningRate = 0.05
batchSize = 128
```



Test Accuracy - 87%

```
Test Accuracy: 0.8713
```

Class Wise Accuracies -

```
Class Wise Accuracy:
class 1 : 0.86
class 2 : 0.967
class 3 : 0.722
class 4 : 0.902
class 5 : 0.826
class 6 : 0.979
class 7 : 0.614
class 8 : 0.936
class 9 : 0.975
class 10 : 0.932
```

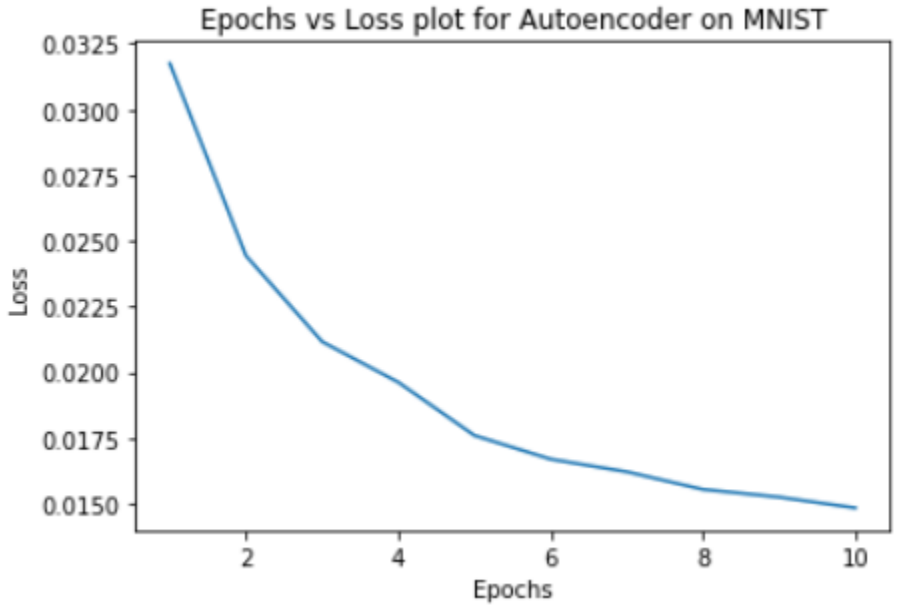
Question 3 -

Loss plot for autoencoder -

I used MSE loss because the encoding is done of input and output should be as close as possible and that can be done best using MSE as the loss is more in MSE because of the square used.

Hyperparameters -

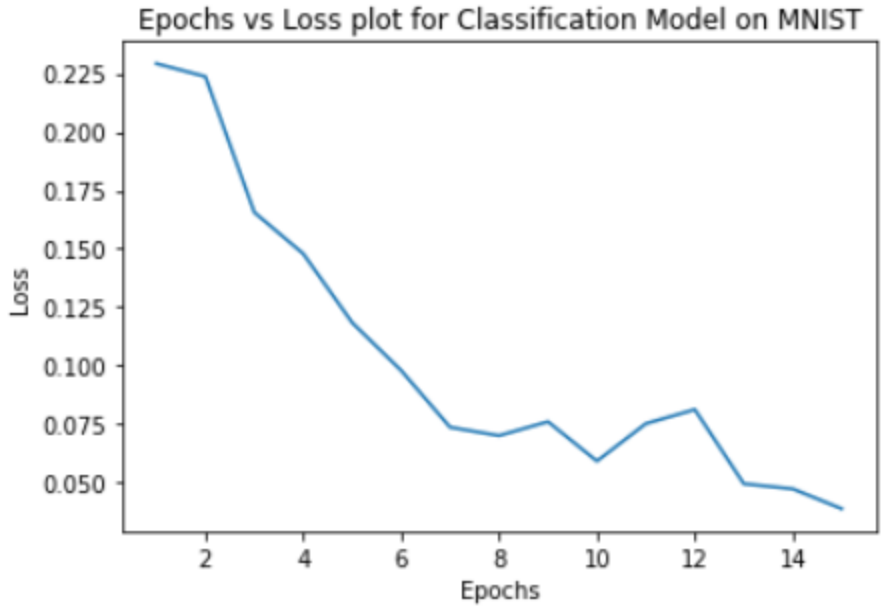
```
epochs = 10
learningRate = 0.001
batchSize = 128
```



Loss plot for Classification Model -

Hyperparameters -

```
epochs = 15
learningRate = 0.001
batchSize = 128
```



Test Accuracy - 98.2%

```
Test Accuracy: 0.9829
```

Class-Wise Accuracy -

```
Class-Wise Accuracy:
class 1 : 0.9908163265306122
class 2 : 0.9876651982378855
class 3 : 0.9874031007751938
class 4 : 0.9861386138613861
class 5 : 0.9796334012219959
class 6 : 0.9876681614349776
class 7 : 0.9770354906054279
class 8 : 0.9863813229571985
class 9 : 0.9691991786447639
class 10 : 0.9762140733399405
```

Question 4 -

Test Accuracy = 90%

```
Test Accuracy: 0.9008
```

Class-Wise Accuracy -

```
class 1 : 0.9704081632653061
class 2 : 0.9779735682819384
class 3 : 0.8914728682170543
class 4 : 0.8891089108910891
class 5 : 0.9124236252545825
class 6 : 0.8632286995515696
class 7 : 0.8966597077244259
class 8 : 0.9105058365758755
class 9 : 0.8162217659137577
class 10 : 0.865213082259663
```