



CPSC 6420 – ARTIFICIAL INTELLIGENCE

Project 6

C14109603

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Digit Classification:

Parameters:

Epoch Value = 20

Batch size = 64

Learning rate = 0.1

Test error rate = 0.0214

Test accuracy = 0.9786

Train accuracy = 0.9926

Train loss = 0.0188

Validation accuracy = 0.9810

Validation loss = 0.0874

Hidden layer 1 size is 150.

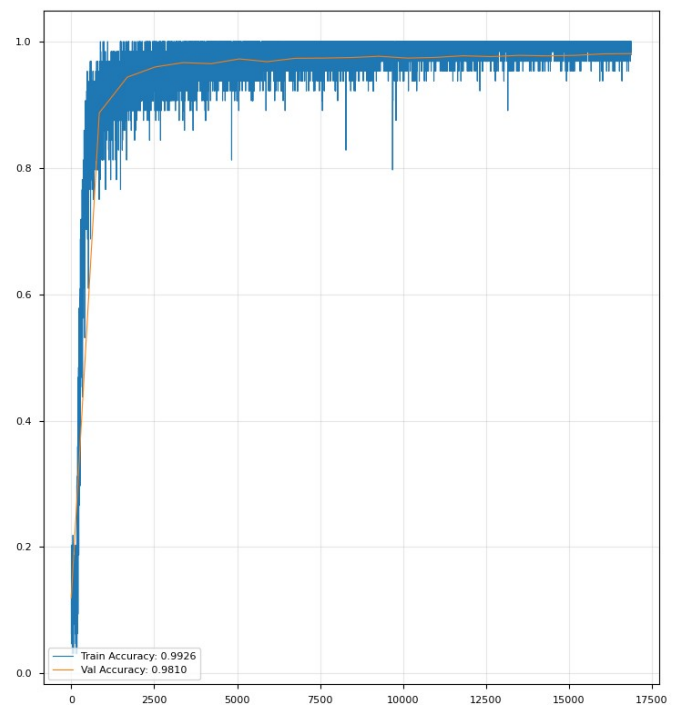
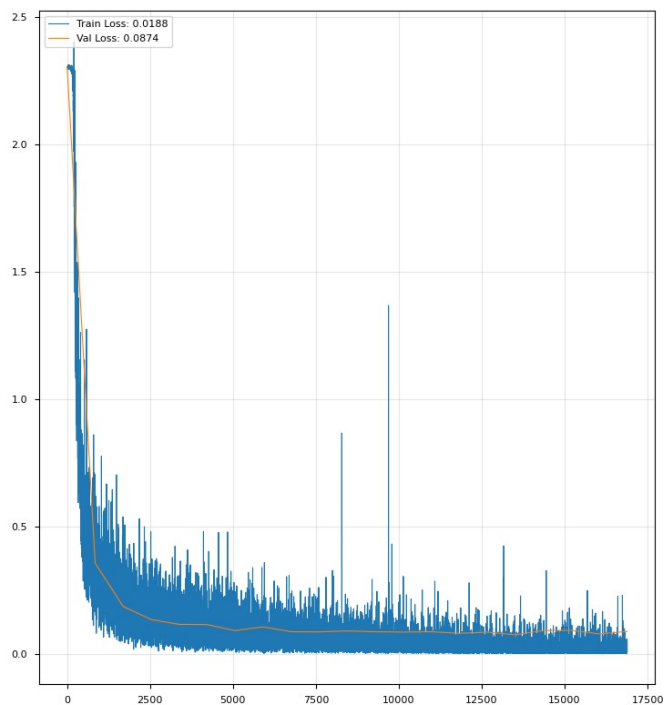
Hidden layer 2 size is 200.

b, b1 and b2 is initialized as 0.

w, w1 and w2 are initialized as random value between range -0.01 to 0.01.

Results:

Epoch: 20, Step: 845



Anaconda Prompt (Anaconda) - python D:\arti_intel\Assignments\Project6\project6\model.py

Number of classes: 10

Train...

Epoch: 1/20

54016/54000 [=====] - ETA: 59s - loss: 1.0549 - acc: 0.6169 - val_loss: 0.3556 - val_acc: 0.8872

Epoch: 2/20

54016/54000 [=====] - ETA: 59s - loss: 0.2589 - acc: 0.9189 - val_loss: 0.1856 - val_acc: 0.9437

Epoch: 3/20

54016/54000 [=====] - ETA: 60s - loss: 0.1679 - acc: 0.9468 - val_loss: 0.1343 - val_acc: 0.9598

Epoch: 4/20

54016/54000 [=====] - ETA: 61s - loss: 0.1331 - acc: 0.9575 - val_loss: 0.1153 - val_acc: 0.9667

Epoch: 5/20

54016/54000 [=====] - ETA: 62s - loss: 0.1087 - acc: 0.9650 - val_loss: 0.1144 - val_acc: 0.9650

Epoch: 6/20

54016/54000 [=====] - ETA: 64s - loss: 0.0928 - acc: 0.9692 - val_loss: 0.0906 - val_acc: 0.9725

Epoch: 7/20

54016/54000 [=====] - ETA: 63s - loss: 0.0794 - acc: 0.9741 - val_loss: 0.1054 - val_acc: 0.9682

Epoch: 8/20

54016/54000 [=====] - ETA: 63s - loss: 0.0684 - acc: 0.9764 - val_loss: 0.0863 - val_acc: 0.9735

Epoch: 9/20

54016/54000 [=====] - ETA: 63s - loss: 0.0608 - acc: 0.9788 - val_loss: 0.0856 - val_acc: 0.9738

Epoch: 10/20

54016/54000 [=====] - ETA: 66s - loss: 0.0568 - acc: 0.9808 - val_loss: 0.0894 - val_acc: 0.9747

Epoch: 11/20

54016/54000 [=====] - ETA: 67s - loss: 0.0487 - acc: 0.9826 - val_loss: 0.0864 - val_acc: 0.9767

Epoch: 12/20

54016/54000 [=====] - ETA: 69s - loss: 0.0477 - acc: 0.9833 - val_loss: 0.0849 - val_acc: 0.9738

Epoch: 13/20

54016/54000 [=====] - ETA: 70s - loss: 0.0380 - acc: 0.9859 - val_loss: 0.0864 - val_acc: 0.9748

Epoch: 14/20

54016/54000 [=====] - ETA: 68s - loss: 0.0349 - acc: 0.9872 - val_loss: 0.0801 - val_acc: 0.9775

Epoch: 15/20

54016/54000 [=====] - ETA: 70s - loss: 0.0289 - acc: 0.9894 - val_loss: 0.0846 - val_acc: 0.9762

Epoch: 16/20

54016/54000 [=====] - ETA: 70s - loss: 0.0285 - acc: 0.9894 - val_loss: 0.0743 - val_acc: 0.9782

Epoch: 17/20

54016/54000 [=====] - ETA: 67s - loss: 0.0229 - acc: 0.9912 - val_loss: 0.0909 - val_acc: 0.9773

Epoch: 18/20

54016/54000 [=====] - ETA: 67s - loss: 0.0232 - acc: 0.9909 - val_loss: 0.0920 - val_acc: 0.9782

Epoch: 19/20

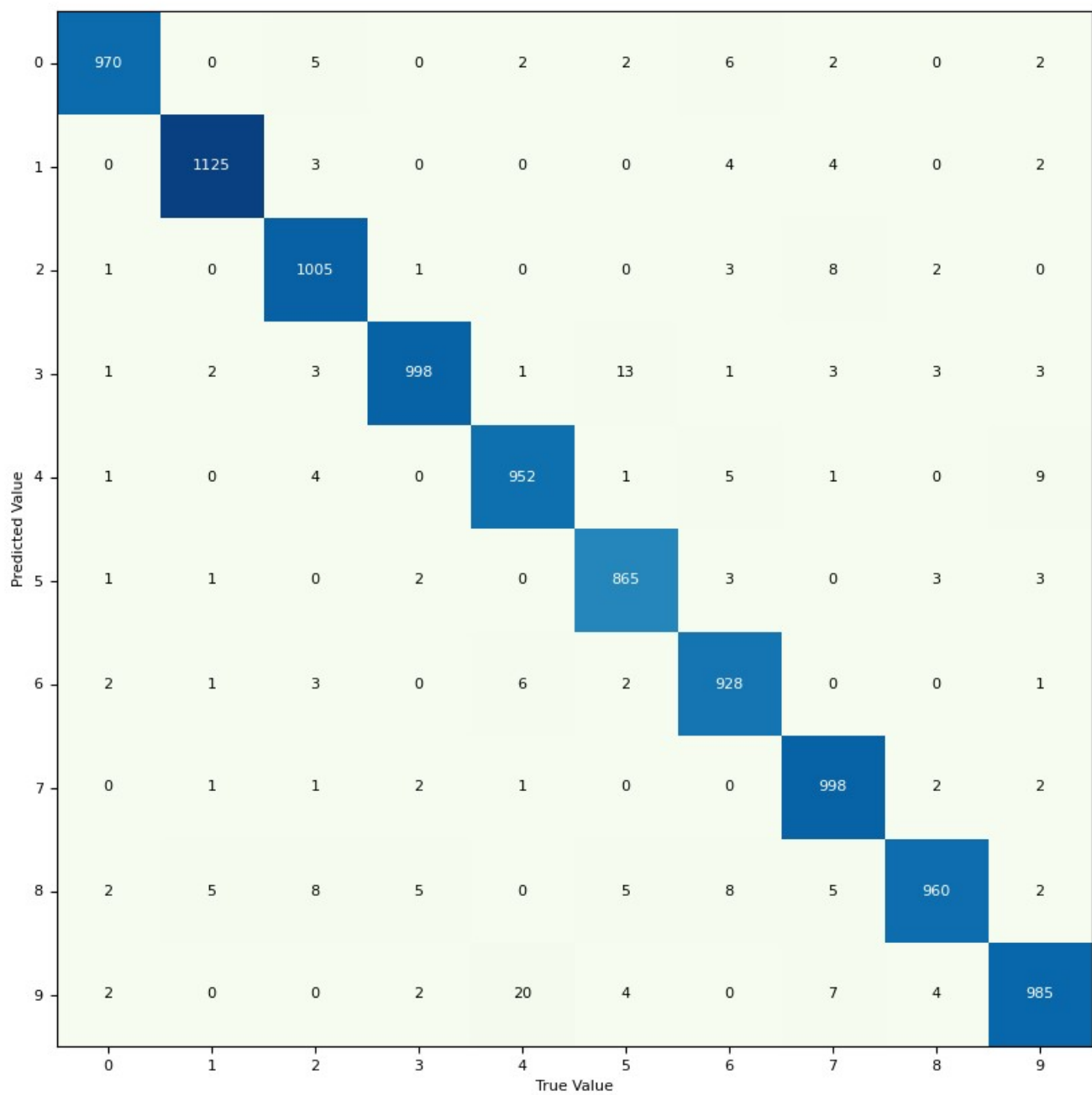
54016/54000 [=====] - ETA: 67s - loss: 0.0193 - acc: 0.9926 - val_loss: 0.0778 - val_acc: 0.9805

Epoch: 20/20

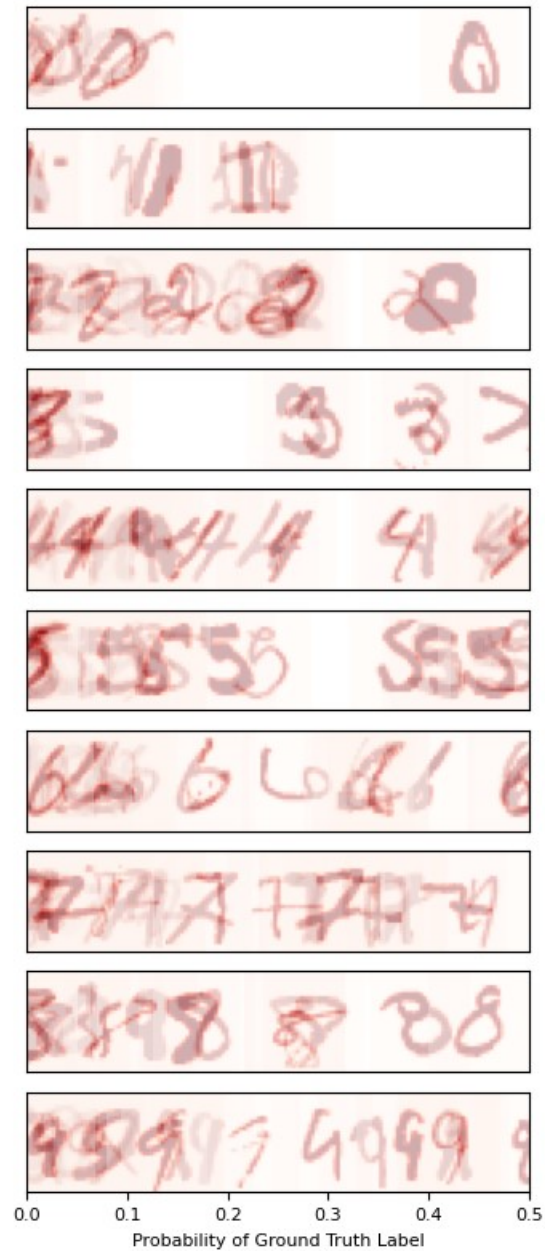
54016/54000 [=====] - ETA: 69s - loss: 0.0188 - acc: 0.9926 - val_loss: 0.0874 - val_acc: 0.9810

Test...

Test Accuracy: 0.9786



Test Error Rate: 0.0214



Letter Classification:

Parameters:

Same as the first one.

Test error rate = 0.0648

Test accuracy = 0.9352

Train accuracy = 0.9643

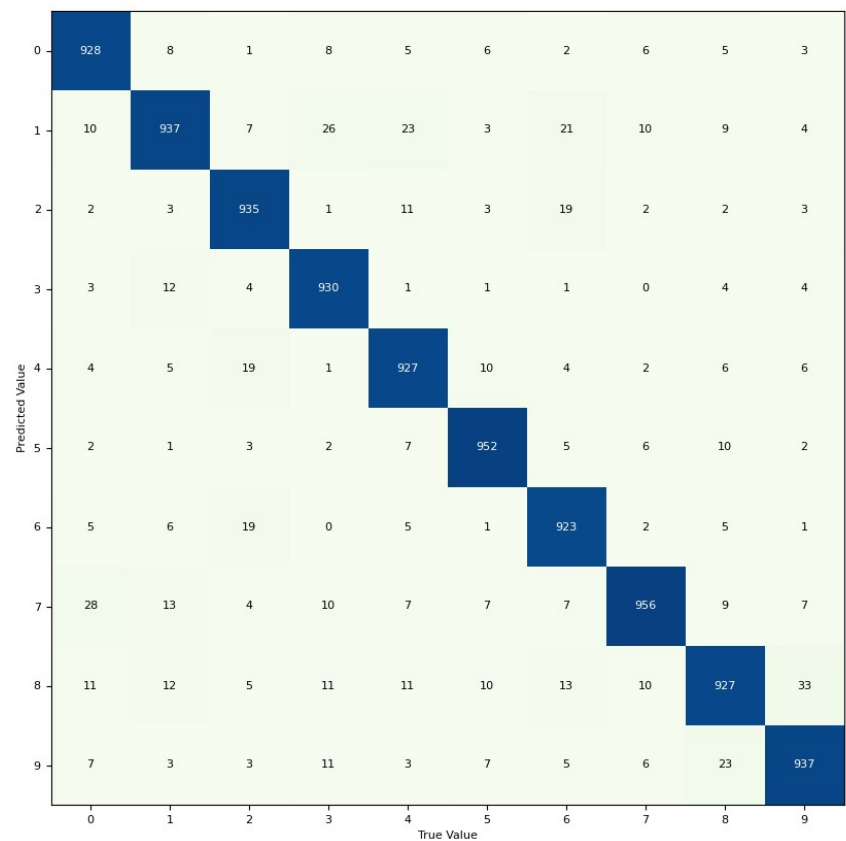
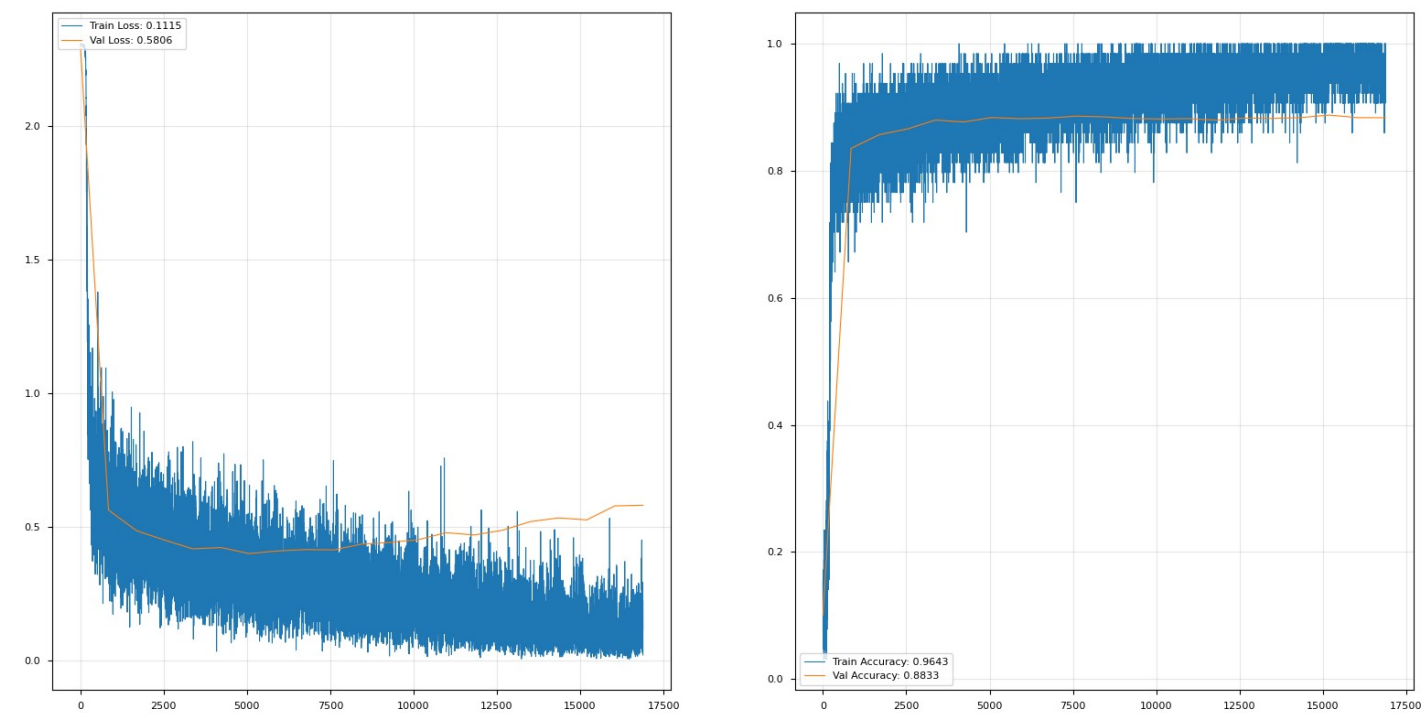
Train loss = 0.0115

Validation accuracy = 0.8833

Validation loss = 0.5806

Results:

Epoch: 20, Step: 845




```
Loading data...
54000 train samples
6000 validation samples
10000 test samples
Sample shape: (1, 28, 28)
Number of classes: 10

Train...
Epoch: 1/20
  54016/54000 [=====] - ETA: 57s - loss: 1.0568 - acc: 0.6499 - val_loss: 0.5625 - val_acc: 0.8352
Epoch: 2/20
  54016/54000 [=====] - ETA: 57s - loss: 0.5092 - acc: 0.8470 - val_loss: 0.4849 - val_acc: 0.8567
Epoch: 3/20
  54016/54000 [=====] - ETA: 59s - loss: 0.4442 - acc: 0.8628 - val_loss: 0.4500 - val_acc: 0.8657
Epoch: 4/20
  54016/54000 [=====] - ETA: 60s - loss: 0.3999 - acc: 0.8764 - val_loss: 0.4174 - val_acc: 0.8797
Epoch: 5/20
  54016/54000 [=====] - ETA: 65s - loss: 0.3648 - acc: 0.8859 - val_loss: 0.4224 - val_acc: 0.8767
Epoch: 6/20
  54016/54000 [=====] - ETA: 66s - loss: 0.3378 - acc: 0.8938 - val_loss: 0.3997 - val_acc: 0.8837
Epoch: 7/20
  54016/54000 [=====] - ETA: 64s - loss: 0.3136 - acc: 0.9010 - val_loss: 0.4094 - val_acc: 0.8818
Epoch: 8/20
  54016/54000 [=====] - ETA: 65s - loss: 0.2901 - acc: 0.9085 - val_loss: 0.4148 - val_acc: 0.8828
Epoch: 9/20
  54016/54000 [=====] - ETA: 66s - loss: 0.2705 - acc: 0.9143 - val_loss: 0.4135 - val_acc: 0.8858
Epoch: 10/20
  54016/54000 [=====] - ETA: 69s - loss: 0.2503 - acc: 0.9196 - val_loss: 0.4351 - val_acc: 0.8847
Epoch: 11/20
  54016/54000 [=====] - ETA: 70s - loss: 0.2313 - acc: 0.9268 - val_loss: 0.4414 - val_acc: 0.8822
Epoch: 12/20
  54016/54000 [=====] - ETA: 73s - loss: 0.2165 - acc: 0.9315 - val_loss: 0.4512 - val_acc: 0.8813
Epoch: 13/20
  54016/54000 [=====] - ETA: 74s - loss: 0.1989 - acc: 0.9367 - val_loss: 0.4780 - val_acc: 0.8820
Epoch: 14/20
  54016/54000 [=====] - ETA: 73s - loss: 0.1855 - acc: 0.9396 - val_loss: 0.4693 - val_acc: 0.8795
Epoch: 15/20
  54016/54000 [=====] - ETA: 75s - loss: 0.1710 - acc: 0.9448 - val_loss: 0.4869 - val_acc: 0.8827
Epoch: 16/20
  54016/54000 [=====] - ETA: 76s - loss: 0.1567 - acc: 0.9495 - val_loss: 0.5193 - val_acc: 0.8822
Epoch: 17/20
  54016/54000 [=====] - ETA: 72s - loss: 0.1456 - acc: 0.9522 - val_loss: 0.5332 - val_acc: 0.8837
Epoch: 18/20
  54016/54000 [=====] - ETA: 73s - loss: 0.1324 - acc: 0.9573 - val_loss: 0.5256 - val_acc: 0.8875
Epoch: 19/20
  54016/54000 [=====] - ETA: 73s - loss: 0.1221 - acc: 0.9606 - val_loss: 0.5780 - val_acc: 0.8835
Epoch: 20/20
  54016/54000 [=====] - ETA: 75s - loss: 0.1115 - acc: 0.9643 - val_loss: 0.5806 - val_acc: 0.8833
Test...
Test Accuracy: 0.9352
```

Test Error Rate: 0.0648

