Indian Institute of Technology, Jodhpur

Assignment on Multiclass classification using Neural Network.

Submitted by

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Task Link:
https://colab.research.google.com/drive/17id7pQTNUPBSNo90zLgHdAxtlEvXtitP?usp=sharing

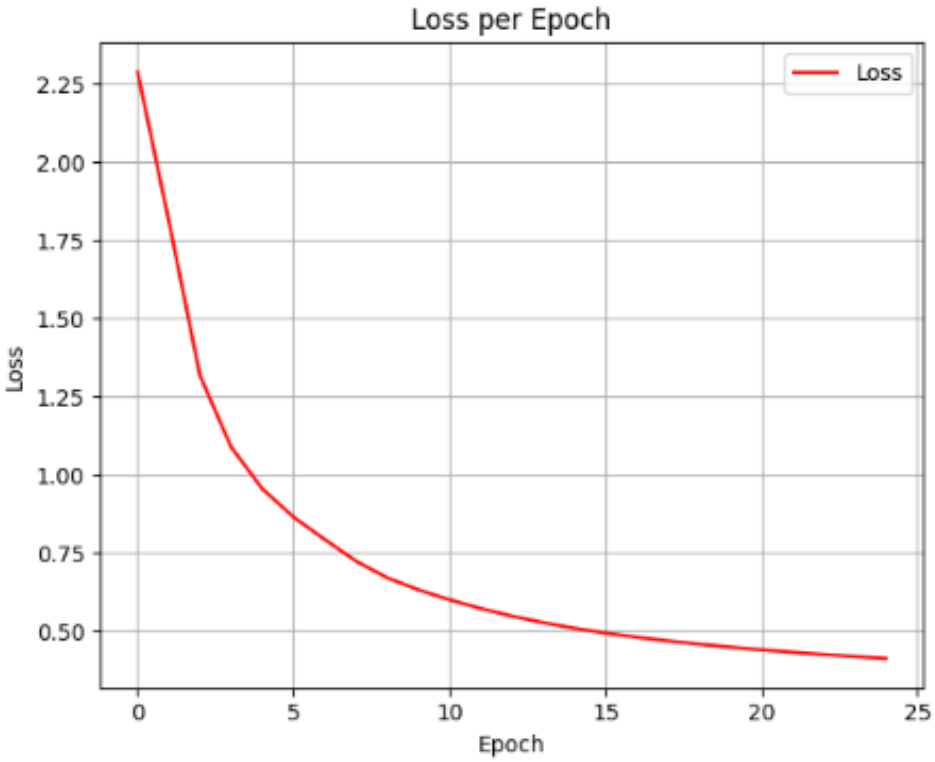
Initial weight is initialize using xaviers weight initialization technique with random seed value is equal to 4.

For train - test ratio 70:30

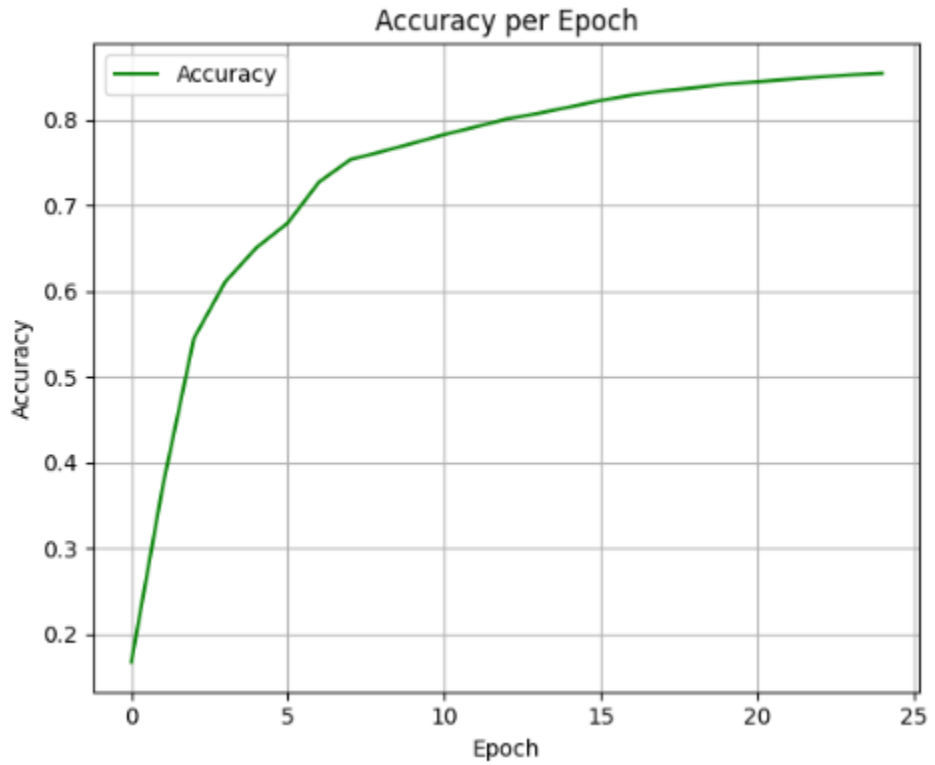
Learning rate = 0.02, Epochs = 25, Batch size = 23

The table shows loss and accuracy after each epoch on train data.

Epoch: 1, Loss: 2.2879, Accuracy: 16.71%
Epoch: 2, Loss: 1.8120, Accuracy: 37.16%
Epoch: 3, Loss: 1.3174, Accuracy: 54.48%
Epoch: 4, Loss: 1.0887, Accuracy: 61.08%
Epoch: 5, Loss: 0.9552, Accuracy: 65.07%
Epoch: 6, Loss: 0.8648, Accuracy: 67.94%
Epoch: 7, Loss: 0.7937, Accuracy: 72.72%
Epoch: 8, Loss: 0.7244, Accuracy: 75.34%
Epoch: 9, Loss: 0.6711, Accuracy: 76.27%
Epoch: 10, Loss: 0.6327, Accuracy: 77.24%
Epoch: 11, Loss: 0.6008, Accuracy: 78.25%
Epoch: 12, Loss: 0.5729, Accuracy: 79.15%
Epoch: 13, Loss: 0.5486, Accuracy: 80.07%
Epoch: 14, Loss: 0.5277, Accuracy: 80.73%
Epoch: 15, Loss: 0.5098, Accuracy: 81.47%
Epoch: 16, Loss: 0.4943, Accuracy: 82.23%
Epoch: 17, Loss: 0.4810, Accuracy: 82.86%
Epoch: 18, Loss: 0.4693, Accuracy: 83.35%
Epoch: 19, Loss: 0.4588, Accuracy: 83.72%
Epoch: 20, Loss: 0.4494, Accuracy: 84.15%
Epoch: 21, Loss: 0.4408, Accuracy: 84.42%
Epoch: 22, Loss: 0.4330, Accuracy: 84.70%
Epoch: 23, Loss: 0.4258, Accuracy: 84.98%
Epoch: 24, Loss: 0.4192, Accuracy: 85.23%
Epoch: 25, Loss: 0.4131, Accuracy: 85.41%

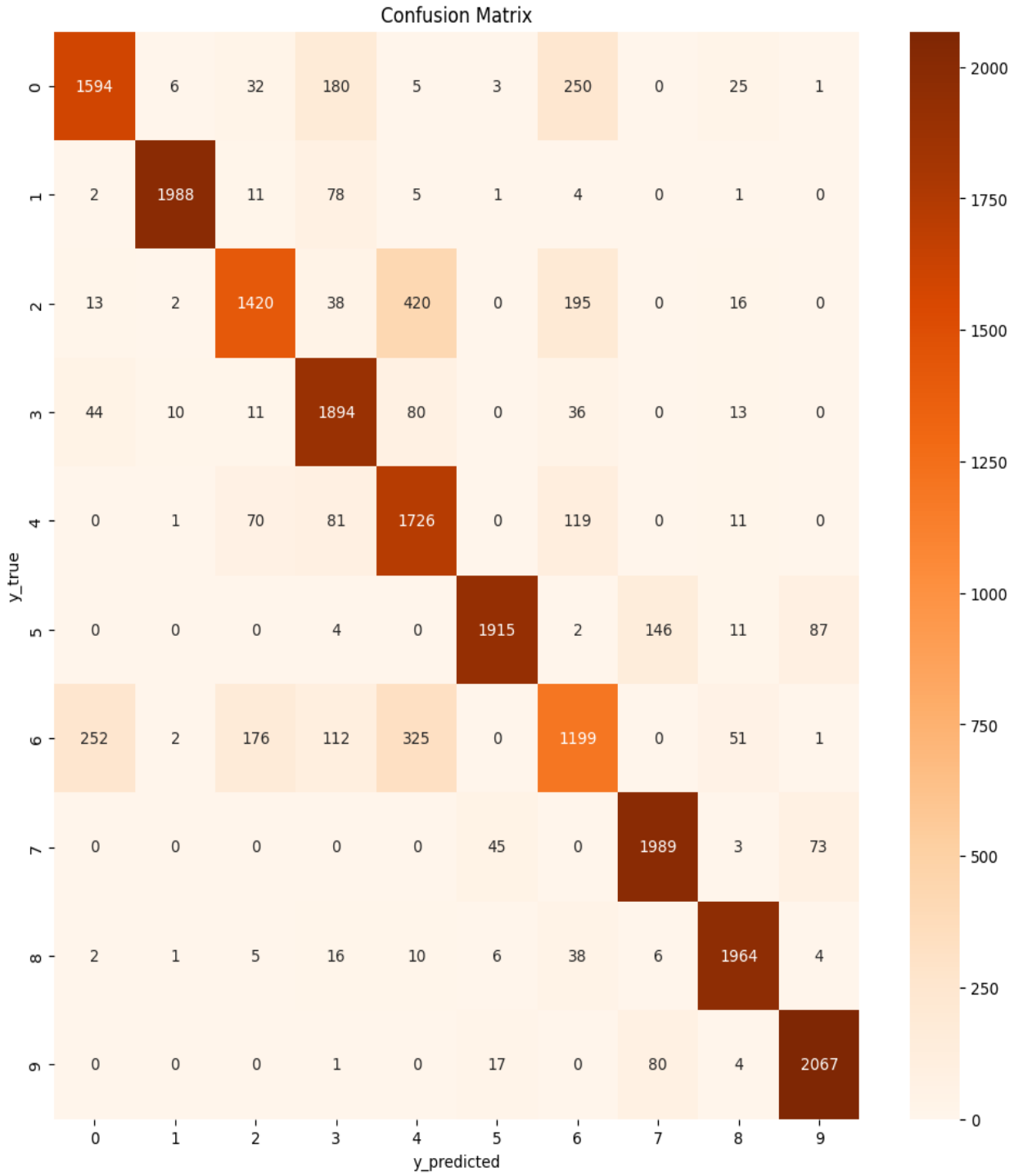


Loss per epoch on train dataset



Accuracy per epoch on train dataset

Accuracy on test dataset : 84.55%



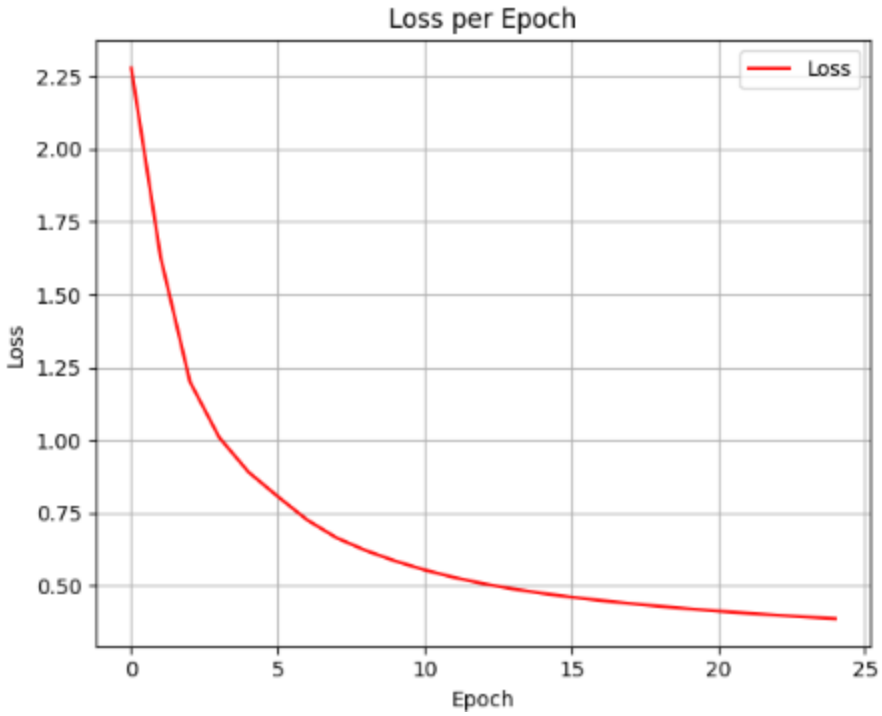
Confusion matrix of test dataset

For train - test ratio 80:20

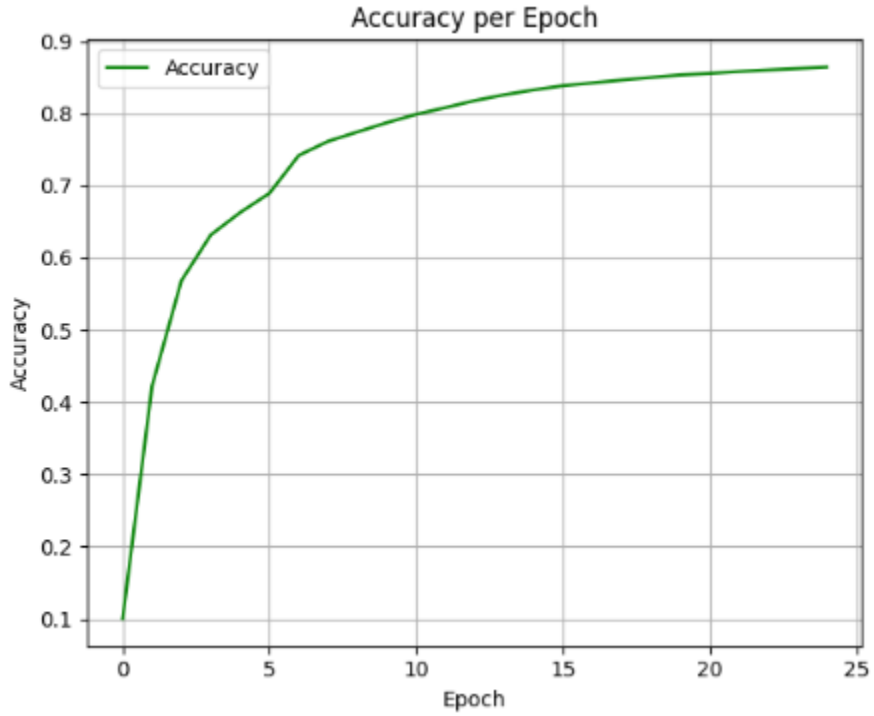
Learning rate = 0.02, Epochs = 25, Batch size = 23

The table shows loss and accuracy after each epoch on train data.

Epoch: 1, Loss: 2.2793, Accuracy: 10.04%
Epoch: 2, Loss: 1.6283, Accuracy: 42.23%
Epoch: 3, Loss: 1.2001, Accuracy: 56.83%
Epoch: 4, Loss: 1.0084, Accuracy: 63.17%
Epoch: 5, Loss: 0.8893, Accuracy: 66.27%
Epoch: 6, Loss: 0.8052, Accuracy: 68.94%
Epoch: 7, Loss: 0.7248, Accuracy: 74.19%
Epoch: 8, Loss: 0.6634, Accuracy: 76.15%
Epoch: 9, Loss: 0.6197, Accuracy: 77.44%
Epoch: 10, Loss: 0.5837, Accuracy: 78.72%
Epoch: 11, Loss: 0.5532, Accuracy: 79.88%
Epoch: 12, Loss: 0.5275, Accuracy: 80.81%
Epoch: 13, Loss: 0.5060, Accuracy: 81.78%
Epoch: 14, Loss: 0.4880, Accuracy: 82.58%
Epoch: 15, Loss: 0.4729, Accuracy: 83.26%
Epoch: 16, Loss: 0.4598, Accuracy: 83.84%
Epoch: 17, Loss: 0.4483, Accuracy: 84.22%
Epoch: 18, Loss: 0.4378, Accuracy: 84.62%
Epoch: 19, Loss: 0.4283, Accuracy: 84.98%
Epoch: 20, Loss: 0.4196, Accuracy: 85.33%
Epoch: 21, Loss: 0.4117, Accuracy: 85.54%
Epoch: 22, Loss: 0.4044, Accuracy: 85.81%
Epoch: 23, Loss: 0.3977, Accuracy: 86.02%
Epoch: 24, Loss: 0.3915, Accuracy: 86.22%
Epoch: 25, Loss: 0.3857, Accuracy: 86.42%

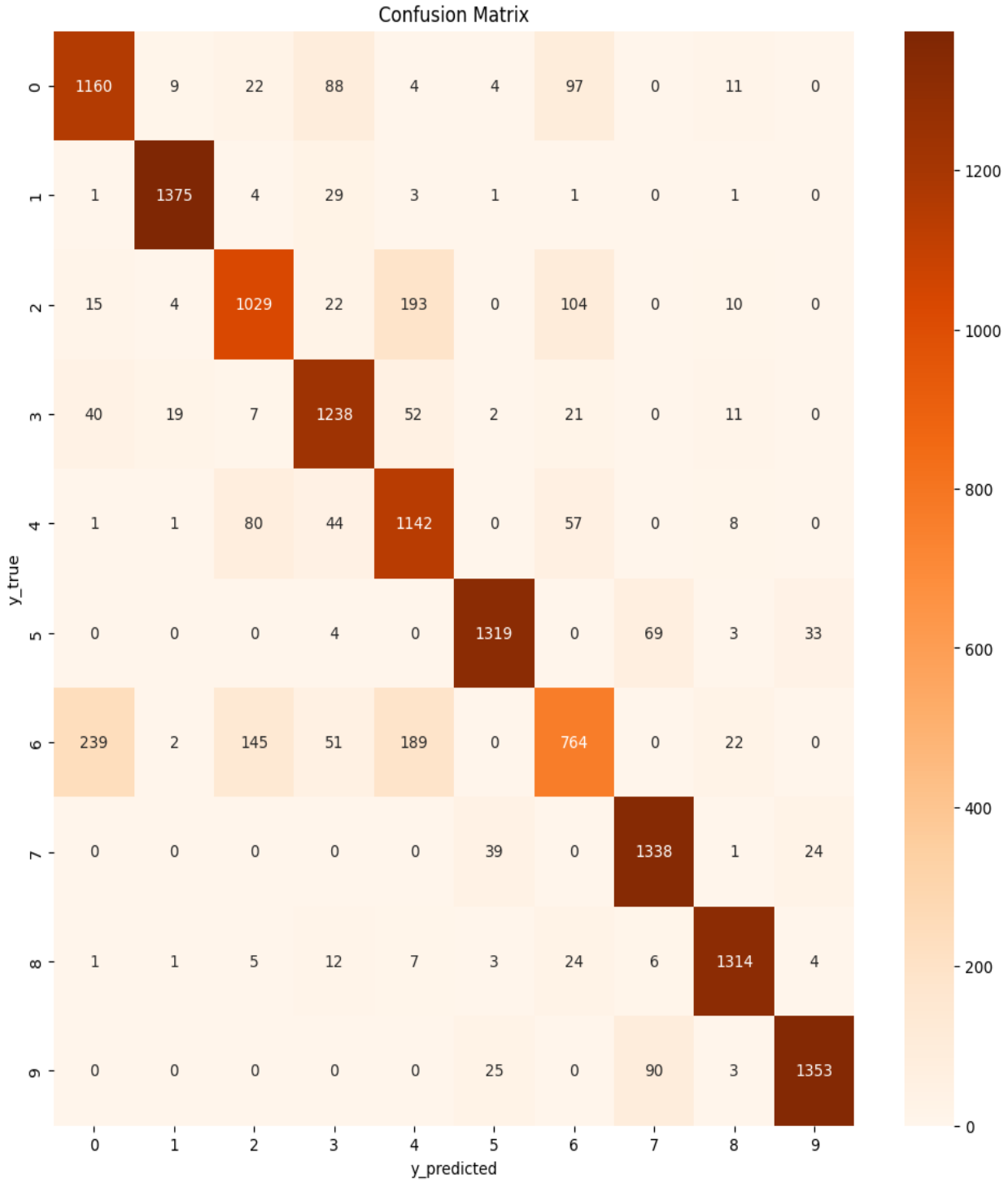


Loss per epoch on train dataset



Accuracy per epoch on train dataset

Accuracy on test dataset : 85.94%



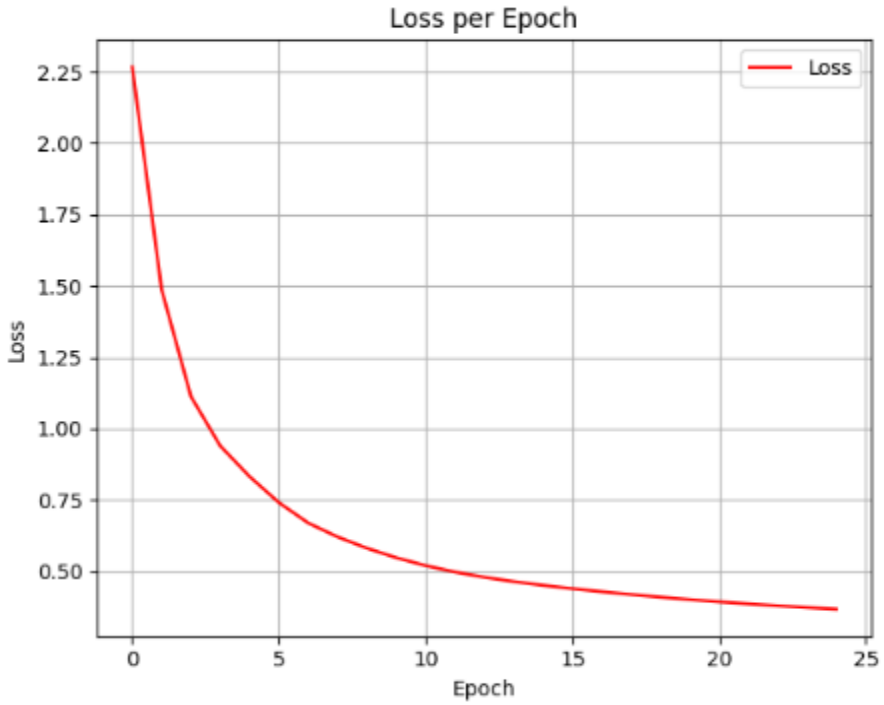
Confusion matrix of test dataset

For train - test ratio 90:10

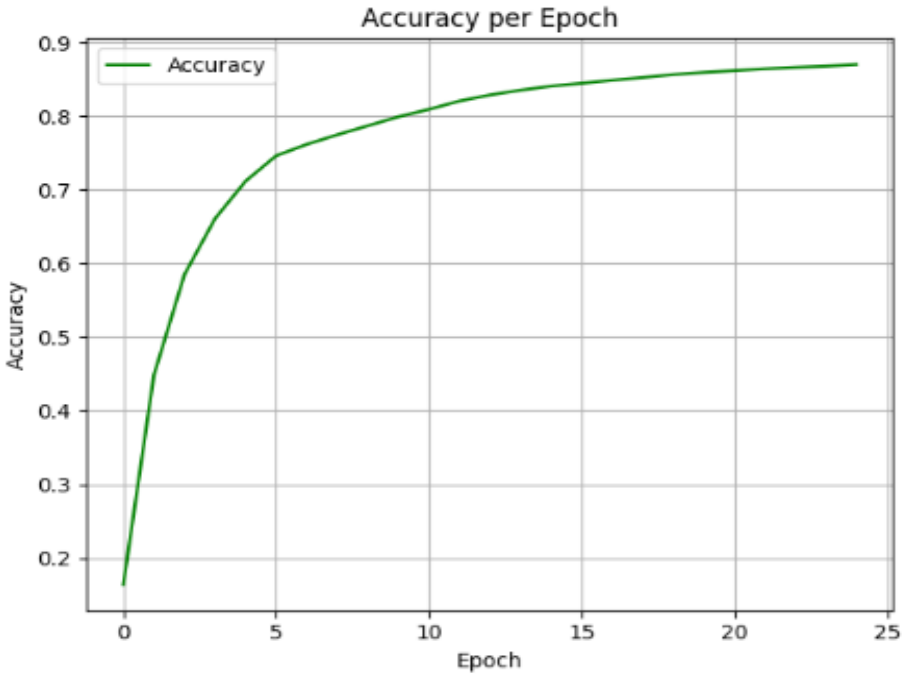
Learning rate = 0.02, Epochs = 25, Batch size = 23

The table shows loss and accuracy after each epoch on train data.

Epoch: 1, Loss: 2.2674, Accuracy: 16.41%
Epoch: 2, Loss: 1.4878, Accuracy: 44.84%
Epoch: 3, Loss: 1.1127, Accuracy: 58.49%
Epoch: 4, Loss: 0.9393, Accuracy: 66.08%
Epoch: 5, Loss: 0.8320, Accuracy: 71.16%
Epoch: 6, Loss: 0.7407, Accuracy: 74.61%
Epoch: 7, Loss: 0.6692, Accuracy: 76.15%
Epoch: 8, Loss: 0.6206, Accuracy: 77.46%
Epoch: 9, Loss: 0.5810, Accuracy: 78.68%
Epoch: 10, Loss: 0.5477, Accuracy: 79.90%
Epoch: 11, Loss: 0.5201, Accuracy: 80.91%
Epoch: 12, Loss: 0.4976, Accuracy: 82.04%
Epoch: 13, Loss: 0.4793, Accuracy: 82.86%
Epoch: 14, Loss: 0.4642, Accuracy: 83.51%
Epoch: 15, Loss: 0.4511, Accuracy: 84.06%
Epoch: 16, Loss: 0.4394, Accuracy: 84.45%
Epoch: 17, Loss: 0.4287, Accuracy: 84.86%
Epoch: 18, Loss: 0.4188, Accuracy: 85.23%
Epoch: 19, Loss: 0.4096, Accuracy: 85.63%
Epoch: 20, Loss: 0.4011, Accuracy: 85.93%
Epoch: 21, Loss: 0.3933, Accuracy: 86.17%
Epoch: 22, Loss: 0.3860, Accuracy: 86.41%
Epoch: 23, Loss: 0.3794, Accuracy: 86.61%
Epoch: 24, Loss: 0.3733, Accuracy: 86.77%
Epoch: 25, Loss: 0.3676, Accuracy: 87.00%

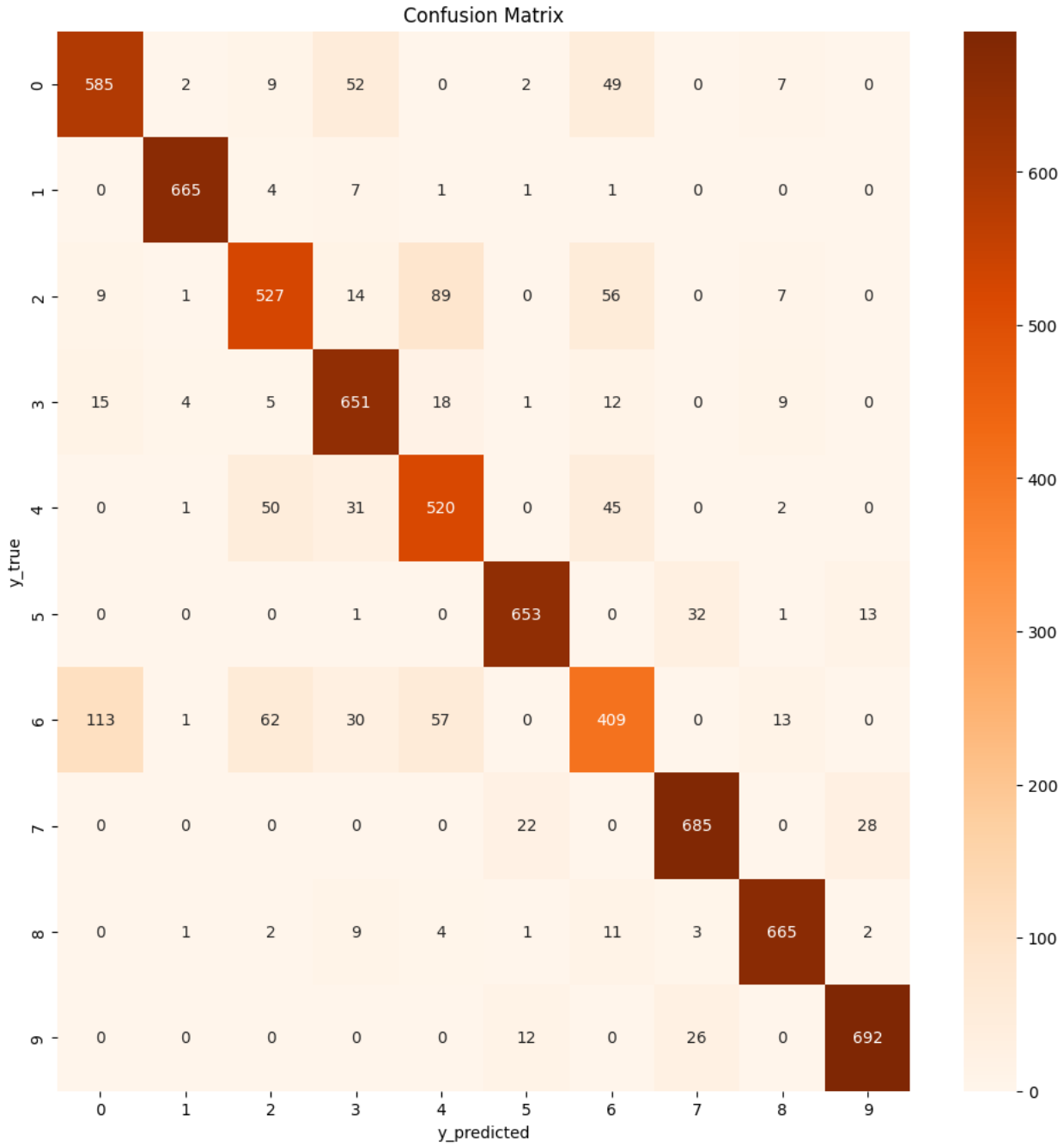


Loss per epoch on train dataset



Accuracy per epoch on train dataset

Accuracy on test dataset : 86.46 %



Confusion matrix of test dataset

Total trainable parameters. = 111146
Total Non- trainable parameters = 7840