

Intro to Deep Learning

Assignment 3

- a. I used dictionaries to store the values obtained from forward propagation and back propagation, to avoid the use of multiple variables at each step. The results obtained by training the model for 500 iterations, along with the test set accuracy is shown below:

```
Loss in iteration 483 is: 0.11487015467161647
Loss in iteration 484 is: 0.11469409294337178
Loss in iteration 485 is: 0.11451933543149923
Loss in iteration 486 is: 0.11434507489043955
Loss in iteration 487 is: 0.1141716708455681
Loss in iteration 488 is: 0.11399849571016418
Loss in iteration 489 is: 0.1138256167761764
Loss in iteration 490 is: 0.11365427232996718
Loss in iteration 491 is: 0.11348297987340167
Loss in iteration 492 is: 0.11331294700811587
Loss in iteration 493 is: 0.11314406185548609
Loss in iteration 494 is: 0.11297402647512705
Loss in iteration 495 is: 0.11280522591029757
Loss in iteration 496 is: 0.11263510657998542
Loss in iteration 497 is: 0.11246541562027014
Loss in iteration 498 is: 0.11229669202018389
Loss in iteration 499 is: 0.11212802486561342
Loss in iteration 500 is: 0.11196135309219
Training time: 661.199054479599 seconds.
Test accuracy: 0.9655
PS D:\Rutgers NB\Courses\Deep Learning\HW3> █
```

- b. Utilizing PyTorch, the model was trained for 10 epochs, with the average training loss for each epoch shown in the image below. Additionally, the training set time, average loss for the test set and test set accuracy is shown in the screenshot below:

```
PS D:\Rutgers NB\Courses\Deep Learning\HW3> C:\Users\prana\AppData\Local\Programs\Python\Python38\python.exe hw3b.py
Epoch 1: [59999/60000 (100%)] Average Loss: 0.216060
Epoch 2: [59999/60000 (100%)] Average Loss: 0.114879
Epoch 3: [59999/60000 (100%)] Average Loss: 0.088406
Epoch 4: [59999/60000 (100%)] Average Loss: 0.076874
Epoch 5: [59999/60000 (100%)] Average Loss: 0.070880
Epoch 6: [59999/60000 (100%)] Average Loss: 0.064890
Epoch 7: [59999/60000 (100%)] Average Loss: 0.072224
Epoch 8: [59999/60000 (100%)] Average Loss: 0.058121
Epoch 9: [59999/60000 (100%)] Average Loss: 0.065332
Epoch 10: [59999/60000 (100%)] Average Loss: 0.058701
Training Time: 928.2866404056549s

Test set: Average loss: 0.1555, Accuracy: 9681/10000 (97%)

Time taken for training and testing: 936.55s
PS D:\Rutgers NB\Courses\Deep Learning\HW3> █
```