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# HW 5 Writeup

For this assignment, I created a neural network with three layers and passed in training data to train the neural network. With the trained model, I used it on test sets to make predictions.

I used three layers to filter the large amount of features through my neural network. The first layer has 250 nodes, the second layer has 50 nodes, and the third layer has the ten classes 0-9. I chose these values so that every sample gets filtered fairly, leading to a higher accuracy. I used the ReLU() activation function because it is a highly efficient activation function for this kind of classification problem. I used the CrossEntropyLoss() function because it is best suited for multi-class classification problems. For the optimizer I am using Adam with a learning rate of 0.001 because, through trial and error, I got a higher accuracy with this optimizer and learning rate. I used 41 epochs to train my neural network because it got close to 100% accuracy but not quite there.

Learning rate for Fold 1:

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Learning Rates for Fold 1:
Epoch: 0 | Loss: 9.92376, Acc: 12.14%
Epoch: 10 | Loss: 0.76380, Acc: 78.97%
Epoch: 20 | Loss: 0.18617, Acc: 94.87%
Epoch: 30 | Loss: 0.04140, Acc: 99.37%
Epoch: 40 | Loss: 0.01552, Acc: 99.75%
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Accuracies of the 5 folds and the average:

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Fold 1 accuracy: 82.0%
Fold 2 accuracy: 84.0%
Fold 3 accuracy: 84.0%
Fold 4 accuracy: 86.5%
Fold 5 accuracy: 84.42211055276381%
Average Accuracy: 84.18442211055275%
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