ANN Report

Connor Osborne: A01880782

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Problem 3

Table 1: Training ANNs with 1 Hidden Layer on MNIST; mini batch = 10, num epochs=10

ETA/HLS	10	25	50
$\eta = 0.5$	91.10%	92.38%	85.17%
$\eta = 0.25$	88.28%	90.43%	76.21%
$\eta = 0.125$	86.31%	88.07%	74.07%

Table 2: Training ANNs with 2 Hidden Layers on MNIST; h1=10; mini batch = 10, num epochs=10

ETA/H2	10	25	50
$\eta = 0.5$	90.00%	90.58%	90.42%
$\eta = 0.25$	88.50%	90.04%	89.82%
$\eta = 0.125$	83.78%	86.93%	86.76%

Table 3: Training ANNs with 2 Hidden Layers on MNIST; h1=25; mini batch = 10, num epochs=10

ETA/H2	10	25	50
$\eta = 0.5$	92.05%	92.52%	92.77%
$\eta = 0.25$	89.43%	90.83%	91.64%
$\eta = 0.125$	86.86%	89.07%	89.04%

Table 4: Training ANNs with 2 Hidden Layers on MNIST; h1=50; mini batch = 10, num epochs=10

ETA/H2	10	25	50
$\eta = 0.5$	92.90%	92.97%	93.56%
$\eta = 0.25$	91.52%	92.23%	92.41%
$\eta = 0.125$	87.52%	89.45%	90.11%

Observations

Based on the results from running these tests it is easy to see that both architecture and learning rate play a big part in the accuracy of the NNs. The NNs with 2 hidden layers have much higher accuracy rates than the NNs with 1 hidden layer. The number of neurons in each layer seem to also effect the accuracy though to a much smaller degree. In the NNs with 1 hidden layer the higher number of neurons appears to be detrimental to the accuracy of the NN however when there are 2 hidden layers the more neurons each layer has, the greater the accuracy of the system. The learning rate or η also seems to have a large impact on the accuracy as for all of the NNs that were tested the higher the valuer of η the greater the overall accuracy of the NNs became.