Artificial Neural Networks

Homework 3 Exercise 3

Classification Errors:

Data Set / Network	***Network 1***	***Network 2***	***Network 3***
Training Set	6.8000e-04	0.1235	0.0020
Validation Set	0.0437	0.1472	0.0381
Test Set	0.0495	0.1529	0.0379

Number of Training Epochs

Network 1	55
Network 2	70
Network 3	200

Discussion

It's clear that *Network 3* is the most effective in terms of accuracy, ranking first among the networks in question, this is a result of its structure as it is built to take input in form of images, and after each of its hidden layers the ReLU components rectify the activations before passing them through to the next layer. The softmax and classification layers also help in producing a better classifying network due to their structure. It also outperforms *Network 1* which has the same structure since it learns more effectively due to it's L2 regularization.

One the other hand, *Network 2*, performs the worst among all others, as it has no specialized components, no regularization and the vanishing gradient problem is more apparent due to its 3 *100-neuron* fully connected hidden layers.