Assignment One: Neural Networks

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1. Int r odu ct ion

This project report details our experiments with changing various Neural Network parameters and the e ects those modi cat ions had upon the ability of the Neural Network to converge to a solut ion. Our neural network assignment went a litt le beyond the default assignment. We really wanted to know: what really happens when you change alpha, and when you change the number of neurons? As a result, we ended up re-discovering a method of training, the use of a validat ion set .

## 1.1 M ot ives

One of the topics discussed in class was over tt ing and under tt ing. We want to visualize this as it s happening on a real dataset. We have two variables we're interested in: number of neurons, and the value of alpha. Alpha is the learning rate of the neural net, and the number of neurons is the number of neurons in the hidden layer of the network. Both of these settings should have some e ect on the tt ing of the dataset.

# P r ocedur e

Our Neural Network made use of the simple-generalizat ion method for classi cat ion of the data sets. To train and test our classi er, the provided dataset was divided in two: half of the data for training, and half for test ing. A single network was it erated through 10,000 t imes, and 100 networks were realized for stat ist ical analysis. After training the neural network, the test ing data was applied and the realized errors were accumulated over an entire run. All tests were done on the supplied Voting Records training set using the the Simple Generalizat ion method discussed in the homework.

# R esu lt s

1. C on clu sion

One of the interesting results was the behavior of over tt ing. There appears to be a period of t ime in each graph where they hit the min, usually within the rst 1000 it erat ions, then they mostly get worse after that. Given this insight, it is our opinion that if you had a validat ion set , you could simply train unt il your validat ion set starts to over t , and immediately stop training. However, while we tested with a wide range of alphas and hidden neurons, we only tested it with one problem

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