**NLP Project Report**

CMPT 310

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The objective of our project was to build a program used to determine whether a news article was real or fake. By testing different options, we aim to reach a greater accuracy.

**Neural Network Learning Analysis**

For the neural network approached, the same attribute set was used as in the decision tree. Multilayer perceptron was used to build the network and the default parameters from Weka were used to being with: training rate at 0.3, momentum at 0.2, training time at 500 and a hidden layer of a which is half of the sum of the input and output nodes. From this we were able to get an accuracy of 85%.

From testing, some general rules were found. Increasing the number of hidden nodes did not show any definitive trend. Hidden layers were not tested extensively as they increase test time by a large factor but from testing various node sizes and layer amount at certain points accuracy drops to 50%. Momentum and learning rate were found to affect how quickly the neural network arrives to a minimum or if it starts to overshoot and goes around the minimum. Training time has been found to require a minimum amount as the rate of error changes slowly then quickly then back to being slow. Having a longer time also was found to start increasing error rate.

Using the GUI option and some research, we gain some insight as to how to options affect the result. Training rate is the step size for the gradient descent learning and we have found a low value around 0.1 gave the best result. Momentum also followed this trend although both affect how the network reach a minimum. In the case where the combine values are high, the learning network could over shoot a minimum or escape a local minimum and end up in the global one.

Overall there is less information one can gain when analyzing a neural network compared to analyzing a decision tree. From looking at the visualization of the learning, it shows how all factors affect the accuracy but finding a solution to make it more accurate are hard. When it comes to the number of nodes and hidden layers, there is no absolute way of finding the right amount. The run-of-thumb for the number of hidden nodes has been researched to be half of the number of input and output nodes. The graph below shows that. Starting from 1-10 nodes, the networks is as accurate as decision trees. As it goes closer to half of the input and output nodes, it becomes better than the trees at around 87% accuracy.