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CMPT 465

Project 4

Due November 2, 2023

Question 1)

To determine what number of hidden neurons would result in the highest classification rate, I ran the experiment multiple times and stored the results in a table. Below are the results from 3 experiments.

Neurons LearningRMSE Iter Testing RMSE Classification Rate

2 0.199282457514105 5001 0.108785658644084 98.8165680473373

4 0.221602237284854 5001 0.243252127705260 94.0828402366864

6 0.272925834750150 5001 0.243252127705260 94.0828402366864

8 0.199216393758954 5001 0.266469355010597 92.8994082840237

10 0.0999511150059133 1730 0.172005229038445 97.0414201183432

Neurons LearningRMSE Iter Testing RMSE Classification Rate

2 0.330826453147306 5001 0.230769230769231 94.6745562130178

4 0.0999809141457287 3017 0.153846153846154 97.6331360946746

6 0.266211139026250 5001 0.230769230769231 94.6745562130178

8 0.128667206562967 5001 0.172005229038445 97.0414201183432

10 0.225944998259935 5001 0.255124983873492 93.4911242603550

Neurons LearningRMSE Iter Testing RMSE Classification Rate

2 0.203631397285262 5001 0.153846153846154 97.6331360946746

4 0.0999668048370516 1872 0.153846153846154 97.6331360946746

6 0.317476713553234 5001 0.317161971201359 89.9408284023669

8 0.278912983367587 5001 0.230769230769231 94.6745562130178

10 0.235182109380984 5001 0.230769230769231 94.6745562130178

These results tell us that typically having 2 or 4 hidden neurons will give us the best classification rate, however, we are not able to determine which is better as they both result in a higher CR once and then have the same CR for last one. The results of using 6, 8, and 10 hidden neurons do not present a pattern.

Question 2)

The results from question 1 tell us that using 2 or 4 hidden neurons would give us the best Classification Rates. To determine which one would be better I was originally going to run the experiment on both neurons 5 times and compare the means, however, I ultimately decided to run the experiment on all 5 numbers of hidden neurons to have a better grasp on the results. Below are the mean results of all hidden neuron amounts twice.

Neurons Learning RMSE Iter Testing RMSE Classification Rate

2 0.270208449612636 5001 0.195859051580438 95.8579881656805

4 0.231583981734643 4385.4 0.199591985228427 95.8579881656805

6 0.186197771895448 5001 0.202457479324519 95.8579881656805

8 0.210102682426448 5001 0.270429415779538 92.5443786982249

10 0.211791304160267 4949.8 0.246275891408466 93.8461538461538

Neurons Learning RMSE Iter Testing RMSE Classification Rate

2 0.287495614685331 5001 0.197984922498853 95.7396449704142

4 0.145779551716004 4103.4 0.185810572776363 96.3313609467456

6 0.259659615672023 5001 0.248109024384865 93.6094674556213

8 0.230088263537528 4791.2 0.231129912063435 94.5562130177515

10 0.228355040435037 4605 0.227550818864095 94.7928994082840

These results tell us that using 4 hidden neurons would give us the best classification rate as it is tied for first in the first set of experiments and first in the second, while also having the smallest number of mean iterations in both. Using 2 hidden neurons comes in 2nd for getting the best classification rate. It cannot be determined which among the remaining three would be better as the results vary in both experiments.