Artificial Intelligence Project 2 - Artificial Neural Networks

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Project Write Up

1. With the number of hidden neurons set at 5, changing the holdout percentage and samples impacted the error rate for training. The data was changed simply be rearranging the order it was presented in. The holdout rates tested were 10%, 20%, 30%, 50% and 70%, as seen in the table below. While running this experiment, the percent correct dipped to a minimum at 30% holdout. The percent correct for the other four trials were all very similar to each other and none were over 50%. While not ideal, values of 50% correct are to be expected because, when plotted, the raw data appears to be very random and difficult to sort or classify.

Table : Holdout Rate and Percent Correct with Different Data Sets

|  |  |
| --- | --- |
| Holdout Rate | Percent Correct |
| 10% | 45.5 |
| 20% | 43 |
| 30% | 34.5 |
| 50% | 47.5 |
| 70% | 46.5 |

1. When the number of hidden neurons were changed over the range of 2 to 10, the percent correct also fluctuated, as seen in the table below. During the experiment, the maximum percent correct was reached when the number of hidden nodes was 5. The error rate fluctuates relatively dramatically with the different number of hidden nodes, as seen in the figure below. This is because the input data is relatively randomized, therefore making the outputs from the neural network hard to classify. Running the same experiment again would almost definitely, save random coincidence, produce a plot with different maximums and minimums.

Table : Number of Hidden Nodes and Percent Correct

|  |  |
| --- | --- |
| Number of Hidden Nodes | Percent Correct |
| 2 | 44 |
| 3 | 34 |
| 4 | 28.5 |
| 5 | 51 |
| 6 | 38 |
| 7 | 44 |
| 8 | 38.5 |
| 9 | 39.5 |
| 10 | 48.5 |

Figure : Error Rates with Different Number of Hidden Nodes

1. In order to complete this project, we made the simplifying assumption that there would ever only be one output node and two input nodes to consider. The implementation created for this project was designed to be fairly resistant to changes in the number of hidden layers, as discussed above. This implementation of the project would not be able to consider more than two input nodes. If needed, the program could be adapted to consider more than two input nodes by generating a certain number of variables based on the number of columns in the text file; variable names could be generated by adding a “name” field to the top of the text file. The program could also be adapted to consider more than one output node, but that would be more difficult to implement. With more output nodes would come more weights to consider and then the different outputs would have to be compared to determine the best weights.