Analysis Of Self-Organizing Maps

Using A Java Based Implementation

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Neural Networks 547

**Self-Organizing Map**

Self Organizing Maps (SOM) are based on competitive learning; where output neurons of the network compete among themselves to be activated or fired.1 The result of which is that only one neuron per group is on at any one time.1 In this study, the Self-Organizing map consists of a 2 dimensional matrix with a varying number of neurons. The neurons become selectively tuned to various input patterns during the course of the competitive learning process.1

Java was used to code the SOM network. A Graphical user intereface was used to create a heat map based on the neuron weights. This was done in order to see “weight grouping”. There were 2 given inputs to the SOM.

In the following plots are the plotted

Tables 1-5 investigate different parameters of the RBF algorithm.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number of RBF neurons** | **# Of Epochs** | **Learning rate** | **Was Shuffled** | **Converged?** | **Correct Decision rate** |
| 2 | 4 | 0.1 | yes | yes | %57.75 |
| 6 | 5 | 0.1 | yes | yes | %51.25 |
| 15 | 4 | 0.1 | yes | yes | %54.25 |
| 30 | 6 | 0.1 | yes | yes | %61.12 |
| 50 | 7 | 0.1 | yes | yes | %55.25 |

Table 1: The above uses the KMeans learning approach with all weights set to 0.5. Note that convergence does not seem to depend heavily on the number of neurons.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number of RBF neurons** | **# Of Epochs** | **Learning rate** | **Was Shuffled** | **Converged?** | **Correct Decision rate** |
| 2 | 4 | 0.1 | yes | yes | %44.13 |
| 6 | 6 | 0.1 | yes | yes | %57.75 |
| 15 | 5 | 0.1 | yes | yes | %49.25 |
| 30 | 4 | 0.1 | yes | yes | %61.12 |
| 50 | 4 | 0.1 | yes | yes | %50.0 |

Table 2: The above uses the fixed centers selected at random learning approach with all weights set to 0.5. Note that convergence does not seem to depend heavily on the number of neurons.

**Results and Conclusions**

Citations

1. Haykin, Simon S. *Neural Networks: A Comprehensive Foundation*. Upper Saddle River, NJ: Prentice Hall, 1999. Print.

Source Code