

Evaluation of MyNN

This report aims to find out how MyNN works compared to Neuroph Studio and DL4J.

Part 1: Single Hidden Layer Test with Sigmoid

Experiment 1: Car Evaluation Database

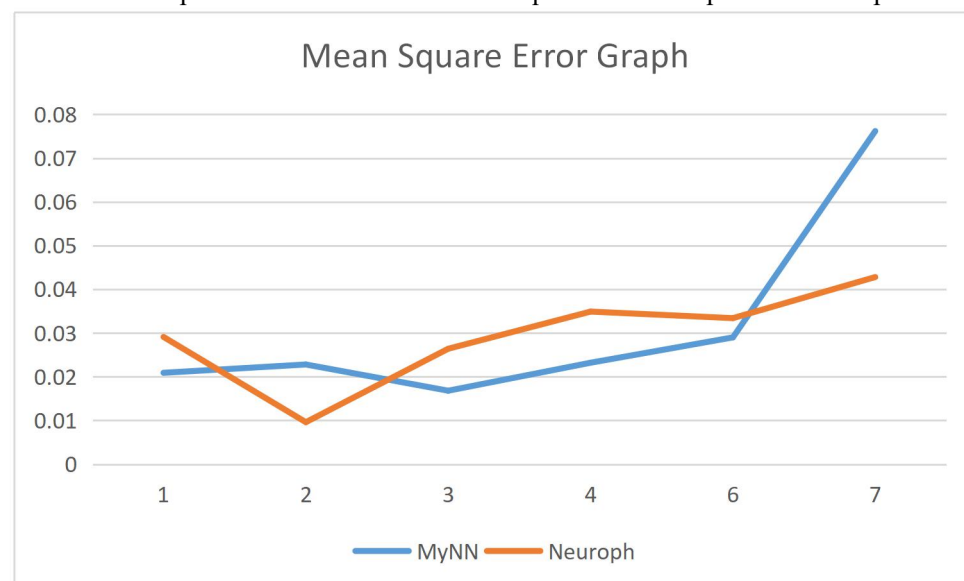
Car Evaluation Database was derived from a simple hierarchical decision model. The model evaluates cars according to 21 input attributes and output 4 attributes.

In this experiment, we are using 80% of data for training and 20% for testing the network, but with different set of parameters. In addition, for reducing the influence of different initialized weight which varies from each training attempt, in MyNN, we are using the time seed “54321” to initialize network weight.

Below is a table that summarizes this experiment.

Training Attempt	Number of Hidden Neurons	Max Error	Learning Rate	Momentum	MyNN Total Mean Square Error	MyNN Number of Iterations	Neuroph Total Mean Square Error	Neuroph Number of Iterations
1	14	0.01	0.2	0.7	0.0209	24	0.0291	33
2	14	0.01	0.3	0.6	0.0228	21	0.0096	21
3	10	0.01	0.3	0.6	0.0168	22	0.0264	37
4	10	0.01	0.5	0.7	0.0232	13	0.0349	187
5	5	0.01	0.4	0.6	0.0165	82	/	/
6	17	0.01	0.2	0.7	0.0290	19	0.0334	23
7	17	0.02	0.6	0.2	0.0762	7	0.0428	19

Below is a Graph that summarizes the mean square error except the 5th attempt.



Problems:

1. The tendency of mean square error is a little bit different. Eg. from 1st attempt to 2nd attempt.
2. In the 5th attempt, Neuroph's network doesn't converge, but MyNN's network converge.

Experiment 2: Predicting the Class of Wine

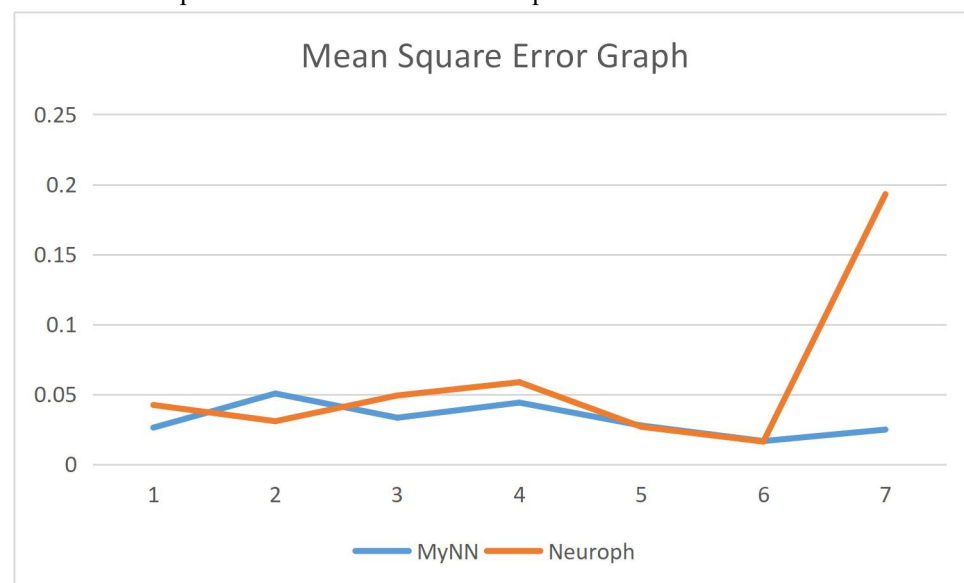
The data are the results of a chemical analysis of wines grown in the same region in Italy but derived from three different cultivars which are outputs. The analysis determined the quantities of 13 constituents found in each of the three types of wines. The data set contains 178 instances, 13 outputs and 3 inputs.

In this experiment, we also use time seed "54321" to initialize network weight.

Below is a table that summarizes this experiment.

Training Attempt	Number of Hidden Neurons	Training Set/ Test Set	Learning Rate	Momentum	MyNN Total Mean Square Error	MyNN Number of Iterations	Neuroph Total Mean Square Error	Neuroph Number of Iterations
1	3	70%/30%	0.2	0.7	0.0261	64	0.0423	45
2	8	70%/30%	0.6	0.9	0.0505	37	0.0307	38
3	11	70%/30%	0.2	0.7	0.0332	52	0.0491	34
4	10	70%/30%	0.4	0.7	0.0440	36	0.0586	37
5	9	70%/30%	0.2	0.7	0.0276	61	0.0267	33
6	9	80%/20%	0.2	0.7	0.0165	79	0.0161	72
7	5	80%/20%	0.4	0.6	0.0247	59	0.1930	14

Below is a Graph that summarizes the mean square error.



Conclusion:

Part 2: Muti-Layer Test with Sigmoid

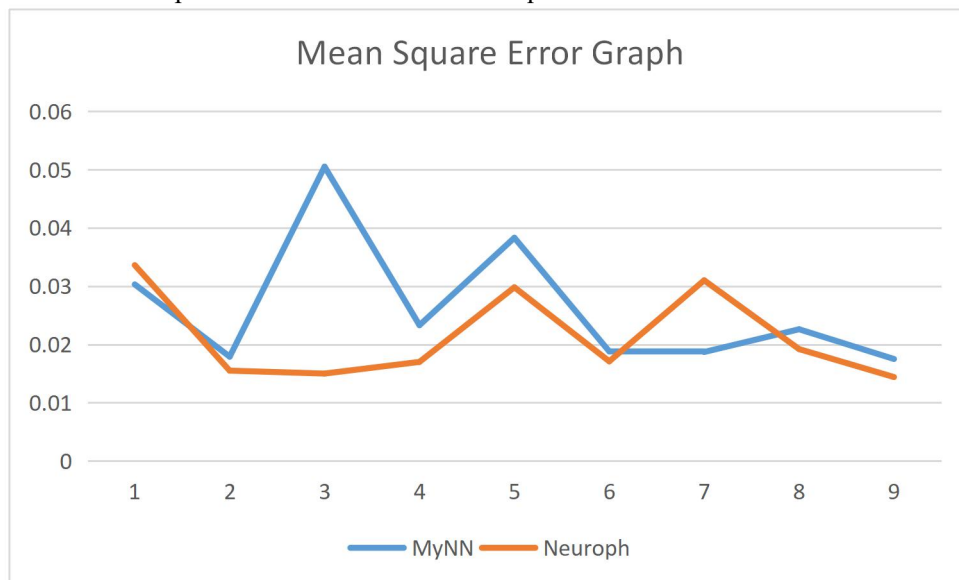
Experiment 1: Car Evaluation Database

The data set is mentioned in Part1. In this experiment, we are using multiple hidden layers and time seed = 54321.

Below is a table that summarizes this experiment.

Training Attempt	Number of Hidden Neurons	Max Error	Learning Rate	Momentum	MyNN Total Mean Square Error	MyNN Number of Iterations	Neuroph Total Mean Square Error	Neuroph Number of Iterations
1	14/8	0.01	0.2	0.7	0.0303	14	0.0336	39
2	14/4	0.01	0.2	0.7	0.0179	41	0.0155	52
3	10/4	0.01	0.2	0.7	0.0505	19	0.0150	48
4	20/4	0.01	0.2	0.7	0.0233	37	0.0170	47
5	14/6	0.01	0.2	0.7	0.0383	19	0.0298	34
6	14/4	0.01	0.3	0.6	0.0188	33	0.0171	36
7	14/4	0.01	0.6	0.2	0.0187	40	0.0310	27
8	14/8/4	0.01	0.2	0.7	0.0226	32	0.0192	95
9	14/10/6	0.01	0.2	0.7	0.0175	46	0.0144	55

Below is a Graph that summarizes the mean square error.



Problems:

1. Big fluctuation in Attempt 3.
2. Overall precision is similar but not as good as Neuroph.

Part 3: Muti-Layer Test with Sigmoid and Advanced Loss Function

Part 4: Muti-Layer Test with Advanced Activation Function