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EE 550 Artificial Neural Networks Homework 4

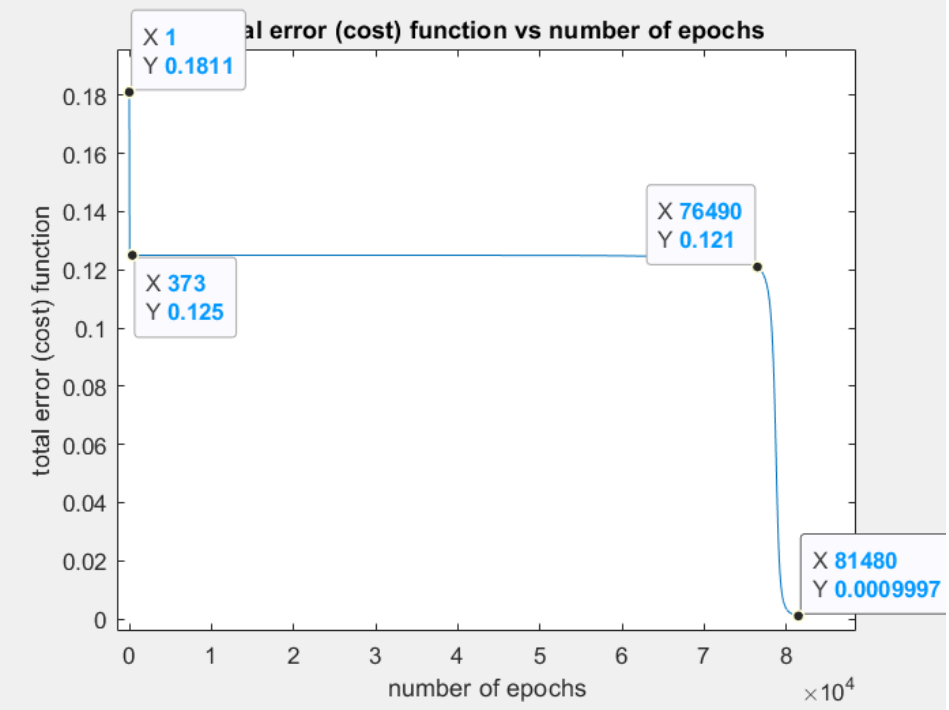
At this project, the multilayer perceptron model is implemented using Matlab and the derivations at the lecture notes.

At the implementation, the number of layers and the numbers of nodes at the ach layer can be determined arbitrarily.

Q1) The layer model for the XOR problem is [2 4 4 1]. 2 is the number of nodes at the input layer, 4's are the number of nodes at two hidden layer and 1 is the number of node at the output layer.

The step size is 0.25 and the iterations continue until the loss value is lower than 0.002.

The initial weight matrix is determined randomly.



At this case, total number of epoch is 81480 and last error value is 0.0009997.

The result is:

input 1	input 2	output
0	0	0.0559
0	1	0.9558
1	0	0.9522
1	1	0.0251

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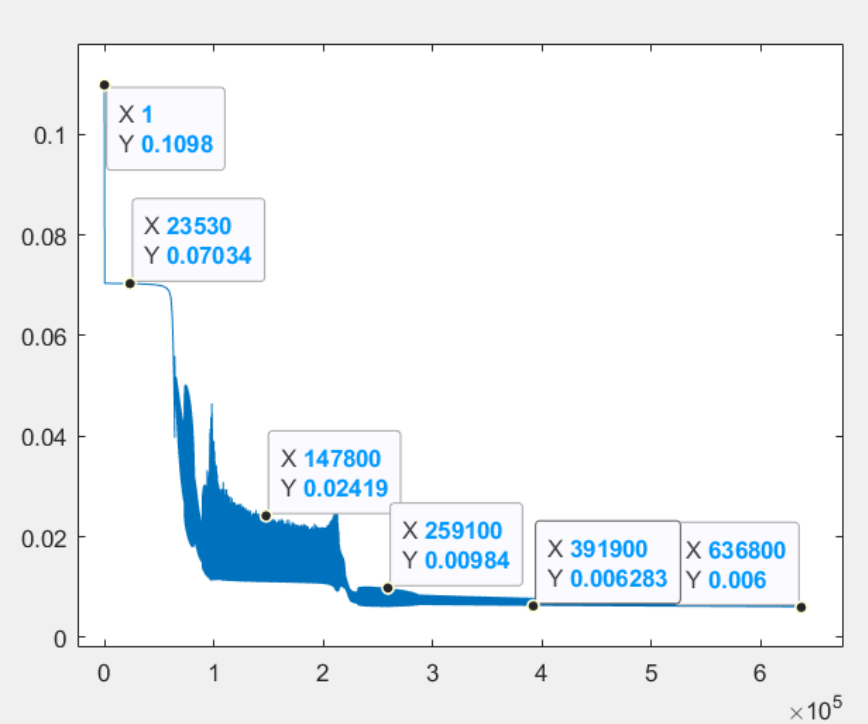
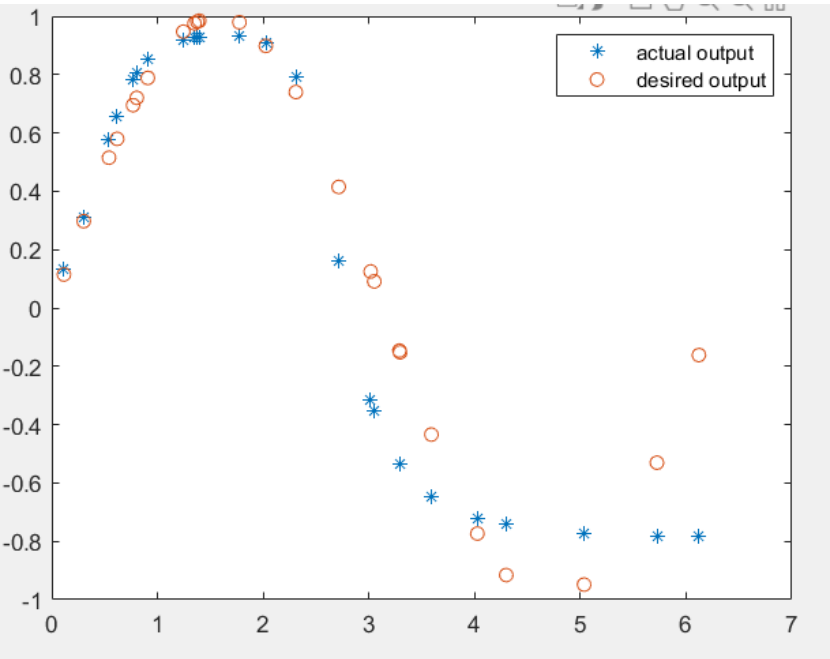
Q2)The layer model for the sinus function is [1 4 6 4 1]. 1 is the number of nodes at the input layer, 4 6 4 are the number of nodes at three hidden layer and 1 is the number of node at the output layer.

The step size is 0.013 and the iterations continue until the loss value is lower than 0.0075. (At the first case it is 0.006).

The initial weight matrix is determined randomly. However, it may not converges to optimum weight matrix. I tried many parameters such as number of layer, number of node and step size. I can not find concrete parameters to work robustly.



At this case, total number of epoch is 636800 and last error value is 0.006.



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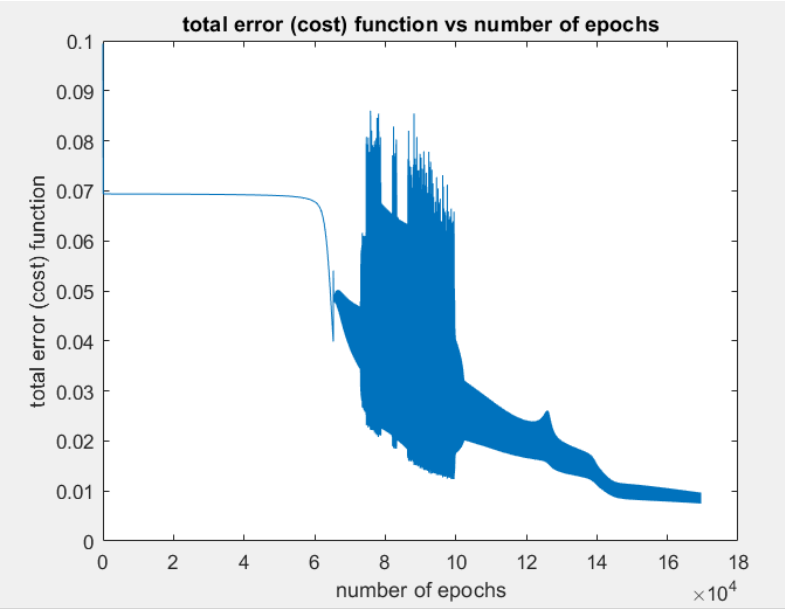

At another case, total number of epoch is 169408 and last error value is 0.0075.