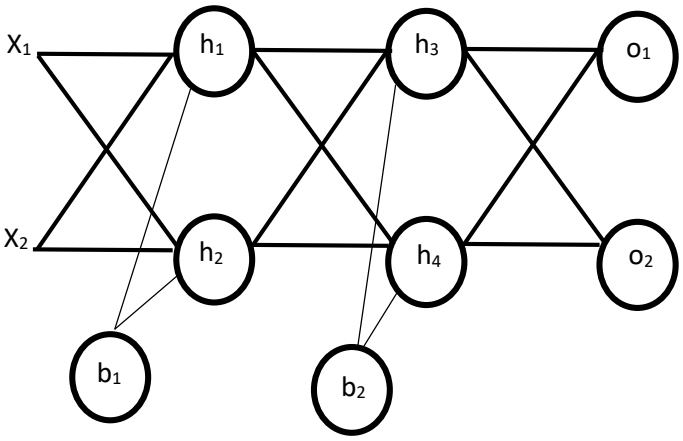
CSCI-494 Deep Learning Homework 1

17/9/2018

Due date: 27 September 2018, 23:59

You are asked to implement backpropagation for a 2 hidden-layer network similar to our example we went through in the class. Your neural network will have the following architecture, where x_1 and x_2 are inputs, o_1 and o_2 are outputs, and h_1-h_4 are the units of two hidden layers.



Given inputs x_1=0.2 and x_2 = 0.6, we want the outputs to be o_1=0.1 and o_2=0.9. In this network, use the sigmoid activation in h_1-h_4 and in o_1, o_2, set the initial weights randomly to fall between 0.001 and 0.5, and use squared error as your loss function. Take your biases associated with your first and second hidden layers as 0.25 and 0.45, respectively. Your initial learning rate will be 0.3 but can be decreased gradually as opposed to continually (for the homework, it may be fixed).

You will do a forward pass, measure the error, and perform the backpropagation to adjust the weights including the biases. Then, repeat this process for a number of times (like 10.000) and draw the graph showing how your error change after each forward pass.

After generating the graph, start this process over multiple times with random weights and draw the graph again. Observe how your graphs change.

Submission

Please zip all your files and submit them through Moodle before the deadline.

Do not use a special Artificial Neural Network library for this assignment. You need to compute forward pass and backpropagation by yourself.

Late submissions will lose 20 points for each day.

Homework assignments should be completed individually. In the event that academic misconduct such as plagiarism or cheating is discovered, the student will receive no credit for the work, and the event reported to the Dean of your school. Please consult the Academic Integrity Statement given in the syllabus for more details about academic honestly.