COMSATS University Islamabad, Attock Campus

Department of Computer Science

Program: BS(AI)

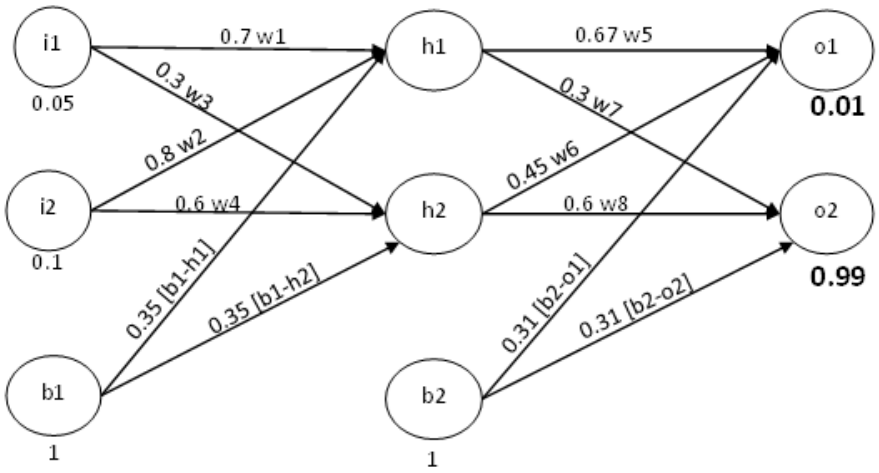
Spring 2023: Assignment 4		**Course: Machine Learning Fundamentals AIC354**
Due Date: 09/06/2023	**Dated: 05/06/2023**	**Marks: 20**
Name:		
Note:- Don't write anything on Question Paper except your Name & Reg. No.		

The student will submit the hard copy to CR before due timing. The CR is responsible to submit the class assignments till due date in office.

Question#1 [CLO-4(SO-2,4)] [5 Marks]

Please use the following network to update all the weights except the bias weights using backward propagation for MLP. Input is given as (i1 = 0.05) and (i2 = 0.1) and target values for (o1 = 0.01) and (o2 = 0.99) and learning rate = 1. Execute for only one iteration. All neurons have sigmoid activation function.

First, you will apply forward pass and calculate total error. Then, you will apply backward propagation for updating all the weights [Note: Please don't update the bias weights]. At the end, you will apply forward pass again with updated weight values and calculate total error.



Question#2 [CLO-4(SO-2,4)] [10 Marks]

Apply the Feedforward Backpropagation method and update all the weights using Batch Gradient Descent optimization technique. Apply the algorithm for three epochs.

A. Calculate the difference between the cost values (SSE) for before and after each epoch.
B. What will be the output of the testing data?

Training data:

X1	X2	X3	Output
1	0	0.5	1
2	0.6	1	0
0.7	0.1	0.4	1
2.5	1	1.5	0

Testing data:

X1	X2	X3	Output
1	1	1	?
1.5	0.5	2	?

Suppose**: Learning rate** = 0.05, and **Activation function** at each hidden and output unit is Sigmoid.

Initial Weights:

Hidden layer 1: w04=0.1, w05=0, w06=1, w14=0, w15=0, w16=0.3, w24=0.2, w25=-0.1, w26=0, w34=0.1, w35=0, w36=0.5
Hidden layer 2: w07=0, w08=-0.1, w47=-0.4, w48=0, w57=0, w58=1, w67=-0.1, w68=0
Output layer 2: w09=1, w79=0.1, w89=-0.2

MLP: