Department of Electronics & Communication Engineering
National Institute of Technology Karnataka, Surathkal, Karnataka, India
EC460- Neural Networks and Deep Learning

Lab Assignment 1: Module 1   **Date of submission: 02-09-2020**

Q.1(a)Write python code for plotting the following activation functions for the input x in the range of -20 to 20.
(a) Sigmoid   (b) TanH   (c) Softsign   (d) ReLU   (e) Softmax
(b)Write python code for the derivative of the following activation functions and their plots for the input x in the range of -20 to 20.
(a) Sigmoid   (b) TanH   (c) Softsign   (d) ReLU

Q.2.Assume we have a 2-input neuron and has the following parameters: w = [1, 1] ; b=2 .Write a python code for calculating the feed-forward output of neural networks by using following activation functions for input x=[4, 5].
(a) Sigmoid   (b) TanH   (c) Softsign   (d) ReLU   (e) Network output comparison with different activation functions using Bar chart plot   (f) verify each result by analytical method

Q.3. Write python code to compute the following Regression loss value for the given true output and predicted output by network:
y_true = [11, 20,19,17,10,24,23]   ## Target or actual Value
y_pred =[12,18,19.5,18,9,23,24]   ## Predicted value by ANN model
(a) MSE   (b) MAE (c) MBE (d) Huber Loss (e) Epsilon Hinge Loss (d) Square Epsilon Hinge Loss (e)verify each loss value by analytical method

Q4.Write python code to compute the values of following Binary classification functions for the given true output and predicted output by network:
y_pred = [0.99, 0.11, 0.11, 0.99, 0.11, 0.11, 0.99, 0.99, 0.99, 0.11, 0.99, 0.99, 0.11, 0.99, 0.99]
                                    ## Predicted value by ANN model
y_true   = [1, 1, 0, 1, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1]   ## Target or actual Value
(a) Binary cross entropy loss (b) Jaccard Loss (c) Dice loss (d) verify each loss value by analytical method

Q.5. Let us consider the given data points (X, Y): (1, 1), (2,1), (3,2), (4,2), (5,4) and the equation of the line passing through origin Y=0.7*X - 0.1.
(i) Plot the graph between X and Y using Python coding   (ii) Calculate the predicted output using above mentioned line equation using Python coding and verify the results with analytical method.
(iii) Calculate the MSE value using Python coding and verify the value with the analytical method.
(iv) Plot the regression line with Python coding

Q.6.The neural network shown in Fig.1 has the following hyper parameters and input: Choose random weights of the neuron and bias=0, learning rate =0.01 and inputs to the
neuron and target values are as follows.

X_1	X_2	Y(target)
4	1	2
2	8	-14
1	0	1
3	2	-1
1	4	-7
6	7	-8

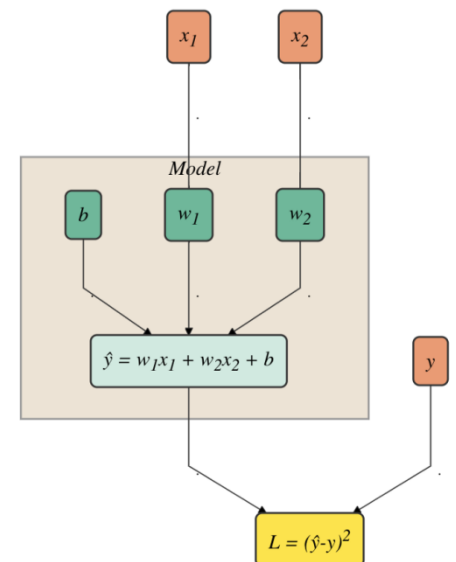Write a python code for calculating the output of neural network using Gradient Descent algorithm.

Fig.1. Model