BITS Pilani Post Graduate Programme
AI/ML C6: Deep Learning and ANN Assignment 1
- [12 marks]

Q1. Train a perceptron

Perceptron is a fundamental building block for neural networks. Let us try to train a single perceptron. Consider the data given in the following table. As one can see, it has two attributes x1,x2, and a class label (either 0 or 1)

1. Implement the perceptron training rule and get the appropriate parameters for a single perceptron (Using only basic libraries like NumPy)

2. Plot the data points and the obtained decision boundary

3. Also draw the schematic diagram of the trained perceptron with learned weights. You can draw this on paper and upload it in the Python notebook

[2+2+1= 5 Marks]

X1	X2	Y
-3.98	-0.12	1
-3.464	-2.11	1
-3.461	1.89	1
-2.22	-3.474	1
-2.02	0.03	0
-2.01	3.459	1
-1.42	-1.409	0
-1.416	1.419	0
-1.09	0.08	0
-0.19	-4.13	1
0.01	1.02	0
0.03	-2.12	0
0.04	2.06	0
0.06	3.97	1
0.07	0.1	0
0.12	-1.12	0
1.11	0.09	0
1.411	1.419	0
1.414	-1.415	0
1.86	3.47	1
1.96	-0.12	0
2.11	-3.472	1

Q2. Train a neural network

Let us design a neural network to classify the Pima Indians Diabetes Dataset.

1. Implement a single hidden layer MLP. The final output layer will have 3 neurons, one for each result. Arch: [Input, hidden, output]

2. Now use a NN with three hidden layers. The first hidden layer has 8 neurons. The second hidden layer has 4 neurons. The third hidden layer has 4 neurons. Arch: [Input,hidden1(8),hidden2(4),hidden3(4),output]

(i) Use Keras or any other framework to design the NN model and train on the diabetes data. Report the accuracy.

(ii) Draw the schematic diagram of the NN along with all the weights and specify a suitable activation function.

[2 (NN1) + 3 (NN2) + 2(diagram)= 7 Marks]

Note: The architecture for NN1 and NN2 is clearly mentioned, any change in the number of layers/neurons will be penalized in the marks.