BITS Pilani, Post Graduate Programme in AI/MLC6: 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.
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 attach a photo.

[2+2+1= 5 Marks]

x_1	x_2	Class
2	3	0
4	5	0
11	11	1
4	11	1
12	5	0
5	2	0
6	1	0
6	3	0
2	10	1
4	7	1
13	8	0
1	6	1
6	9	1
10	12	1
8	3	0
2	8	1

Q2. Train a Neural Network

Let us design a neural network to classify flowers from Iris dataset.

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

2. Now use an NN with two hidden layers. The first hidden layer has 9 neurons. The second hidden layer has 3 neurons. Arch: [Input,hidden1,hidden2,output]

(i) Use keras to design the NN model and train on the iris data.

(ii) Draw the schematic diagram of the NN 2 along with all the weights and specify suitable activation function. How many trainable parameters are there?

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

Link for Iris dataset: https://archive.ics.uci.edu/ml/datasets/iris