LAB 4 : Multi Layered Neural Netwrok and Backpropogation

Name :

Roll Number :

Referrence Material :

1. **Chapter 4:, page no. 106-136, Artificial Neural Network by B. Yegnanarayana)**
2. https://machinelearningmastery.com/implement-backpropagation-algorithm-scratch-python/
3. https://www.geeksforgeeks.org/deep-neural-net-with-forward-and-back-propagation-from-scratch-python/
4. https://scikit-learn.org/stable/modules/generated/sklearn.datasets.make_moons.html
5. https://towardsdatascience.com/the-vanishing-gradient-problem-69bf08b15484

Problem 1 : Demonstrate the working principle of multi layer neural network, with non-linearly separable and non-convex data.

Observation to be demonstrated:

1. Two layer neural network (i.e one output layer) not able to classify non-linearly separable data. Solve the problem by increasing the no. of layer and changing the activation function from hard-limiting to sigmoid.
2. Similar observations have to be demonstrated for non-convex data.(i.e 3 layer network not able to learn the appropriate separating hyper plane, which being resolved using 4 layer network.)
3. Show that, using sigmoid activation, the gradient vanishing/ exploding happens during training, try to resolve this problem by changing the activation function.

Write down the Objectives, Hypothesis and Experimental description for the above problem

Double-click (or enter) to edit

Programming :

Please write a program to demonstrate the same

Step 1 : Data Generation, Generate Non Linearly Seperable and Non Convex Data

Step 2 : Demonstrate how two layered neural network (perceptron without a hidden layer) fails to classify non linearly separable data

Step 3 : Demonstrate how addition of a hidden layer helps in overcoming this problem (Backpropogation)

Step 4 : Demonstrate how 3 Layered Neural network fails on non convex data and 4 layered (2 hidden layers) helps solve this problem

Step 5 : Demonstrate the effect of Vanishing/Exploding gradients occur and how you can solve it

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1 ## Write your code here
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Inferences and Conclusion : State all the key observations and conclusion

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