IMLPR Homework #03

In Chapter 2,

1 Implement the SGD method and Batch method on your own and try training and inferencing for the problem of classifying the following data

X=[0 0 1; 0 1 1; 1 0 1; 1 1 1] D=[0 0 1 1]

where X is the training data and D is the desired output.

This problem is to classify the four given points into two classes using a single neural network

2 Analyze the results in 1 and compare the performance of SGD and Batch methods

3 Summarize the implemented codes of SGD and Batch methods in pseudo codes (i.e., write pseudo codes for the SGD and Batch methods performed in 1). * Pseudo codes are similar to flow charts, providing easier understanding of what is being computed or what is going on.

4 Examine the values of the weight and their meanings. What does $W_1X_1 + W_2X_2 + W_3X_3 = 0$ mean? What is the effect of the fixed value of X_3 or Z coordinate as 1? The equation should represent a decision boundary dividing the data samples into two groups (i.e., classes). Plot the data points and this decision boundary. It should be a linear decision boundary.

5 Why does the SGD method learn faster than the batch method?

6 What method is used for the weight initialization?

7 What could be the limitation of the single-layer neural network? Why need multi-layer neural network?