

Report on - Programming Test: Learning Activations in Neural Networks

Please visit github.com/DKZakeerhussain/Happymonk_Assignment for more information.

1 Architecture

Considering the architecture with an input layer, two hidden layers, and an output layer as shown in the figure below.

we consider the hidden layers to have 10 neurons in each layer while the input layer is data points and the output layers of a number of classes

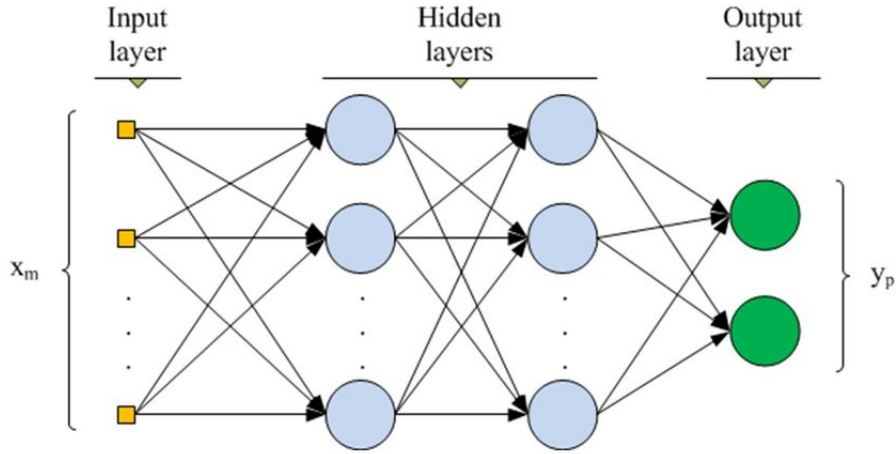


Figure 1: Architecture for the Experiment.

2 Experiment

2.1 Dataset

For this experiment, we consider the **Iris dataset** which is a data frame of 150 measurements of iris petal and sepal lengths and widths, with 50 measurements for each species of “setosa,” “versicolor,” and “virginica.” The dataset is already present in the SK-Learn library

2.2 Assumptions

Some of the assumptions made while solving the assignment as follows

1. Distribution of k_0 and k_1 is assumed to be standard normal distribution
2. Algorithm is considered as Multi-Layer Perceptron
3. Activation Function to be considered as given Ada-Act function which is defined as

$$g(x) = k_0 + k_1 \cdot x$$

4. Loss is to be considered as Categorical Cross entropy which is calculated as

$$\text{Categorical Cross Entropy} = - \sum_{i=1}^N y_i \cdot \log(\hat{y}_i)$$

5. Outputs are predicted using the Softmax activation function which is defined as

$$\text{Softmax}(x_i) = \frac{e^{x_i}}{\sum_{j=1}^N e^{x_j}}$$

6. One hot Encoding for converting the categorical variables to quantitative variables as models deal with only numerical values

2.3 Parameters

1. The input layer will have inputs of 150 neurons in the input layer
2. The hidden layers of 10 neurons in each layer
3. The output layer of classes 3 so we consider 3 neurons in the outer layer
4. Number of epochs to be considered 100
5. Learning rate is set to be 0.01

3 Results

The results are shown in the below table

Table 1: Result Table

	Parameters	Values
1	Train Accuracy	0.975
2	Test Accuracy	0.9667
3	F1-Score	0.966

Plots: 1. plotting the graph of Train loss and test loss

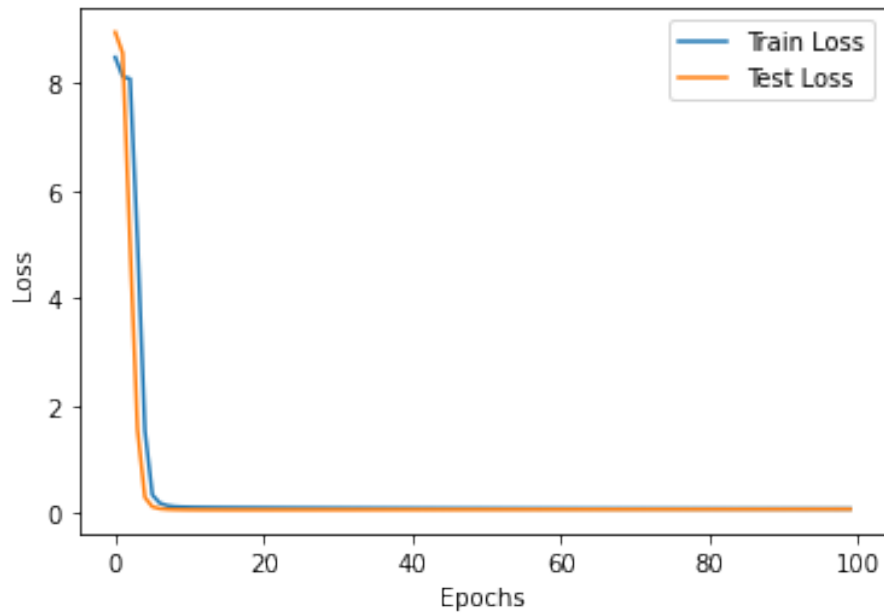


Figure 2: Plot of Loss vs Epoch.