Neural Networks Task 2

Table of Contents

Team Information

Team ID: 5

Member name	Department	IDs
عمر احمد فاروق احمد الجبالي	CS	20201701162
عماد محمود عمر الفاروق محمود	CS	20201700517
عمر احمد محمد عبدالمعطي	CS	20201700524
عمر عبدالفتاح عبدالسميع ابراهيم	CS	20201700538
محمد ابراهيم سعيد امام	CS	20201700650
محمد اسامه كمال يوسف	CS	20201700665

Model Analysis

Sigmoid Test:

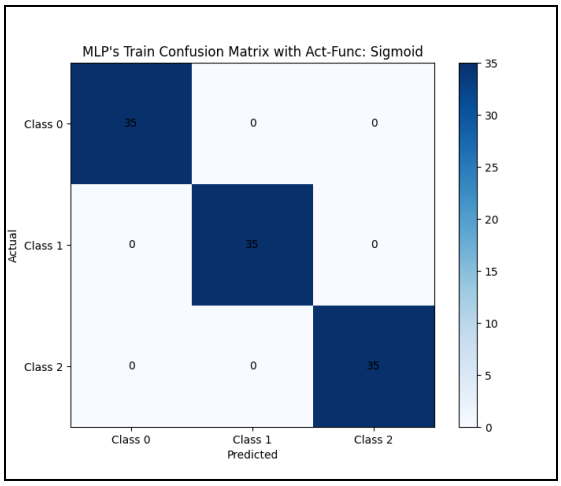
Given Parameters

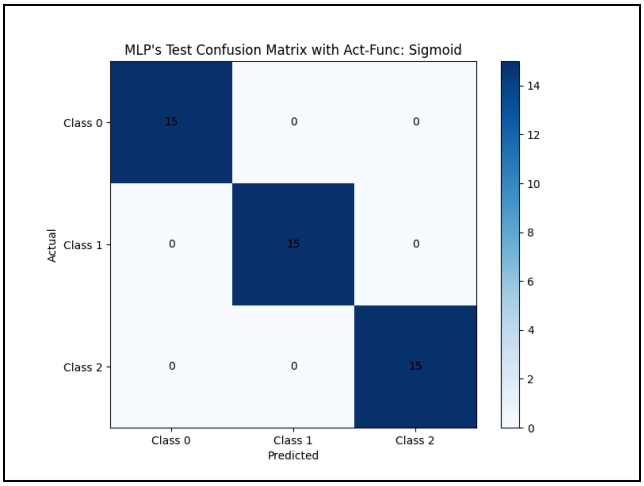
Hyper-Parameters	***Values***
Epochs	1000
Learning Rate (ETA)	0.01
Number of Hidden Layers	2
Number Of Hidden Parameters	[3, 4]

Metrics

Measures	***Values***
Mean Squared Error (MSE)	0.3460667
Train-Accuracy	100%
Test-Accuracy	100%

Confusion Matrix





Hyperbolic-Tangent Test:

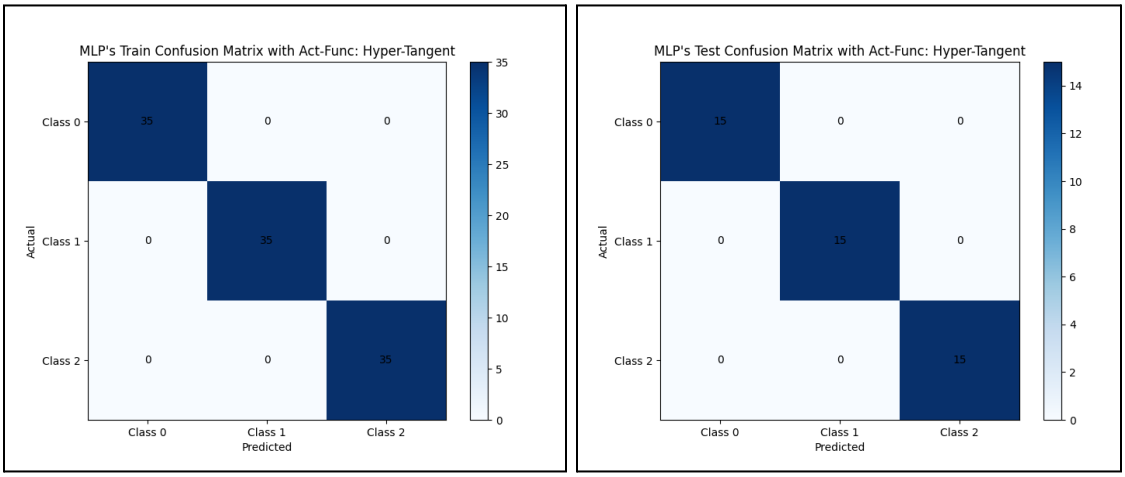
Given Parameters

Hyper-Parameters	***Values***
Epochs	5000
Learning Rate (ETA)	0.001
Number of Hidden Layers	1
Number Of Hidden Parameters	[5]

Metrics

Measures	***Values***
Mean Squared Error (MSE)	0.002397
Train-Accuracy	100%
Test-Accuracy	100%

Confusion Matrix



Conclusion

In conclusion, There are multiple factors that affects accuracy of Multi-Layer Perceptron with both activation functions Sigmoid and Hyperbolic-Tangent.

1. Initial Weights: As they are randomly generated in each fit, different accuracies (also different MSE) appears with low variations ~0.9 to ~1.
2. Increasing the epochs or decreasing the learning rate, makes a highly positive change in the performance of each activation function and vice versa.
3. Increasing the number of neurons in a layer mostly resulting better in accuracy.
4. Increasing the number of layers too much causes an overfitting.

Number of layers mostly fitted well is 1 with number of neurons higher than 4 and 2 with number of neurons higher than 3 in each layer.

To have the most likely weights in a current hyper-parameters, using the method of fitting the model multiple times and save/use the weights with the highest accuracy and lowest MSE.