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| Assignment 4 | |
| Due Date: | March 18, 2019 |
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# Part A

The Neural Network developed in Assignment 3 was converted to an Object-Oriented form. The application is capable of creating Neural Networks with any number of hidden layers. Each layer contains a configurable number of neurons and the last layer’s activation function can be set to Sigmoid, Tanh, RELU, or SoftMax.

The following figure is an example output of the updated application.

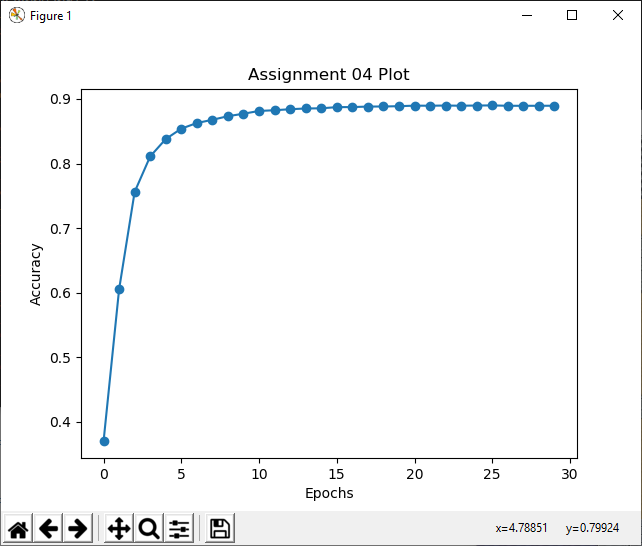


Figure : Mini Batch, Batch Size 10, 30 Epochs

# Part B

The Adam optimizer was added to the implementation from part A. The following figure is an example of the Neural Network’s accuracy using the Adam optimizer.

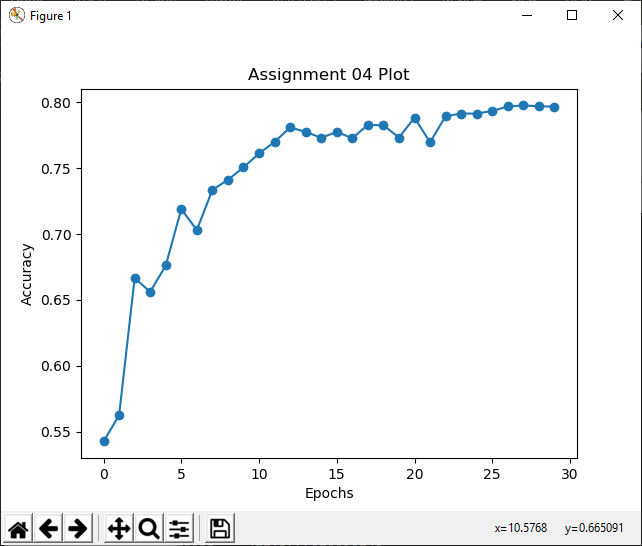


Figure : Mini Batch, Batch Size 10, 30 Epochs, ADAM Optimization

# Part C

# Part D

Batch Normalization was implemented in all layers excluding the last layer.

The following figure is an example of Batch Normalization without the Adam Optimizer.

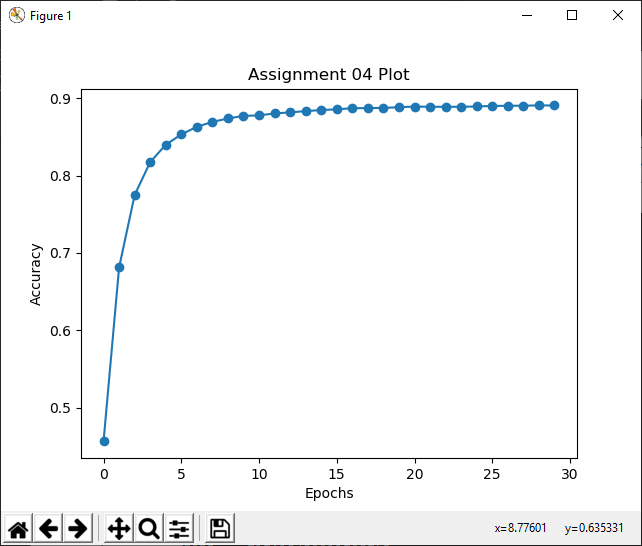


Figure : MiniBatch, Batch Size 10, 30 Epochs, Batch Normalization

The following figure is an example of Batch Normalization with the Adam optimizer.

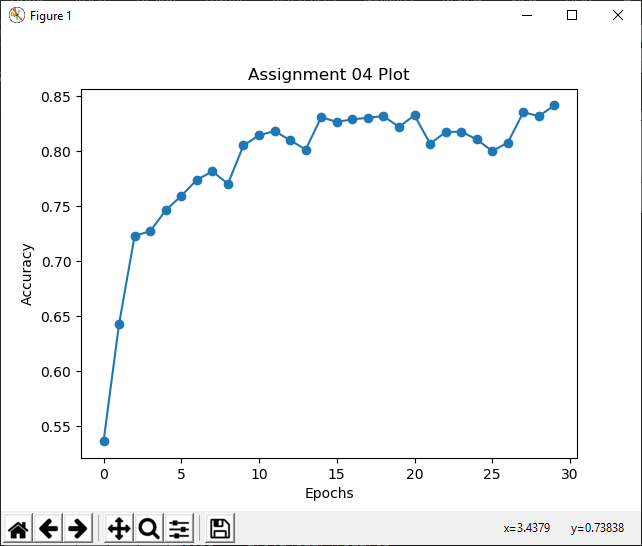


Figure : Mini Batch, Batch Size 10, 30 Epochs, Batch Normalization and ADAM optimization