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| Name: | Edward Eisenberger |
| ID#: | 1066164 |
| 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. All example outputs use Mini Batch with a batch size of 50 and a learning rate of 0.01 for 30 Epochs.

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

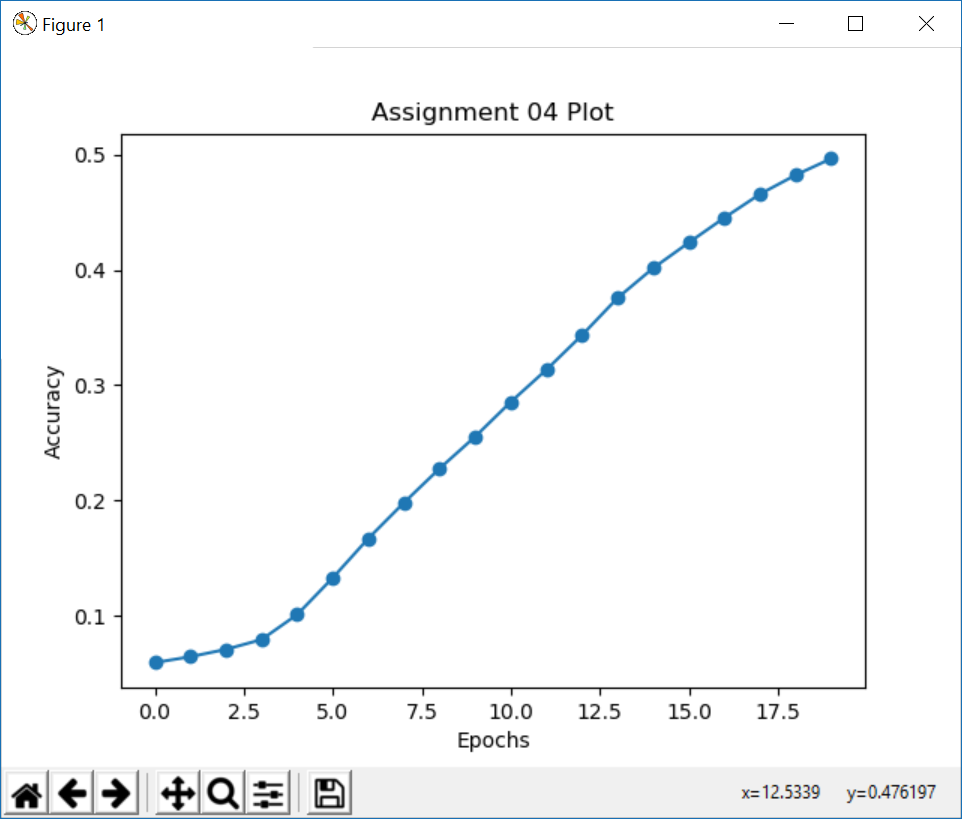


Figure : No Optimizations

# 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.

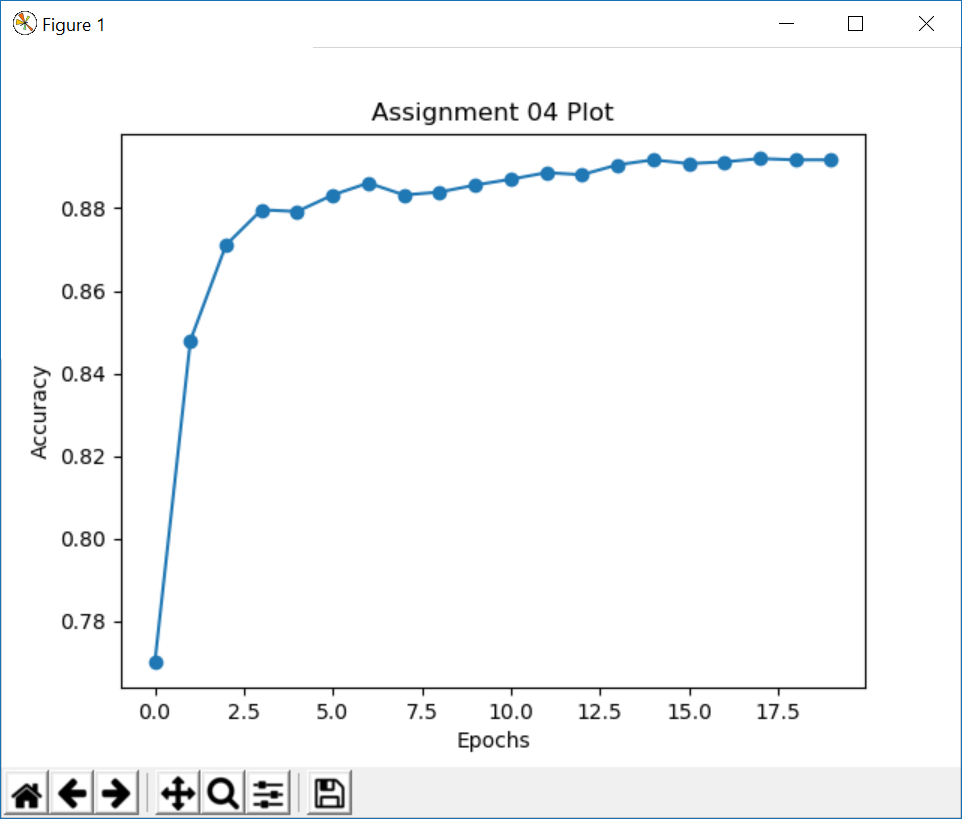


Figure : ADAM Optimization

# Part C

# Part D

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

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

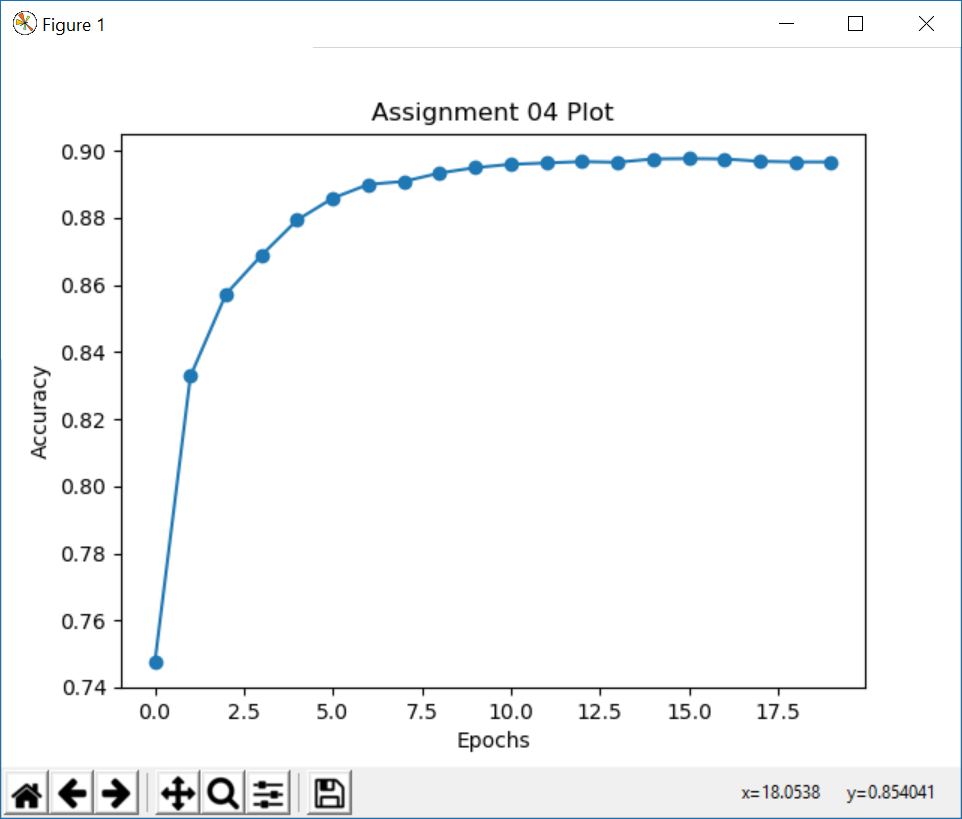


Figure : Batch Normalization with Adam Optimizer