CS 3600 Project4 Analysis

Sang June Rhee

GTID#: 903569008

Question 5

Results is written below.

Status for Pens:

1. Max is 0.9056603773584906.

2. Average is 0.9030303030303031.

3. Standard is 0.002572263437210308.

Status for Cars:

1. Max is 0.97.

2. Average is 0.961.

3. Standard is 0.0058309518948453055.

Question 6:

Results:

a. Data

------Data for Pens------

Neuron Count: 0   Average Accuracy: 0.9034305317324186

Neuron Count: 5   Average Accuracy: 0.9069754145225843

Neuron Count: 10   Average Accuracy: 0.9040594625500287

Neuron Count: 15 Average Accuracy: 0.8978273299028017

Neuron Count: 20 Average Accuracy: 0.9028016009148084

Neuron Count: 25 Average Accuracy: 0.9006861063464837

Neuron Count: 30 Average Accuracy: 0.9034305317324185

Neuron Count: 35 Average Accuracy: 0.9054888507718697

Neuron Count: 40 Average Accuracy: 0.9036020583190394

------Data for Cars------

Neuron Count: 0 Average Accuracy: 0.961

Neuron Count: 5 Average Accuracy: 0.9679999999999997

Neuron Count: 10 Average Accuracy: 0.9710000000000001

Neuron Count: 15 Average Accuracy: 0.9709999999999999

Neuron Count: 20 Average Accuracy: 0.97

Neuron Count: 25 Average Accuracy: 0.966

Neuron Count: 30 Average Accuracy: 0.9710000000000001

Neuron Count: 35 Average Accuracy: 0.968

Neuron Count: 40 Average Accuracy: 0.9650000000000001

b. Learning Curves
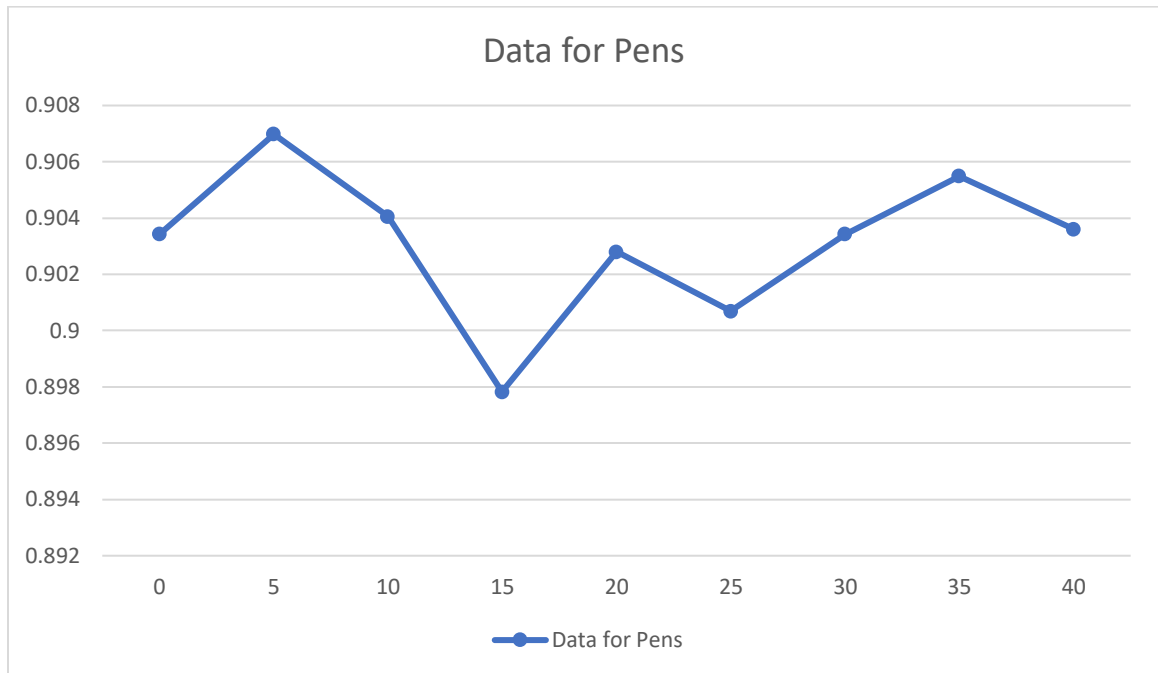
Axis x = Neuron Count, Axis y = Average Accuracy
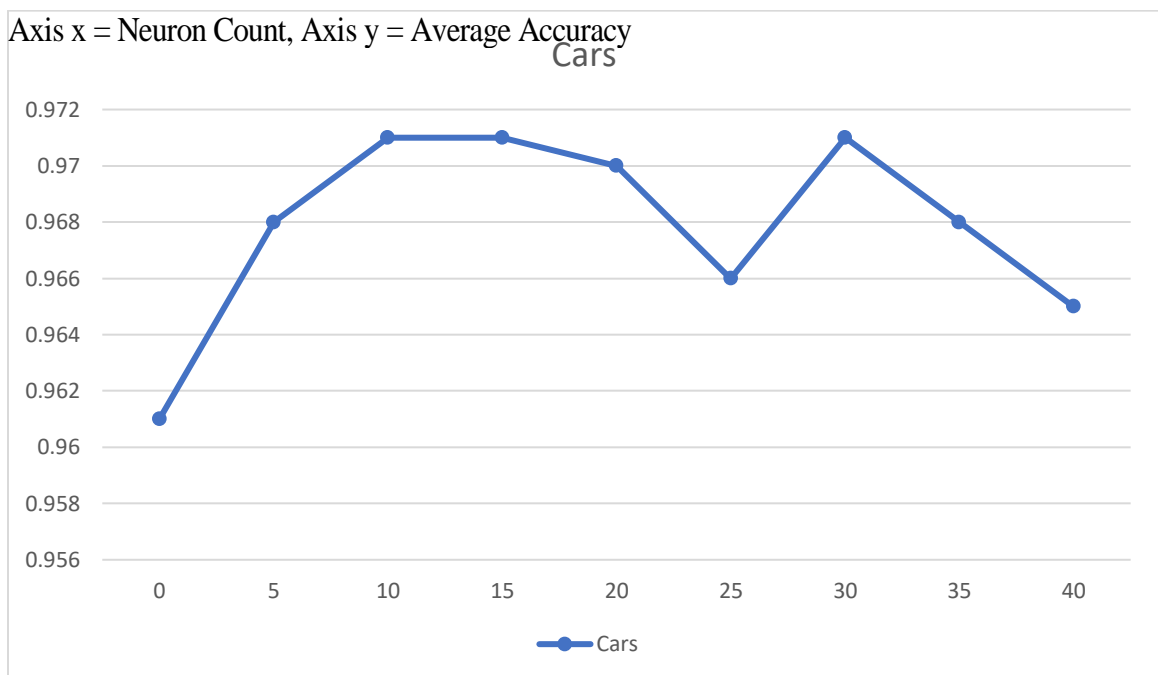
Axis x = Neuron Count, Axis y = Average Accuracy

c. Analysis

As we can see from the above graphs, accuracy increase when the neuron count increases. However, the relationship does not show a linear line. In both pens and cars cases, a neuron count past twenty and it seems granting diminishing returns.

Question 7:

I iterated maximum 500 times and split into training set with a ratio of 70:30.

From the experiment, I played with the number of the perceptron:

0 perceptron always gives equal or lower than 56% testing accuracy.

By increasing the number of perceptrons, the accuracy increases.

1 perceptron gives lower than or equal to 78% testing accuracy.

2 perceptrons most of time gives 100%, but sometimes lower than or equal to 78% because I applied randomization.

More than or equal to 3 perceptrons always gives 100% testing accuracy.

From the experiment, I learned that XOR function is not linearly separable. We need to use at least 2 perceptrons to get accurate dataset, but 3 perceptrons would be the best.