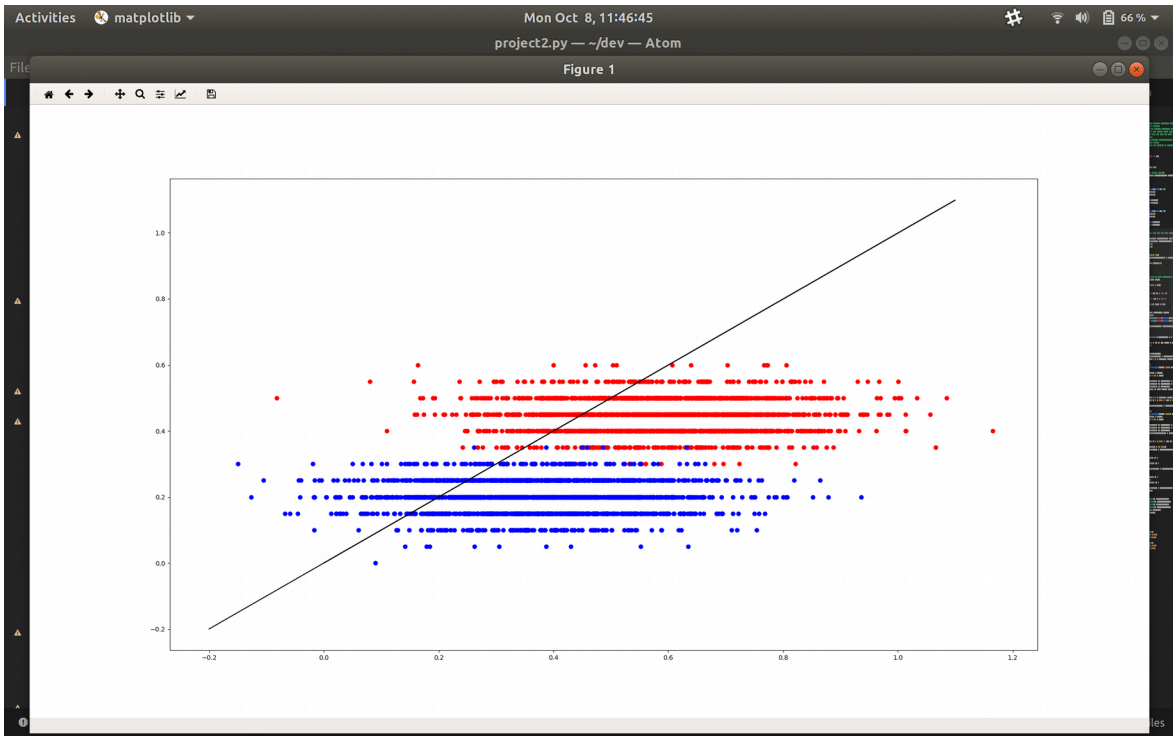
Nathan West
Yonathan Mekonnen
Derrick Adjei
10/7/18
CMSC 409

Scenario A: Hard Activation Function 75% training data

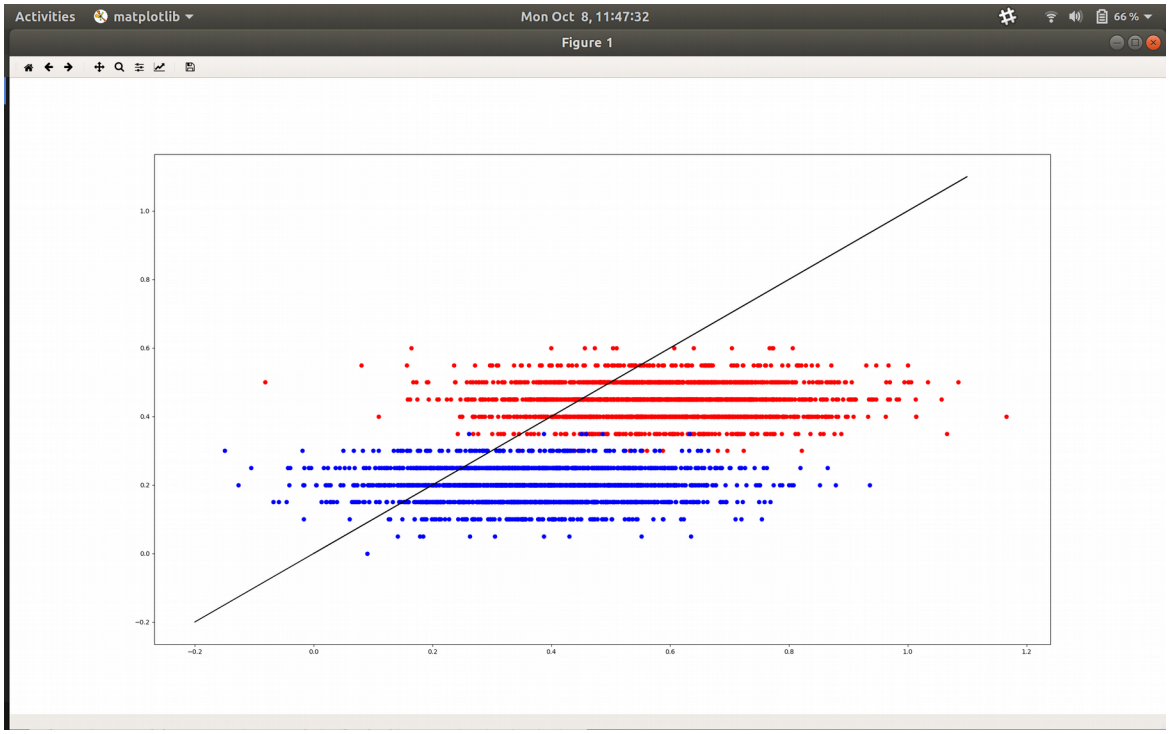
For this scenario, out of 2000 samples we choose 75% of the data for training and 25% for testing. The data was split between differentiating male and female weights and heights. The male heights were centered around the average male height (5.9), with a standard deviation of 0.1. The male weights are centered around the average male weight (195.7) with a standard deviation of 20. The female heights were centered around the average female height (5.4), with a standard deviation of 0.1. The female weights were centered around the average female weight (168.5) with a standard deviation of 20. (might want to mention difference between data with 75% training and 25% training). By updating our weights every iteration we minimized the error our model produced from our training data. Every time our our model is trained it is shown to the model, which then makes a prediction. From that, the error is calculated and the model is then corrected so that it can reduce any error for the upcoming prediction.



When calculating the hard activation of the neuron our accuracy and error rate is described as follows:

Accuracy for 75% hard activation
TP = 0.9899799599198397
FP = 0.08016032064128256
TN = 0.9998253892727901
FN = 0.8347273335563734
Accuracy = 0.6850312053184892
Error = 0.31496879468151084

<u>Scenario A: Hard Activation Function 25% training data</u>
For this scenario, out of 2000 samples we choose 25% of the data for training and 75% for testing.

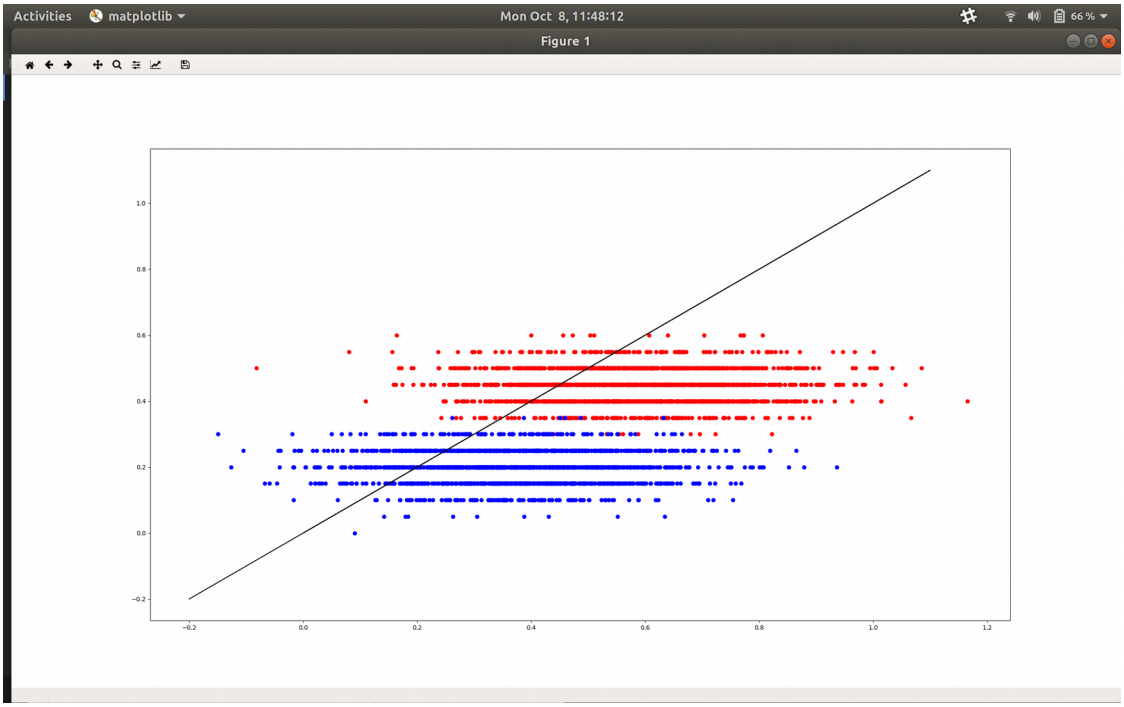


Accuracy for 25% hard activation
TP = 0.8605737158105403
FP = 0.494996664442962
TN = 0.9993465347406615
FN = 0.9958993073326107
Accuracy = 0.5550648341017316
Error = 0.4449351658982684

Clearly, training the perceptron off of 75% the data had more an effect that training off of 25%. It's better to train with more data than less because the algorithm will have more to learn.

Scenario B: Soft Activation Function 75% training data

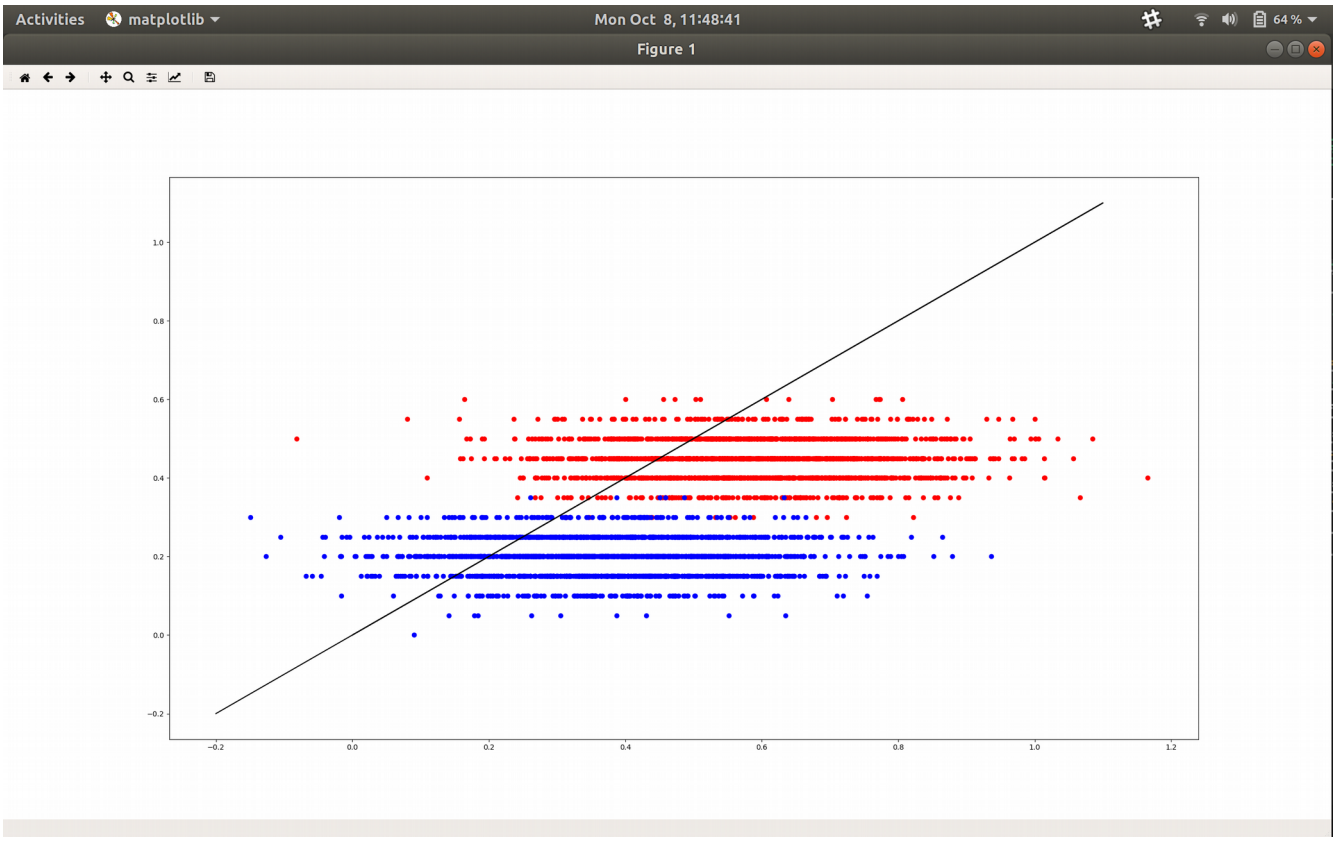
For this scenario, a soft activation function was used by implementing the sigmoid equation. Again, out of 2000 samples we choose 75% of the data for training and 25% for testing. The data was split between differentiating male and female weights and heights. The male heights were centered around the average male height (5.9), with a standard deviation of 0.1. The male weights are centered around the average male weight (195.7) with a standard deviation of 20. The female heights were centered around the average female height (5.4), with a standard deviation of 0.1.



The accuracy for training the perceptron off of 75% of the data using soft activation is described below:

Accuracy for 75% soft activation
TP = 1.0
FP = 0.350701402805611 24
TN = 0.9989187586113153
FN = 0.0
Accuracy = 0.8507412353007208
Error = 0.14925876469927923

Scenario B: Soft Activation Function 25% training data



Accuracy for 25% soft activation
TP = 0.7911941294196131
FP = 0.00133422281521014
TN = 0.9999991087363888
FN = 0.997478596773199
Accuracy = 0.6420033509189215
Error = 0.35799664908107853

Just like hard activation, training the perceptron off of 75% of data allows for better accuracy than training off of 25%.