***CMSC 409: Artificial Intelligence***

***Project No. 1***

**Due Thursday, September 1217, 2019, noon**

*Student certification:*

*Team member 1:*

*Print Name: Peter George*

*Date: 09/16/2019*

*I have contributed by doing the following:* Wrote the code in python 3 to import the data and graph it, wrote the line formulas, did the neurons for the equations, with their weights and thresholds. Special thanks to Daniel Webster for introducing me to Pandas.

*Signed:* 

*Team member 2:*

*Print Name:*

*I have contributed by doing the following:*

*Signed:*

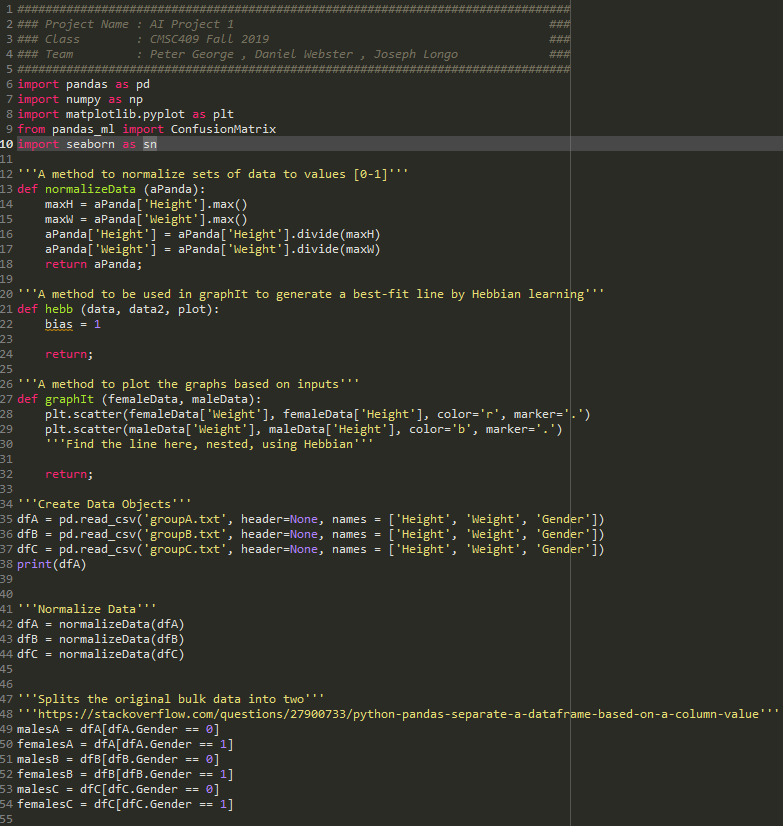
*Team member 3:*

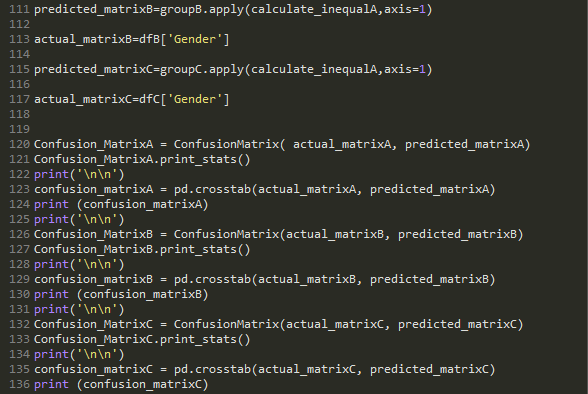
*Print Name: Joseph Longo*

*I have contributed by doing the following: Creating the neuron truth table in part B, creating the functionality, and calculating the possible threshold values.*

*Signed:*

Python 3 code used

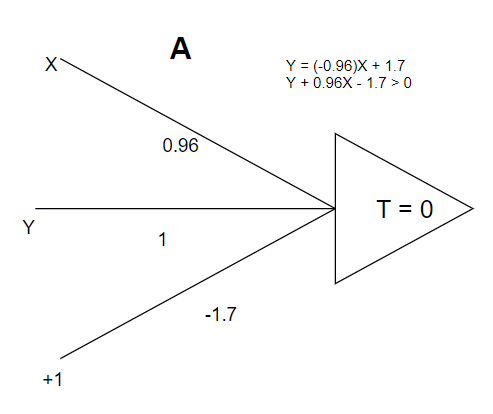
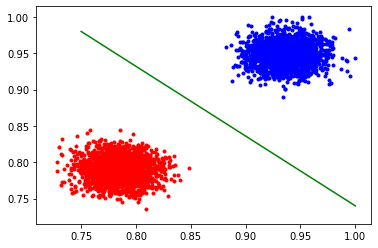




Definition of a Neuron : The decision making process that gives outputs based on weighted inputs

Output :

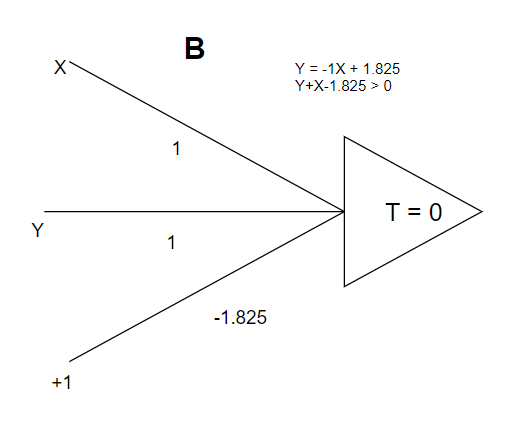
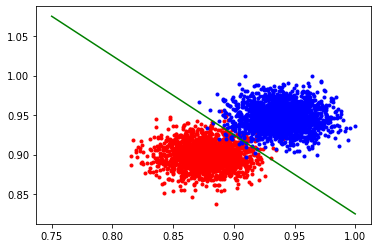
Data Model A from groupA.txt uses line **Y = (-0.96)X + 1.7**  with normalized data



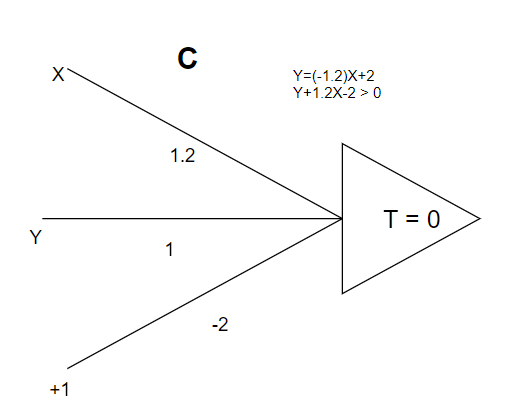
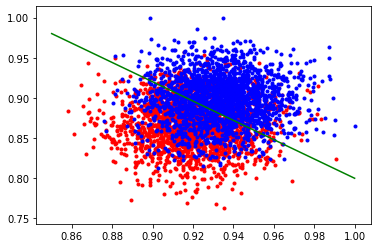
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group A |  |  |  |  |
| Classes | is\_famale =yes | is\_female =no | Total | Recognition |
| is\_female =yes | 2000 | 0 | 2000 |  |
| is\_female = no | 0 | 2000 | 2000 |  |
| Total | 2000 | 2000 | 4000 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Group A** |  |  |  |
| ACC | 1 |  |  |
| Error | 0 |  |  |
| FP(M) | 0 | FPR | 0 |
| FN(M) | 0 | FNR | 0 |
| TP(M) | 2000 | TPR | 1 |
| TN(M) | 2000 | TNR | 1 |
| P(M) | 1 |  |  |

Data Model B from groupB.txt uses line **Y = (-1)X + 1.825**  with normalized data



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group B |  |  |  |  |
| Classes | is\_famale =yes | is\_female =no | Total | Recognition |
| is\_female =yes | 2000 | 0 | 2000 |  |
| is\_female = no | 1912 | 88 | 2000 |  |
| Total | 3912 | 88 | 4000 |  |
| **Group B** |  |  |  |  |
| ACC | 0.522 |  |  |  |
| Error | 0.478 |  |  |  |
| FP(M) | 0 | FPR | 0 |  |
| FN(M) | 1912 | FNR | 0.956 |  |
| TP(M) | 88 | TPR | 0.044 |  |
| TN(M) | 2000 | TNR | 1 |  |
| P(M) | 0.51124 |  |  |  |

Data Model C from groupC.txt uses line  **Y = (-1.2)X + 2** with normalized data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Group C |  |  |  |  |
| Classes | is\_famale =yes | is\_female =no | Total | Recognition |
| is\_female =yes | 1994 | 6 | 2000 |  |
| is\_female = no | 1845 | 155 | 2000 |  |
| Total | 3839 | 161 | 4000 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Group C** |  |  |  |
| ACC | 0.53725 |  |  |
| Error | 0.46275 |  |  |
| FP(M) | 6 | FPR | 0.003 |
| FN(M) | 1845 | FNR | 0.9225 |
| TP(M) | 155 | TPR | 0.0775 |
| TN(M) | 1994 | TNR | 0.997 |
| P(M) | 0.51941 |  |  |

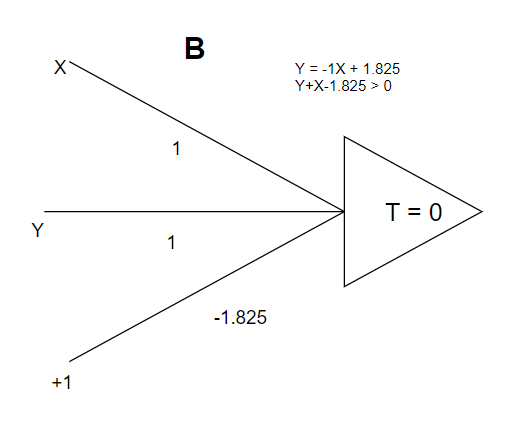
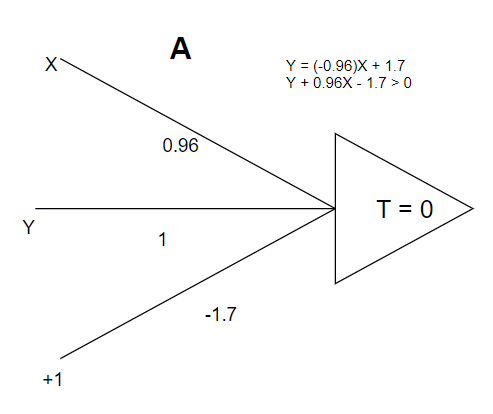
**3B)**

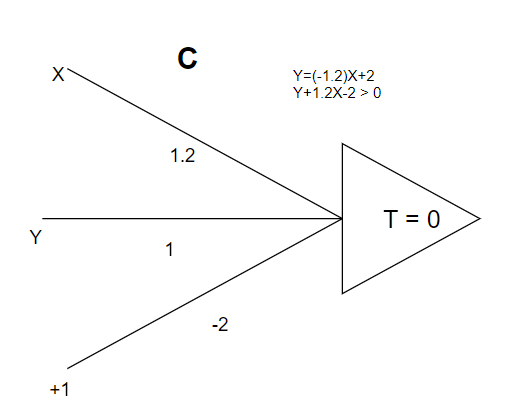
Weights for A were WX = 0.96 , WY = 1 , WBias = -1.7

Weights for B were WX = 1 , WY = 1 , WBias = -1.825

Weights for C were WX = 1.2 , WY = 1 , WBias = -2

Threshold was set to 0 for all three, where above 0 proved to be male.





PR1 ) B ) McCulloch-Pitts neurons

