Neural Network Course

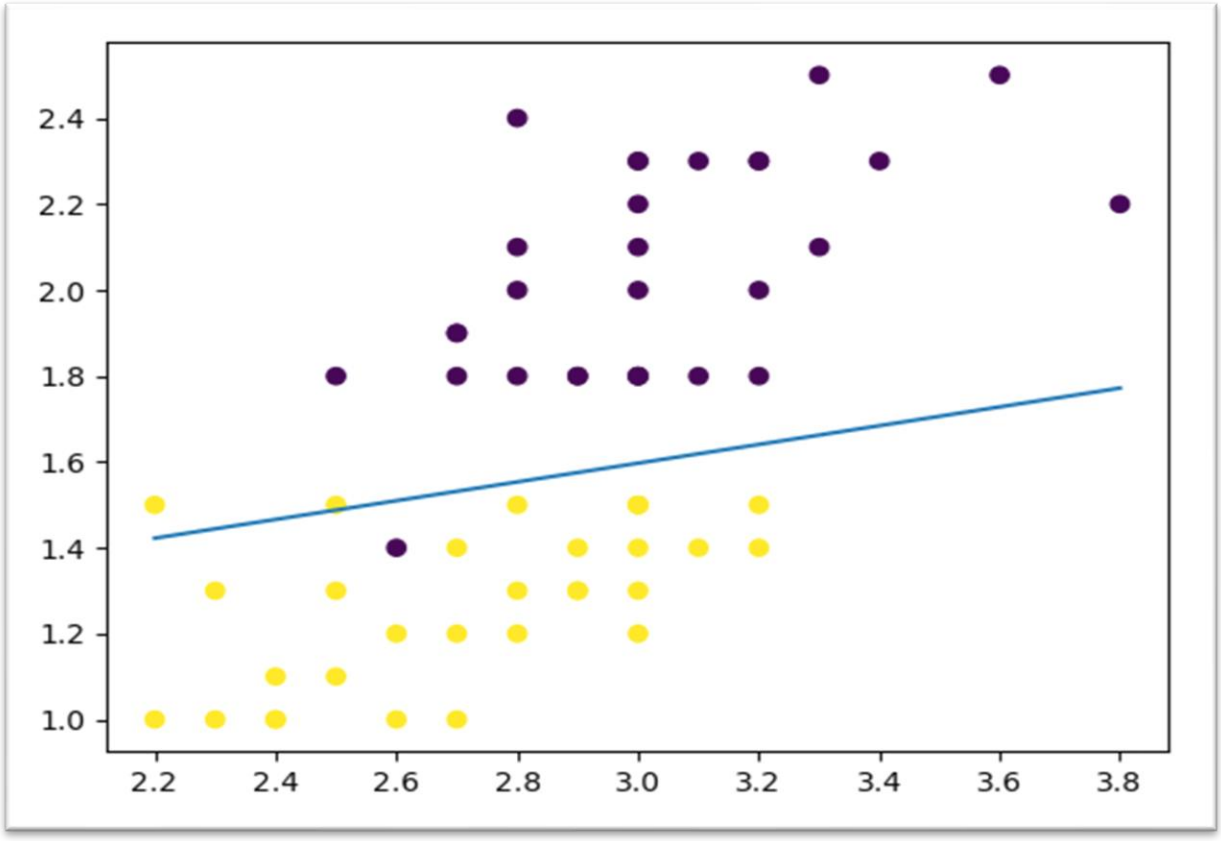
Task 2: Adaline Learning Algorithm

- Screenshots for output

```
--> The Test is Now Running ...
    actual prediction       status
0      1.0          1     Matching
1      1.0          1     Matching
2      1.0         -1  Mismatching
3      1.0          1     Matching
4      1.0          1     Matching
5      1.0          1     Matching
6      1.0          1     Matching
7      1.0          1     Matching
8      1.0          1     Matching
9      1.0          1     Matching
10     1.0          1     Matching
11     1.0          1     Matching
12     1.0          1     Matching
13     1.0          1     Matching
14     1.0          1     Matching
15     1.0          1     Matching
16     1.0          1     Matching
17     1.0          1     Matching
18     1.0          1     Matching
19     1.0          1     Matching
```

```
20    -1.0          -1     Matching
21    -1.0          -1     Matching
22    -1.0          -1     Matching
23    -1.0          -1     Matching
24    -1.0          -1     Matching
25    -1.0          -1     Matching
26    -1.0           1  Mismatching
27    -1.0          -1     Matching
28    -1.0          -1     Matching
29    -1.0          -1     Matching
30    -1.0          -1     Matching
31    -1.0          -1     Matching
32    -1.0          -1     Matching
33    -1.0          -1     Matching
34    -1.0          -1     Matching
35    -1.0          -1     Matching
36    -1.0          -1     Matching
37    -1.0          -1     Matching
38    -1.0          -1     Matching
39    -1.0          -1     Matching
--> Confusion Matrix:
[[19.  1.]
 [ 1. 19.]]
--> Accuracy: 0.95
```

- Fitting Line



- Test Case Data
  - Selected Features: X2 and X4
  - Selected Classes: C2 and C3
  - Learning Rate: 0.0001
  - Epochs Number: 1000
  - MSE Threshold: 0.3

- Appendix
  - MSE Status Output
    - OPT 1: " for all epochs there is no MSE is less than threshold "will be showed if MSE is still greater than thresh to announce you those returned weights are the weights that returned after finishing all epochs

- OPT 2: " the current MSE is less than threshold ... learning gonna stop now " Will be showed if MSE become less than thresh then he breaks and return the current weights

- Running Test Result
  Here we print the 40-sample selected randomly by comparing predicted output with actual one and print the status of it [Matching / Mismatching]

  e.g.

	actual	predicted	Status
0	1	1	Matching
1	-1	1	Mismatching

- Confusion Matrix
  Here we preferred to write hard coded confusion matrix not using modules as we have a confusion of what really needed so we did it as defined

- Accuracy
  Here after creating the confusion matrix, we print the accuracy of model

--- NOTE ---

we have notice When changing value of learning rate in some values e.g., 0.1, 0.01, 0.001 will leads to overshooting e.g. error be so small value as 4 in first epoch then be 277 in the next epoch and start increasing so far so for that reason we RECOMMEND to test with 0.0001