

PATTERN RECOGNITION ASSIGNMENT-1

REPORT

GROUP -3

NEHA MUTHIYAN (B14113)
SIDDHANT KUMAR (B14133)

in the guidance of

Dr. A.D Dileep
(Asst. Professor)

School of Computing and Electrical Engineering
September 2016

TABLE OF CONTENTS

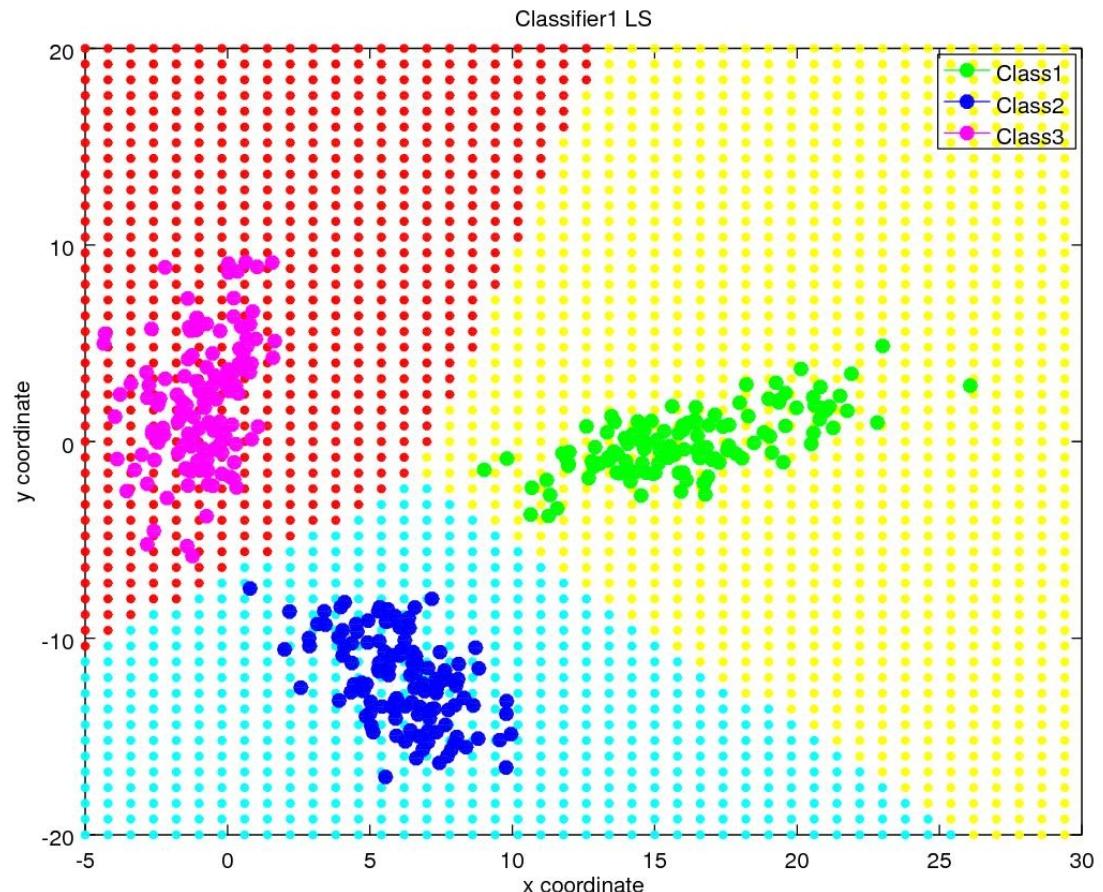
AIM

EXPERIMENTAL OBSERVATIONS

Bayes Classifier

Dataset 1(a) : Linearly Separable data: (LS_Group3)

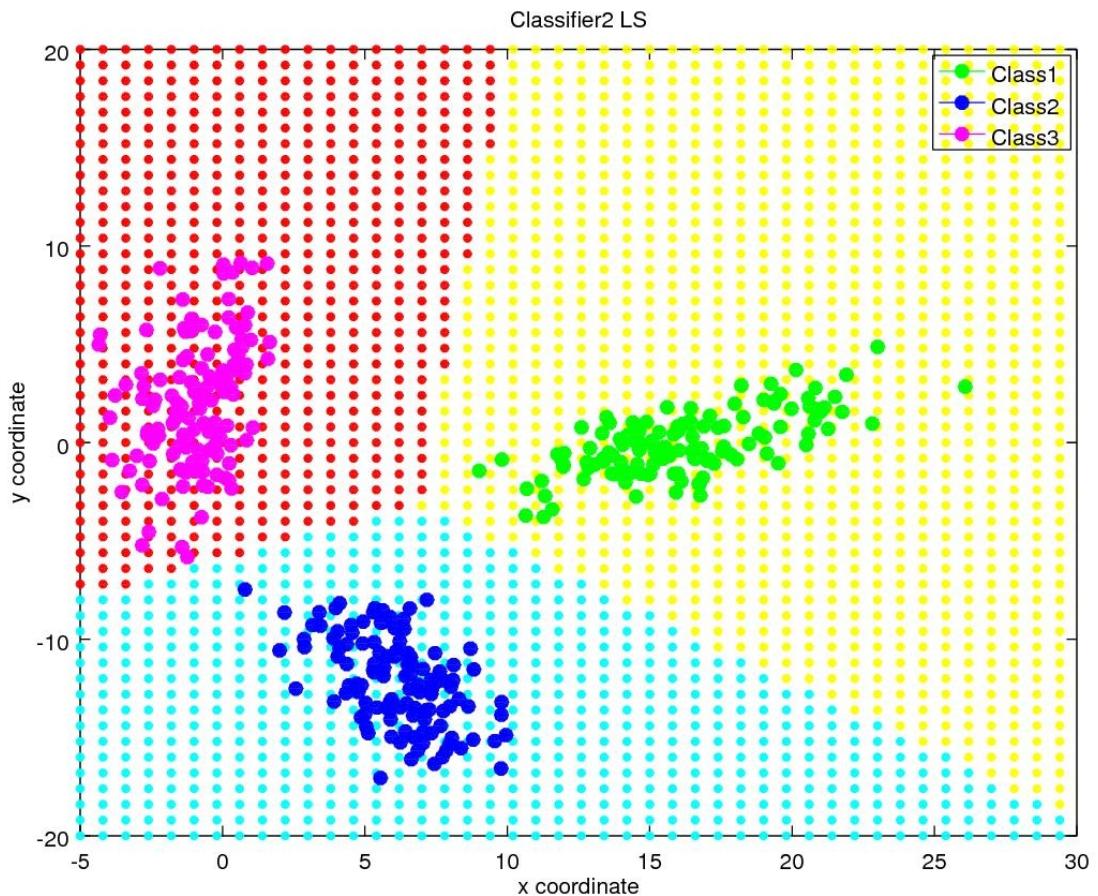
Classifier 1:



Classification Accuracy (%)	100%
Precision for Class1	1
Precision for Class2	1
Precision for Class3	1
Mean Precision	1
Recall for Class1	1
Recall for Class2	1
Recall for Class3	1
Mean Recall	1
F-measure for Class1	1
F-measure for Class2	1
F-measure for Class3	1
Mean F-measure	1

Confusion Matrix :

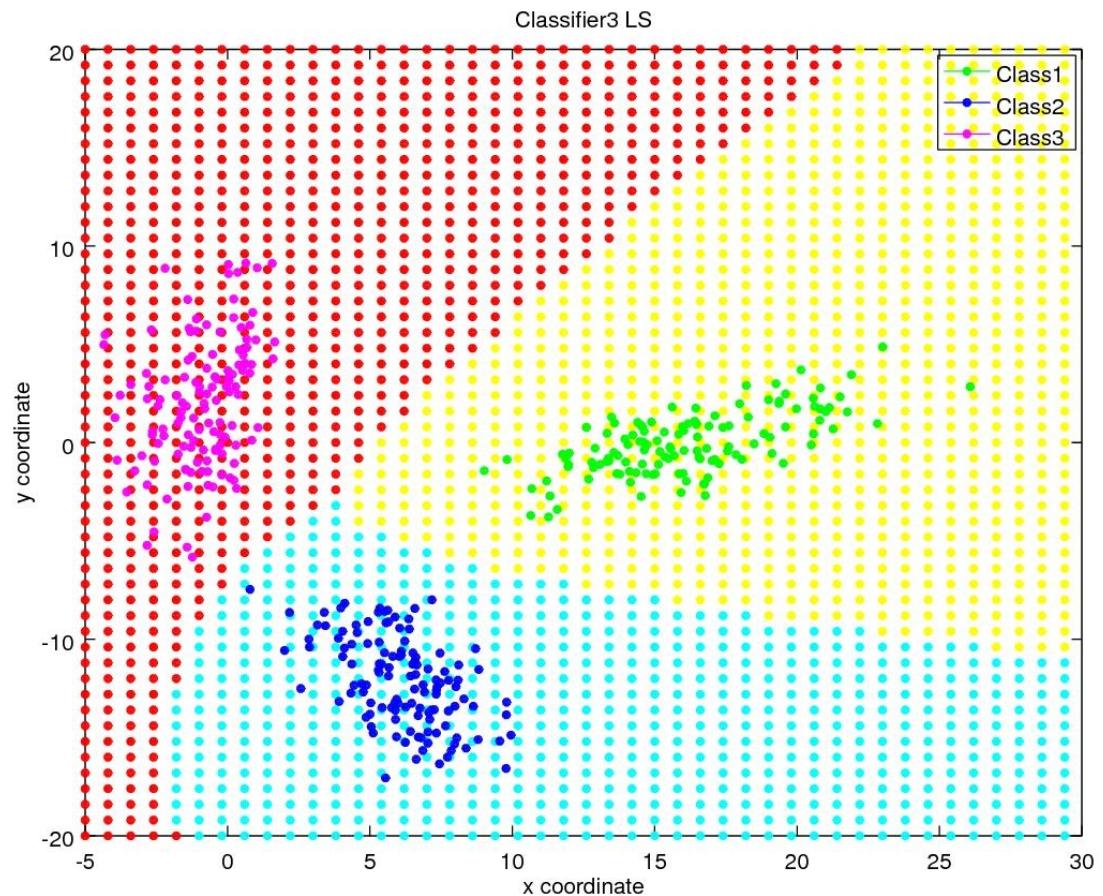
Classifier 2:



Classification Accuracy	100%
Precision for Class1	1
Precision for Class2	1
Precision for Class3	1
Mean Precision	1
Recall for Class1	1
Recall for Class2	1
Recall for Class3	1
Mean Recall	1
F-measure for Class1	1
F-measure for Class2	1
F-measure for Class3	1
Mean F-measure	1

Confusion Matrix:

Classifier 3:

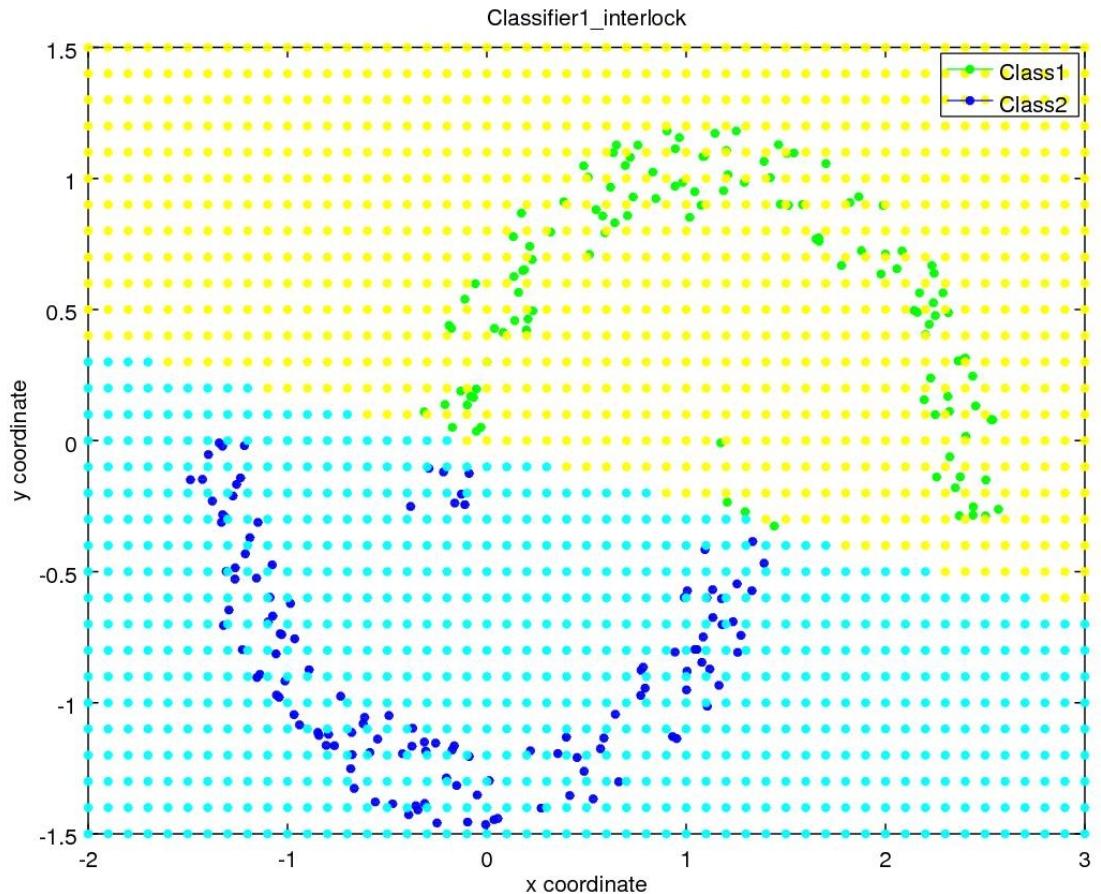


Classification Accuracy (%)	100%
Precision for Class1	1
Precision for Class2	1
Precision for Class3	1
Mean Precision	1
Recall for Class1	1
Recall for Class2	1
Recall for Class3	1
Mean Recall	1
F-measure for Class1	1
F-measure for Class2	1
F-measure for Class3	1
Mean F-measure	1

Confusion Matrix :

Dataset 1(b) : Interlock

Classifier 1:

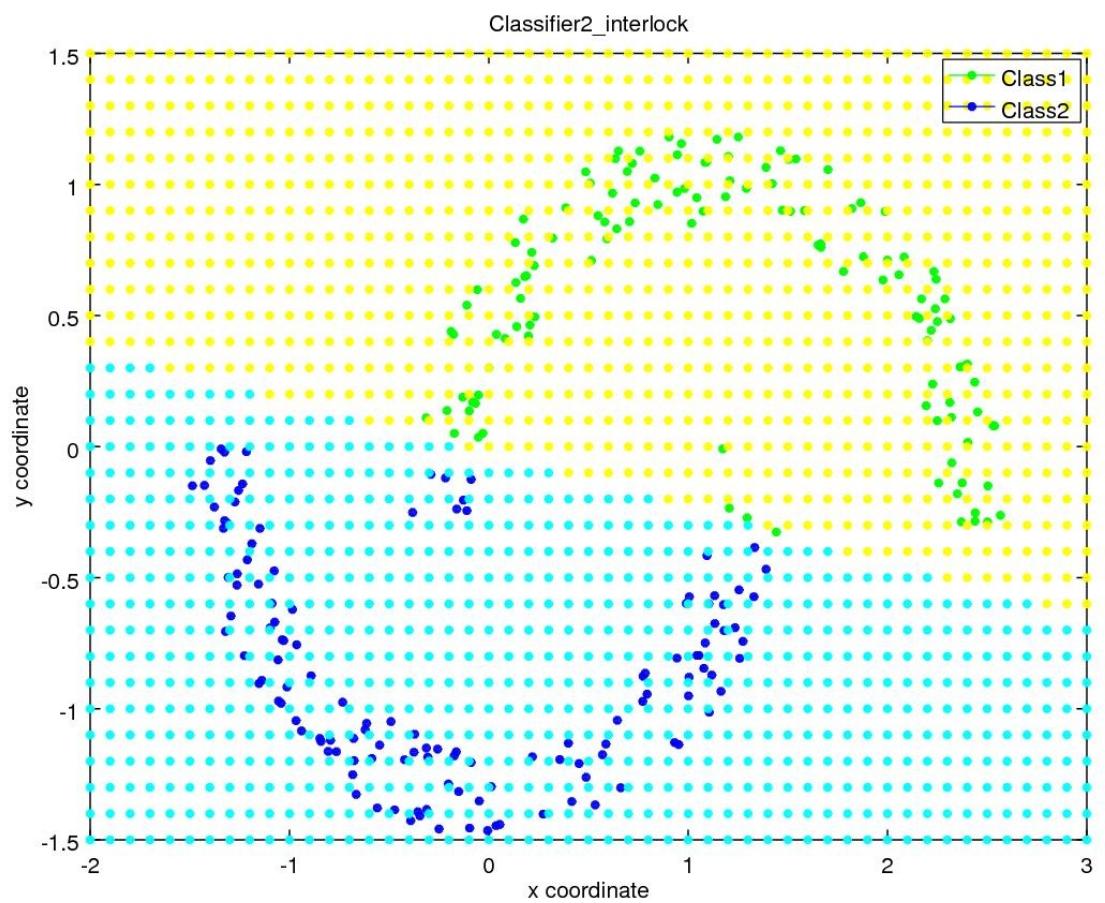


Classification Accuracy (%)	95.6 %
Precision for Class1	0.9672
Precision for Class2	0.9453
Mean Precision	0.9562
Recall for Class1	0.944
Recall for Class2	0.968
Mean Recall	0.956
F-measure for Class1	0.9554
F-measure for Class2	0.9565
Mean F-measure	0.95595

Confusion Matrix :

$$C = \begin{matrix} 118 & 7 \\ 4 & 121 \end{matrix}$$

Classifier 2:

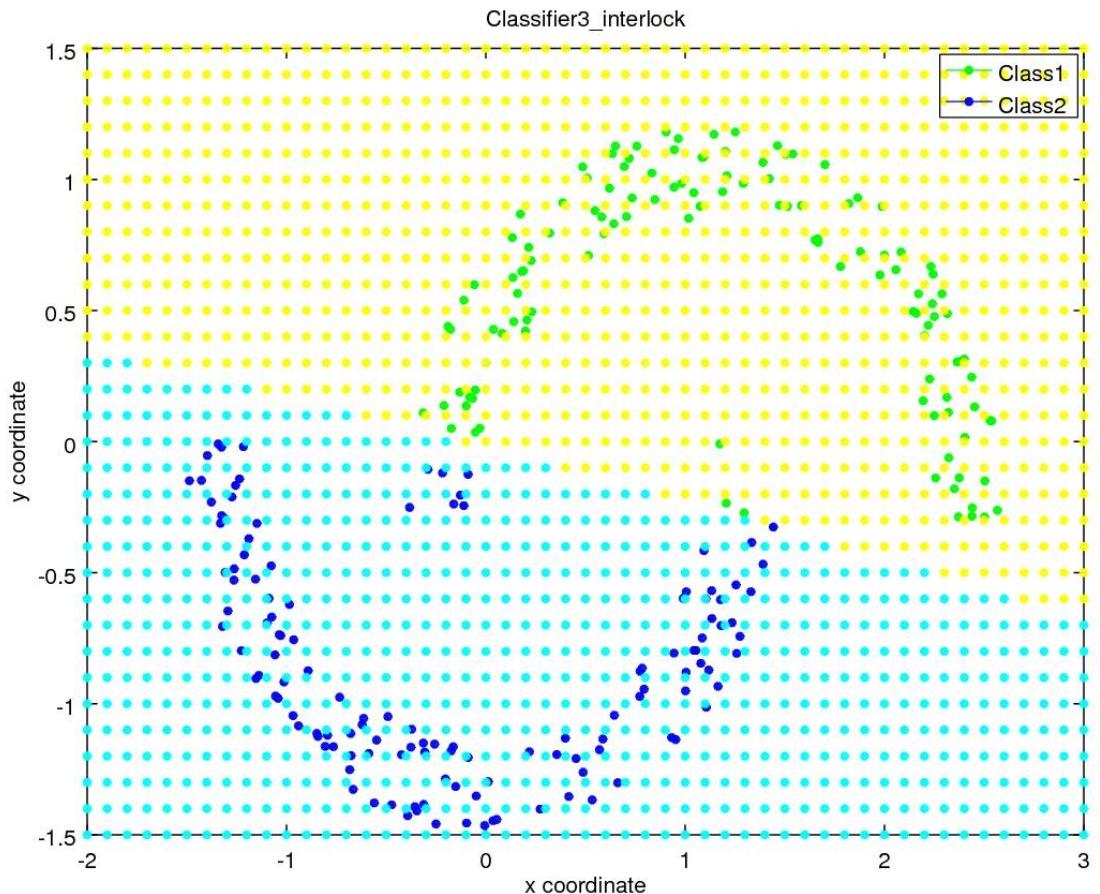


Classification Accuracy	95.6 %
Precision for Class1	0.9672
Precision for Class2	0.9453
Mean Precision	0.9562
Recall for Class1	0.944
Recall for Class2	0.968
Mean Recall	0.956
F-measure for Class1	0.9554
F-measure for Class2	0.9565
Mean F-measure	0.95595

Confusion Matrix :

$$C = \begin{matrix} 118 & 7 \\ 4 & 121 \end{matrix}$$

Classifier 3:



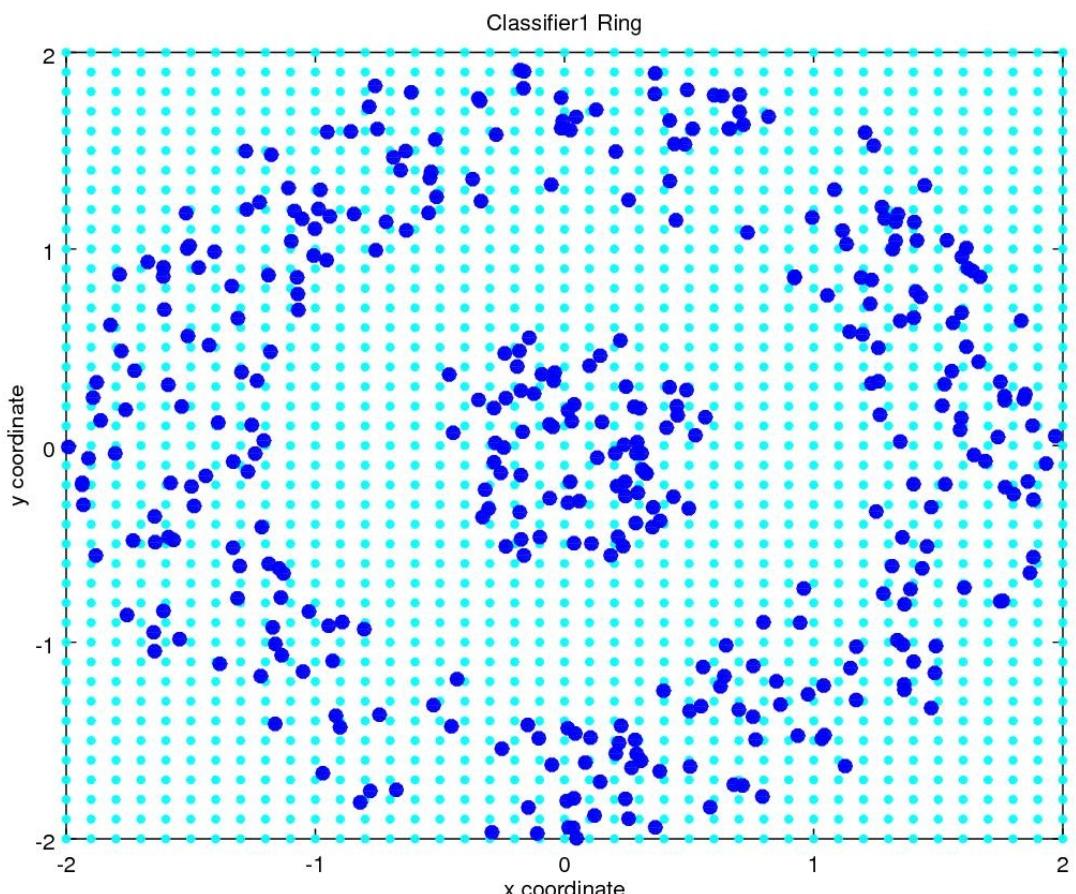
Classification Accuracy (%)	96 %
Precision for Class1	0.975
Precision for Class2	0.946
Mean Precision	0.960
Recall for Class1	0.944
Recall for Class2	0.976
Mean Recall	0.96
F-measure for Class1	0.959
F-measure for Class2	0.9606
Mean F-measure	0.9598

Confusion Matrix :

$$C = \begin{matrix} 118 & 7 \\ 3 & 122 \end{matrix}$$

Dataset 1(b) : Ring

Classifier 1:

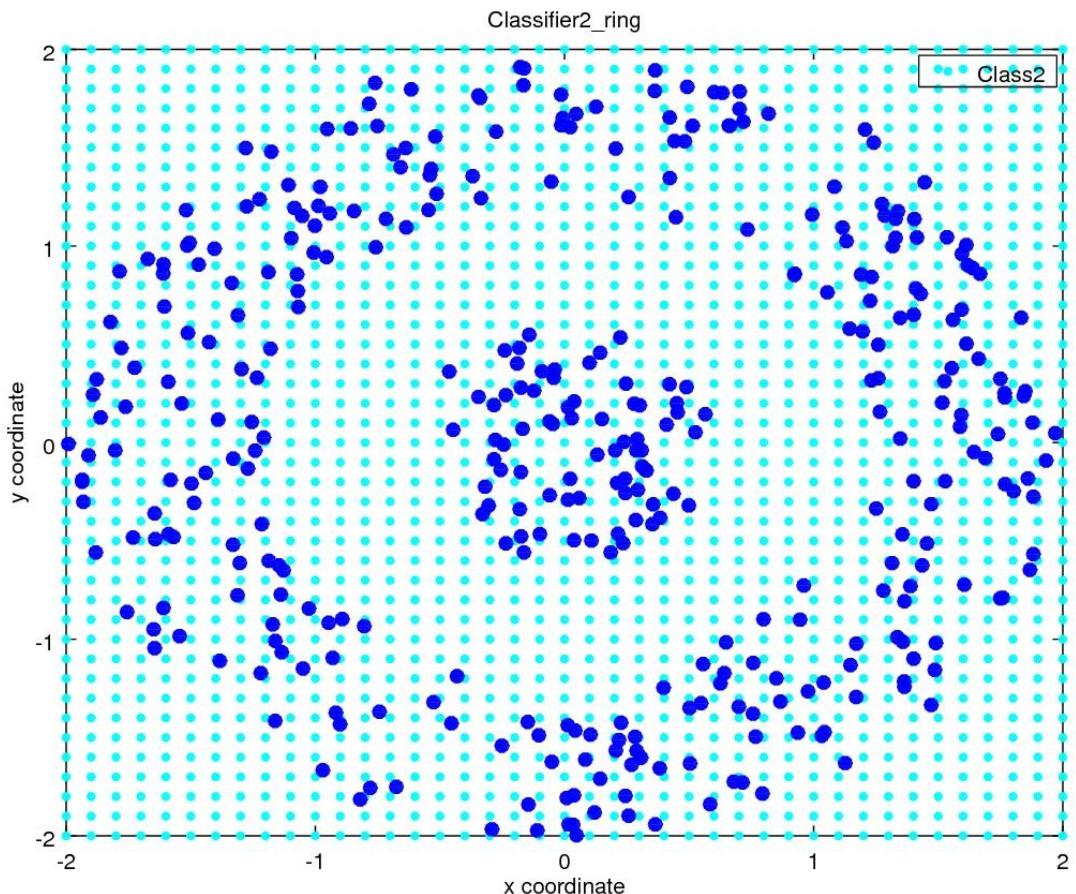


Classification Accuracy	80 %
Precision for Class1	0
Precision for Class2	0.8
Mean Precision	0.4
Recall for Class1	0
Recall for Class2	1
Mean Recall	0.5
F-measure for Class1	0
F-measure for Class2	0.89
Mean F-measure	0.445

Confusion Matrix :

$$C = \begin{matrix} 0 & 75 \\ 0 & 300 \end{matrix}$$

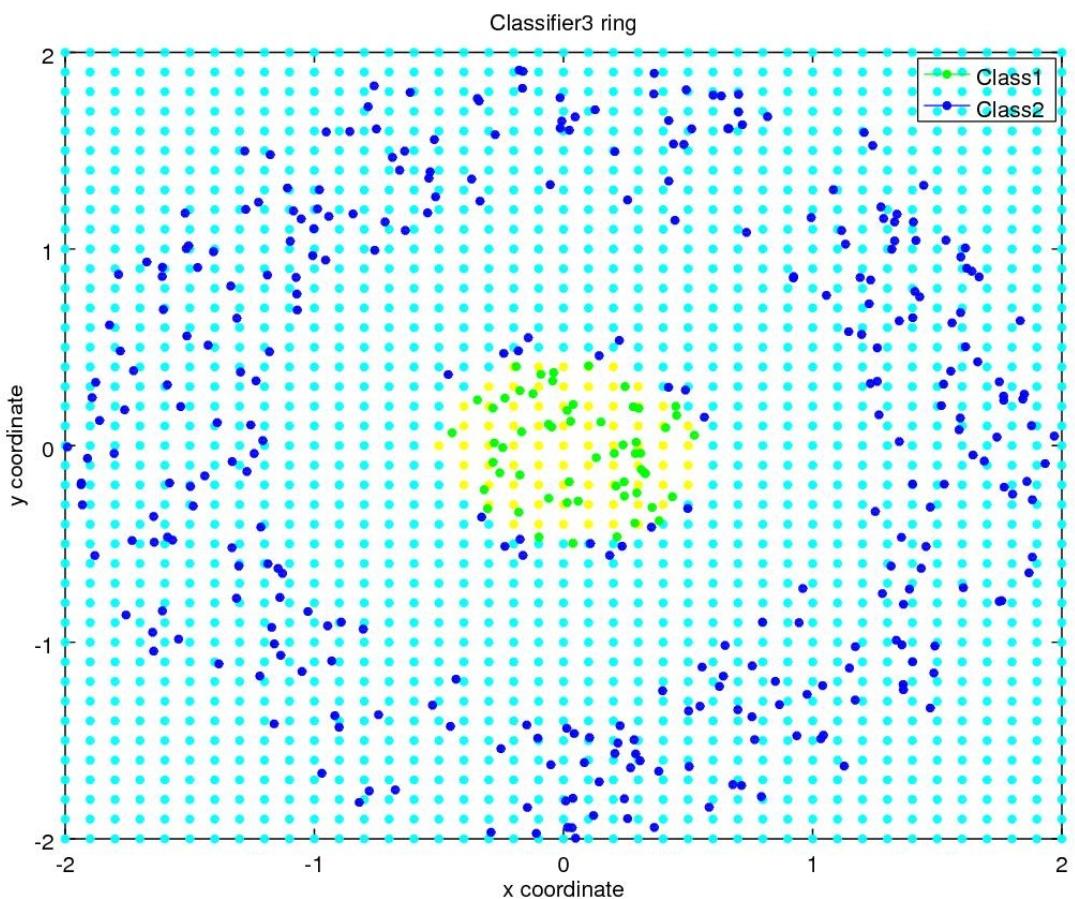
Classifier 2:



Classification Accuracy	80 %
Precision for Class1	0
Precision for Class2	0.8
Mean Precision	0.4
Recall for Class1	0
Recall for Class2	1
Mean Recall	0.5
F-measure for Class1	0
F-measure for Class2	0.89
Mean F-measure	0.445

Confusion Matrix :

Classifier 3:



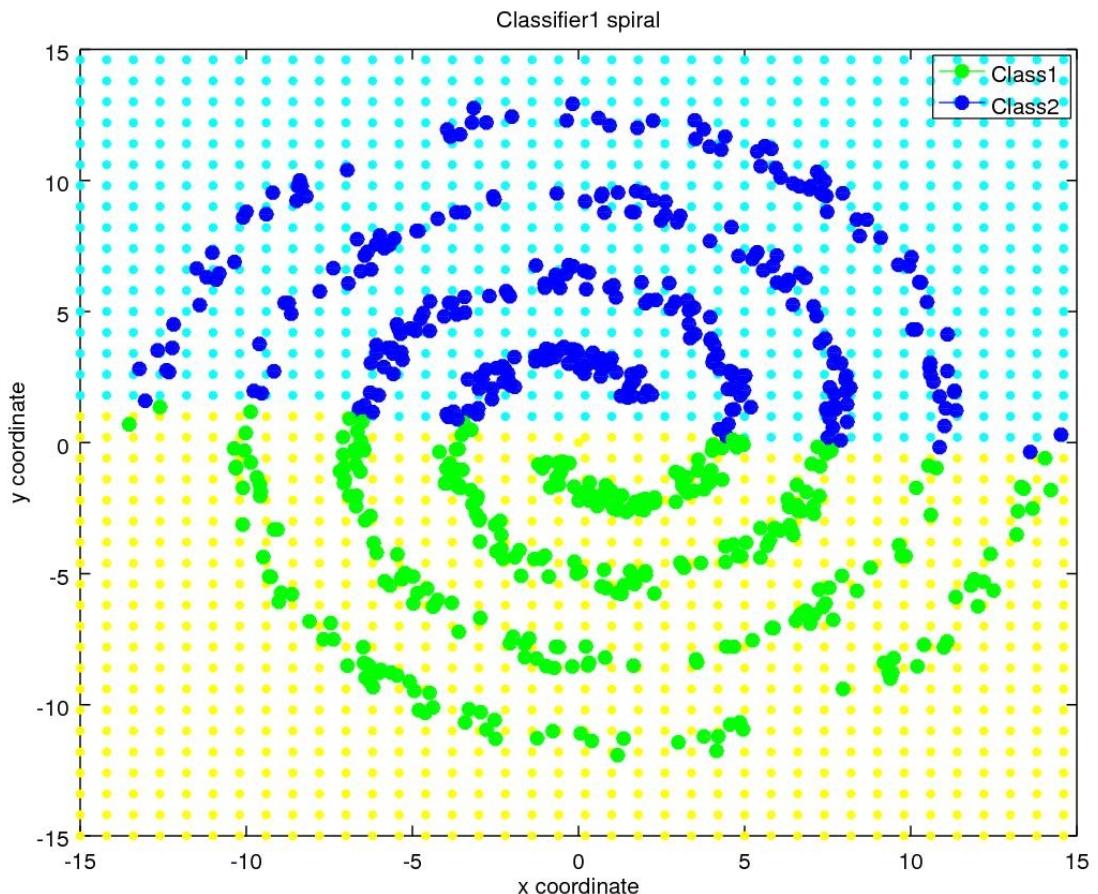
Classification Accuracy	95.2
Precision for Class1	1
Precision for Class2	0.943
Mean Precision	0.971
Recall for Class1	0.76
Recall for Class2	1
Mean Recall	0.88
F-measure for Class1	0.864
F-measure for Class2	0.971
Mean F-measure	0.917

Confusion Matrix :

$$C = \begin{matrix} 57 & 18 \\ 0 & 300 \end{matrix}$$

Dataset 1(b) : Spiral

Classifier 1:

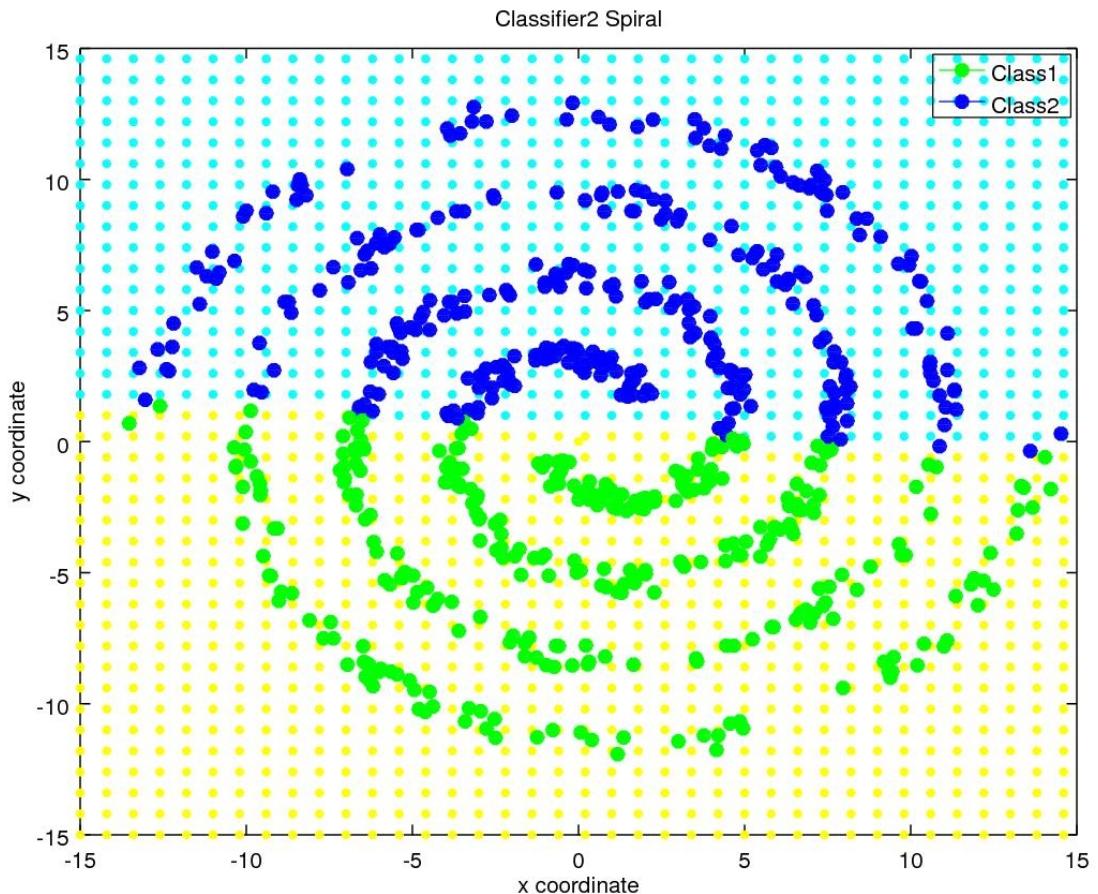


Classification Accuracy (%)	53.7 %
Precision for Class1	0.537
Precision for Class2	0.537
Mean Precision	0.537
Recall for Class1	0.537
Recall for Class2	0.537
Mean Recall	0.537
F-measure for Class1	0.537
F-measure for Class2	0.537
Mean F-measure	0.537

Confusion Matrix :

$$C = \begin{matrix} 175 & 151 \\ 151 & 175 \end{matrix}$$

Classifier 2:

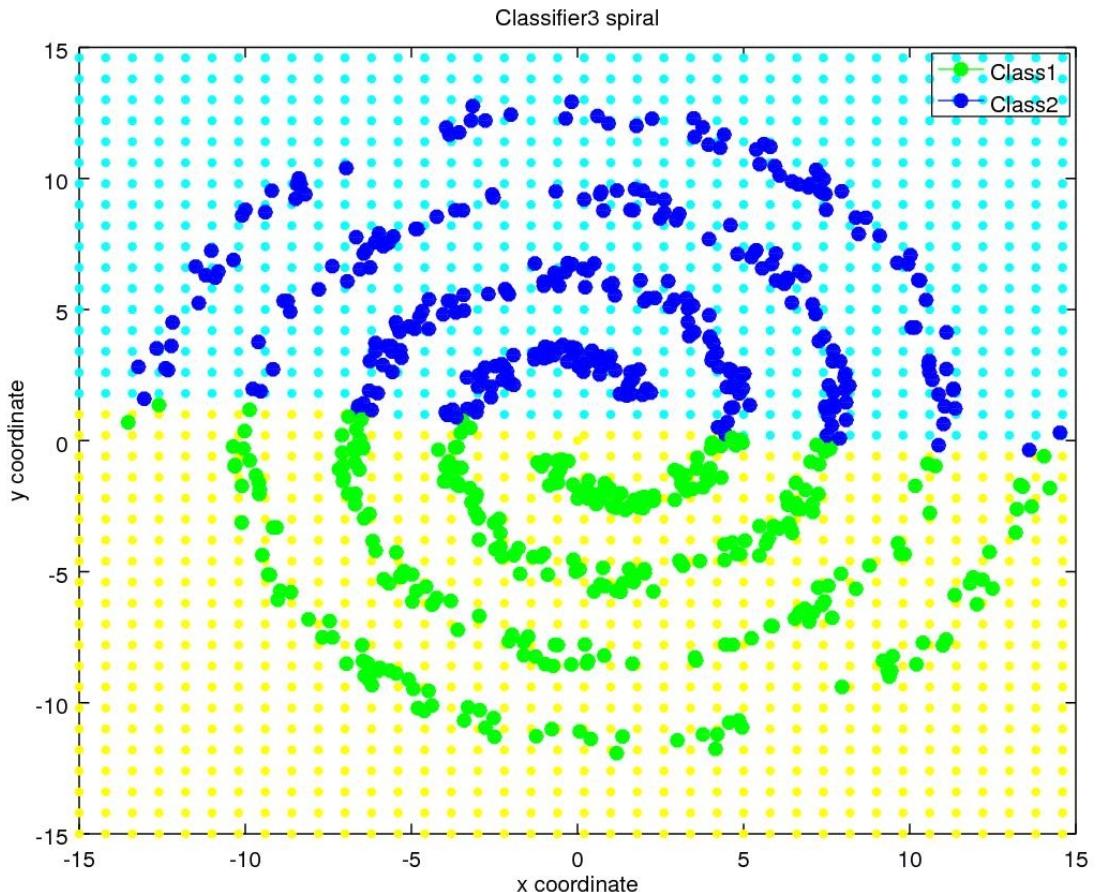


Classification Accuracy	53.7 %
Precision for Class1	0.537
Precision for Class2	0.537
Mean Precision	0.537
Recall for Class1	0.537
Recall for Class2	0.537
Mean Recall	0.537
F-measure for Class1	0.537
F-measure for Class2	0.537
Mean F-measure	0.537

Confusion Matrix :

$$C = \begin{matrix} 175 & 151 \\ 151 & 175 \end{matrix}$$

Classifier 3:



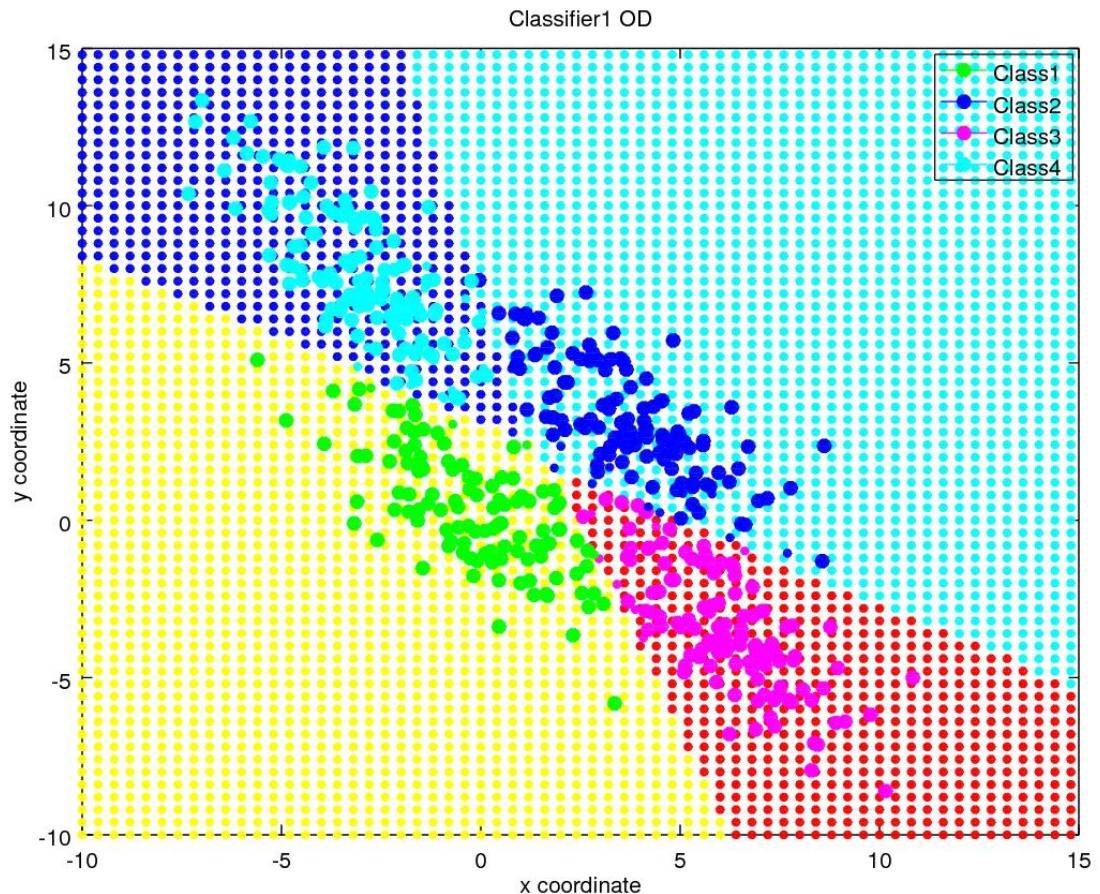
Classification Accuracy	53.7 %
Precision for Class1	0.537
Precision for Class2	0.537
Mean Precision	0.537
Recall for Class1	0.537
Recall for Class2	0.537
Mean Recall	0.537
F-measure for Class1	0.537
F-measure for Class2	0.537
Mean F-measure	0.537

Confusion Matrix :

$$C = \begin{matrix} & 175 & 151 \\ 175 & & \\ 151 & & 175 \end{matrix}$$

Dataset 1(c) : Overlapping Data Set

Classifier 1:



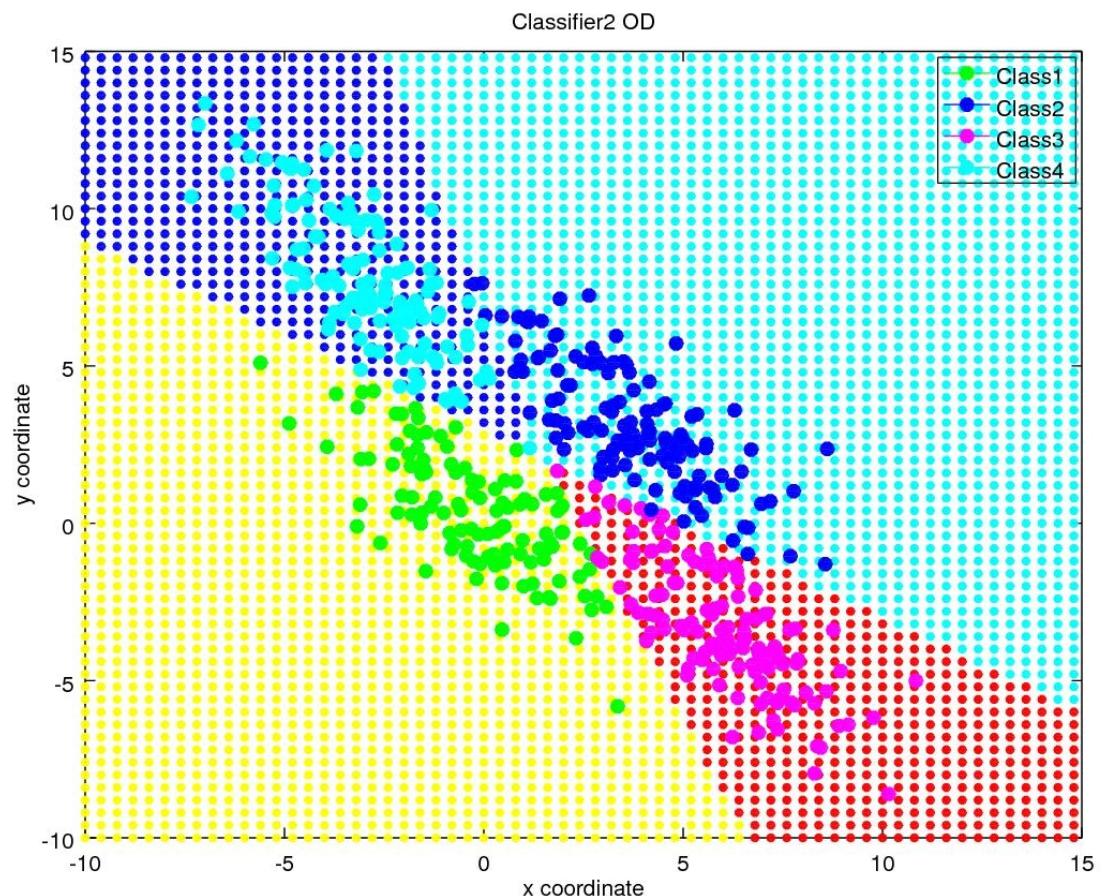
Classification Accuracy (%)	92.4 %
Precision for Class1	0.958
Precision for Class2	0.906
Precision for Class3	0.934
Precision for Class4	0.902
Mean Precision	0.925
Recall for Class1	0.904
Recall for Class2	0.928
Recall for Class3	0.904
Recall for Class4	0.96
Mean Recall	0.924

F-measure for Class1	0.930
F-measure for Class2	0.917
F-measure for Class3	0.919
F-measure for Class4	0.930
Mean F-measure	0.924

Confusion Matrix :

$$C = \begin{matrix} & \begin{matrix} 113 & 0 & 6 & 6 \end{matrix} \\ \begin{matrix} 0 & 116 & 2 & 7 \end{matrix} & \\ \begin{matrix} 2 & 10 & 113 & 0 \end{matrix} & \\ \begin{matrix} 3 & 2 & 0 & 120 \end{matrix} & \end{matrix}$$

Classifier 2:



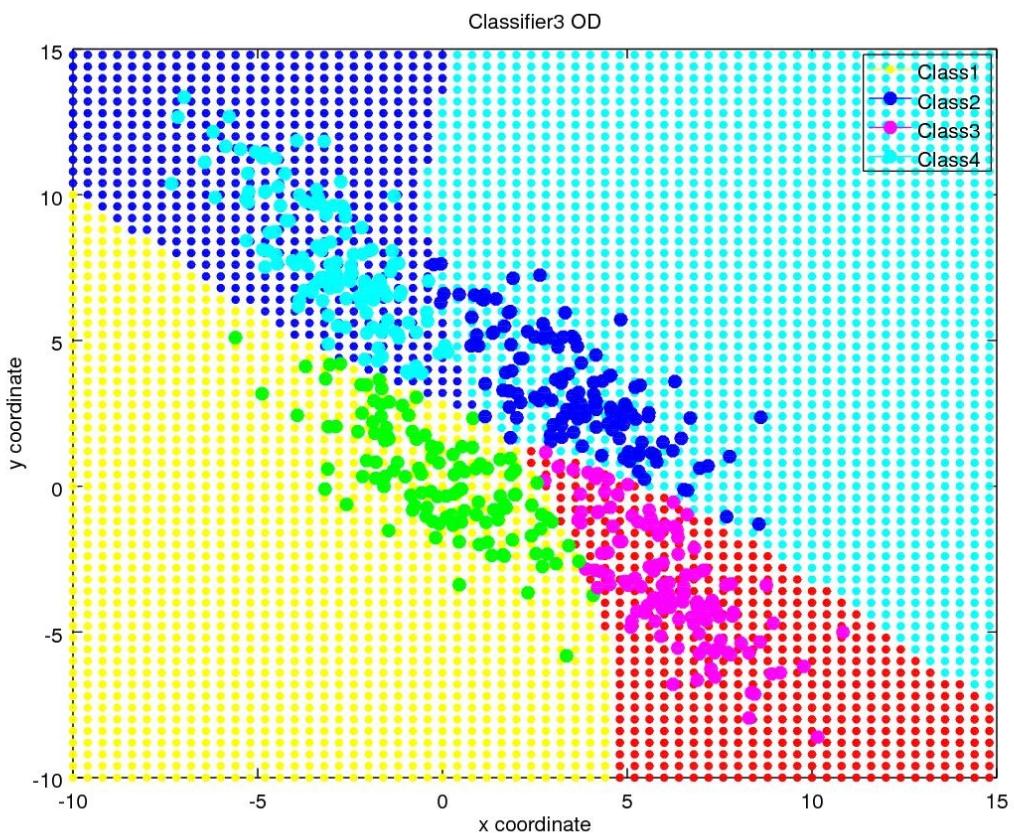
Classification Accuracy (%)	93.6 %
Precision for Class1	0.974
Precision for Class2	0.921
Precision for Class3	0.943
Precision for Class4	0.909
Mean Precision	0.937
Recall for Class1	0.904

Recall for Class2	0.944
Recall for Class3	0.936
Recall for Class4	0.96
Mean Recall	0.936
F-measure for Class1	0.938
F-measure for Class2	0.932
F-measure for Class3	0.939
F-measure for Class4	0.934
Mean F-measure	0.936

Confusion Matrix :

$$C = \begin{matrix} 113 & 0 & 6 & 6 \\ 0 & 118 & 1 & 6 \\ 1 & 7 & 117 & 0 \\ 2 & 3 & 0 & 120 \end{matrix}$$

Classifier 3:



Classification Accuracy (%)	93 %
Precision for Class1	0.951
Precision for Class2	0.913

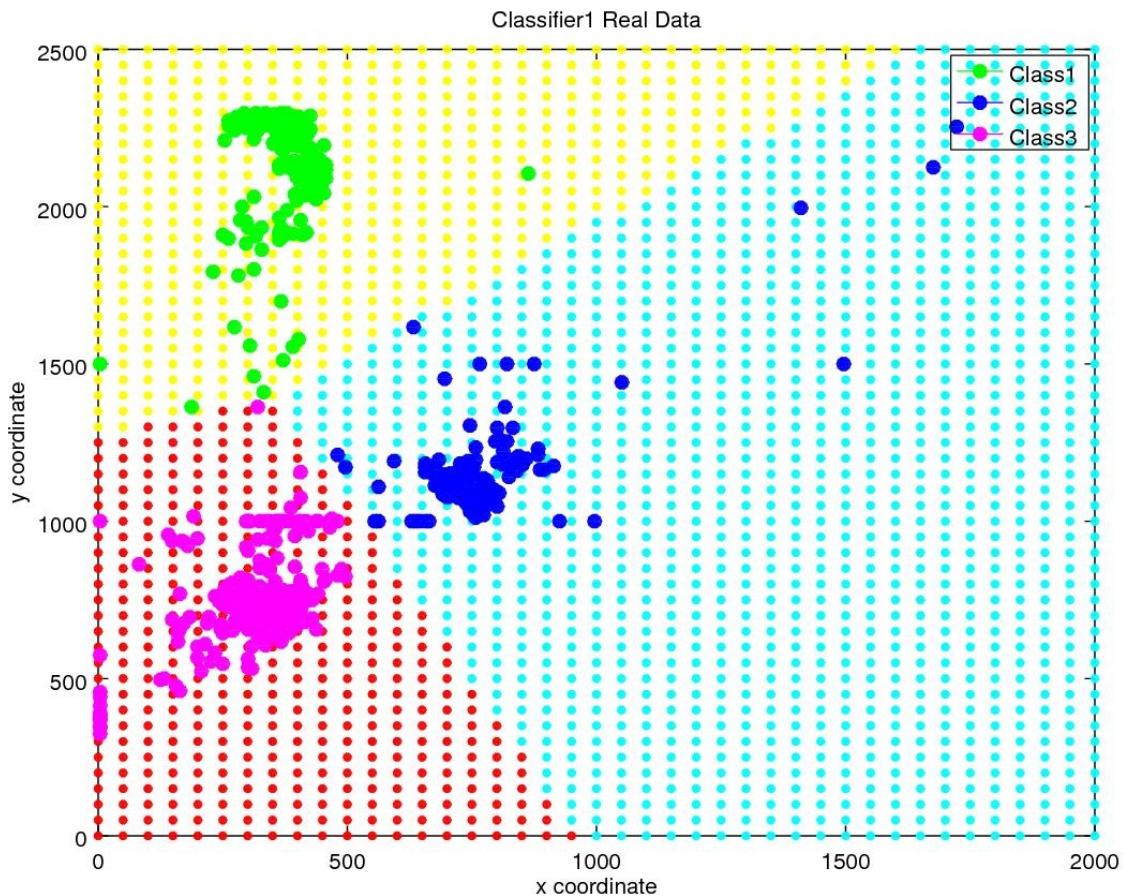
Precision for Class3	0.950
Precision for Class4	0.908
Mean Precision	0.931
Recall for Class1	0.928
Recall for Class2	0.928
Recall for Class3	0.92
Recall for Class4	0.944
Mean Recall	0.93
F-measure for Class1	0.939
F-measure for Class2	0.920
F-measure for Class3	0.935
F-measure for Class4	0.926
Mean F-measure	0.93

Confusion Matrix :

$$C = \begin{matrix} & \begin{matrix} 116 & 0 & 3 & 6 \end{matrix} \\ \begin{matrix} 0 & 116 & 3 & 6 \\ 4 & 6 & 115 & 0 \\ 2 & 5 & 0 & 118 \end{matrix} & \end{matrix}$$

Dataset 2 : Real Data Set

Classifier 1:

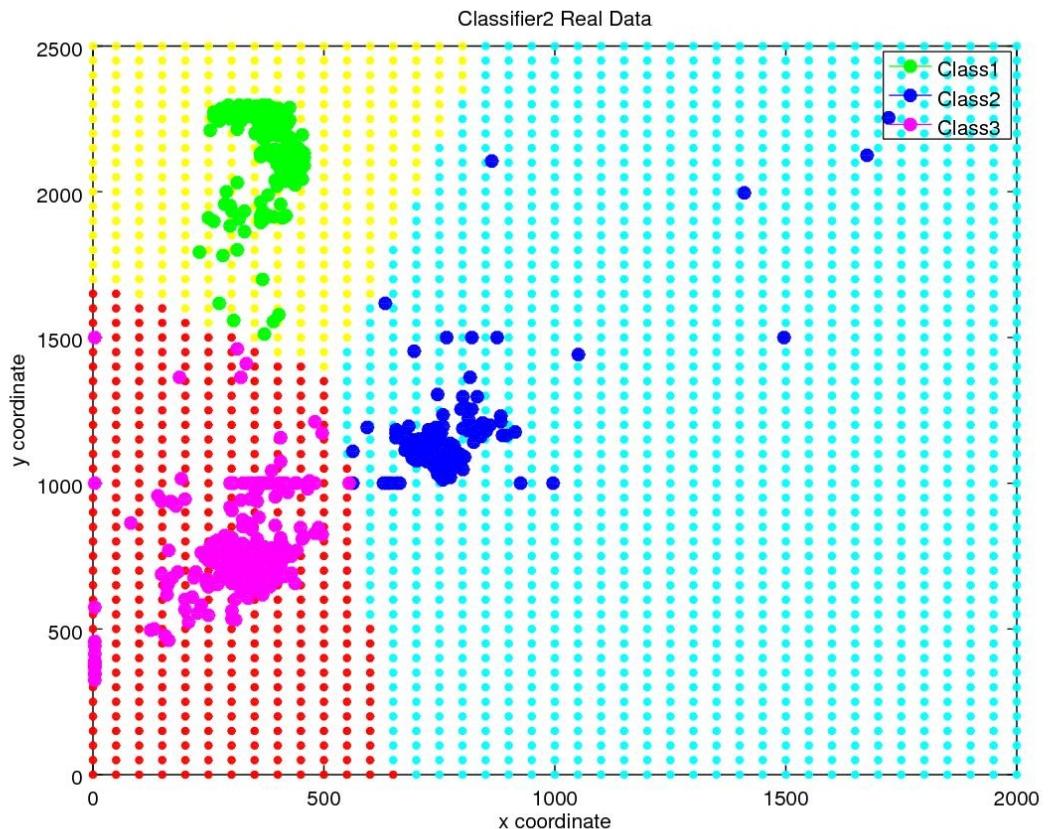


Classification Accuracy (%)	96.6 %
Precision for Class1	0.998
Precision for Class2	0.975
Precision for Class3	0.933
Mean Precision	0.969
Recall for Class1	0.965
Recall for Class2	0.946
Recall for Class3	0.985
Mean Recall	0.9653
F-measure for Class1	0.981
F-measure for Class2	0.960
F-measure for Class3	0.958
Mean F-measure	0.966

Confusion Matrix :

$$C = \begin{matrix} & 553 & 4 & 16 \\ 1 & & 512 & 28 \\ 0 & & 9 & 613 \end{matrix}$$

Classifier 2:

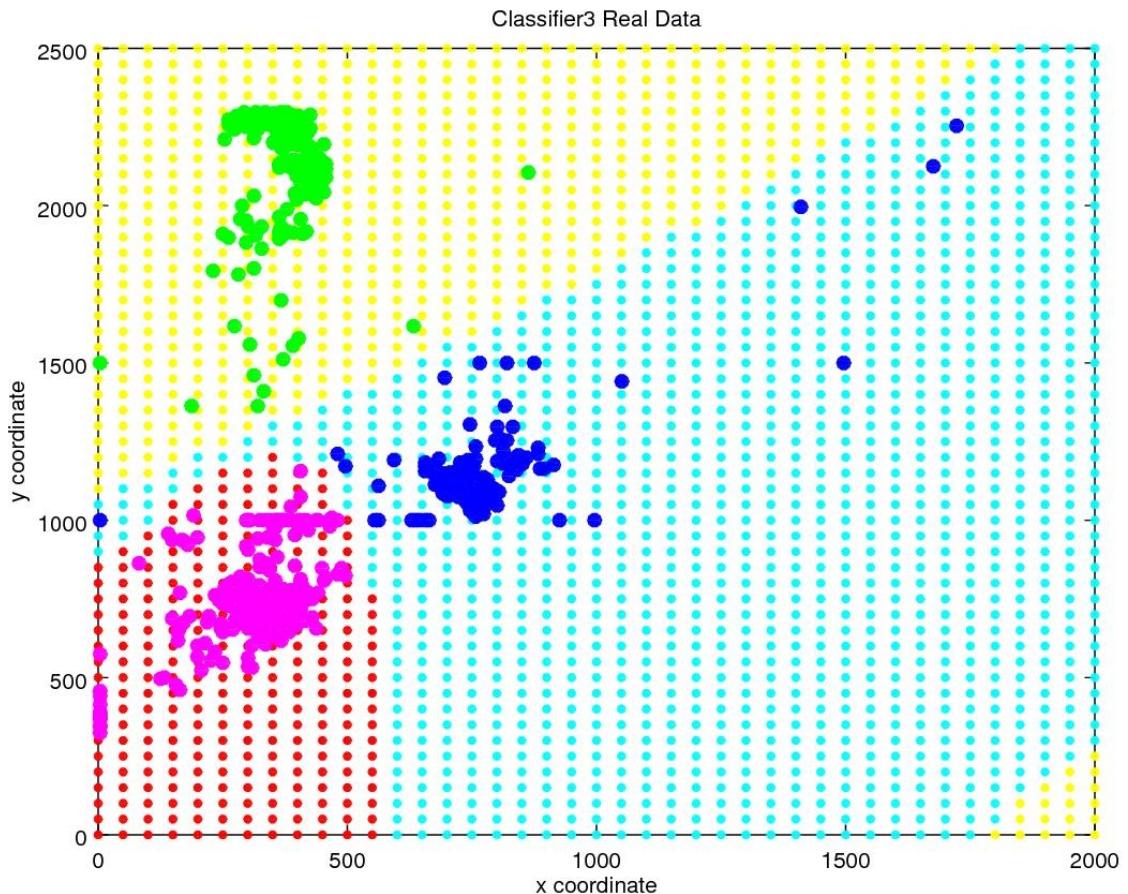


Classification Accuracy (%)	96.4 %
Precision for Class1	1
Precision for Class2	0.975
Precision for Class3	0.925
Mean Precision	0.967
Recall for Class1	0.958
Recall for Class2	0.943
Recall for Class3	0.987
Mean Recall	0.963
F-measure for Class1	0.978
F-measure for Class2	0.959
F-measure for Class3	0.955
Mean F-measure	0.964

Confusion Matrix :

$$C = \begin{matrix} & 549 & 5 & 19 \\ 0 & & 510 & 31 \\ 0 & 8 & & 614 \end{matrix}$$

Classifier 3:



Classification Accuracy (%)	96.7 %
Precision for Class1	0.998
Precision for Class2	0.973
Precision for Class3	0.934
Mean Precision	0.968
Recall for Class1	0.969
Recall for Class2	0.946
Recall for Class3	0.982
Mean Recall	0.967
F-measure for Class1	0.983
F-measure for Class2	0.959
F-measure for Class3	0.957
Mean F-measure	0.966

Confusion Matrix :

$$C = \begin{matrix} & 555 & 3 & 15 \\ 1 & & 512 & 28 \\ 0 & 11 & 611 \end{matrix}$$