CS669 - Pattern Recognition
Programming Assignment 1

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1 Classifier Accuracy for Each Dataset

Dataset	B C_{mean}	B $C_{distinct}$	NB $\sigma^2 I$	NB C_{mean}	NB $C_{distinct}$
LS	99.73%	100%	99.73%	99.73%	99.73%
NLS	62.17%	62.01%	62.58%	62.42%	62.58%
OL	88.53%	92.54%	88.00%	88.53%	89.07%
RL	77.61%	77.44%	77.20%	77.43%	77.43%

2 Confusion Matrices

1. Bayes C_{mean}

   (a) Linearly Seperable

	ω_1	ω_2	ω_3
ω_1	124	1	0
ω_2	0	125	0
ω_3	0	0	125

   (b) Non-Linearly Seperable

	ω_1	ω_2
ω_1	384	228
ω_2	235	377

   (c) Overlapping Data

	ω_1	ω_2	ω_3
ω_1	106	17	2
ω_2	0	109	16
ω_3	7	1	117

   (d) Real World Data

	ω_1	ω_2	ω_3
ω_1	571	23	3
ω_2	343	213	17
ω_3	0	0	622

2. Bayes $C_{distinct}$

   (a) Linearly Seperable

	ω_1	ω_2	ω_3
ω_1	125	0	0
ω_2	0	125	0
ω_3	0	0	125

   (b) Non-Linearly Seperable

	ω_1	ω_2
ω_1	379	233
ω_2	232	380

   (c) Overlapping Data

	ω_1	ω_2	ω_3
ω_1	114	8	3
ω_2	4	116	5
ω_3	6	2	117

   (d) Real World Data

	ω_1	ω_2	ω_3
ω_1	571	23	3
ω_2	343	211	15
ω_3	0	1	621

3. Naive Bayes $C = \sigma^2 I$

   (a) Linearly Seperable

	ω_1	ω_2	ω_3
ω_1	124	1	0
ω_2	0	125	0
ω_3	0	0	125

   (b) Non-Linearly Seperable

	ω_1	ω_2
ω_1	388	224
ω_2	234	378

(c) Overlapping Data

	ω_1	ω_2	ω_3
ω_1	106	17	2
ω_2	2	106	17
ω_3	6	1	118

(d) Real World Data

	ω_1	ω_2	ω_3
ω_1	570	24	3
ω_2	348	207	18
ω_3	0	0	622

4. Naive Bayes C_{mean}

(a) Linearly Seperable

	ω_1	ω_2	ω_3
ω_1	124	1	0
ω_2	0	125	0
ω_3	0	0	125

(b) Non-Linearly Seperable

	ω_1	ω_2
ω_1	386	226
ω_2	234	378

(c) Overlapping Data

	ω_1	ω_2	ω_3
ω_1	106	17	2
ω_2	0	109	16
ω_3	7	1	117

(d) Real World Data

	ω_1	ω_2	ω_3
ω_1	571	23	3
ω_2	345	210	18
ω_3	0	0	622

5. Naive Bayes $C_{distinct}$

(a) Linearly Separable

	ω_1	ω_2	ω_3
ω_1	124	1	0
ω_2	0	125	0
ω_3	0	0	125

(b) Non-Linearly Seperable

	ω_1	ω_2
ω_1	384	228
ω_2	230	382

(c) Overlapping Data

	ω_1	ω_2	ω_3
ω_1	106	18	1
ω_2	2	115	8
ω_3	10	2	113

(d) Real World Data

	ω_1	ω_2	ω_3
ω_1	571	23	3
ω_2	346	210	18
ω_3	0	0	622

3 Decision Region Plot

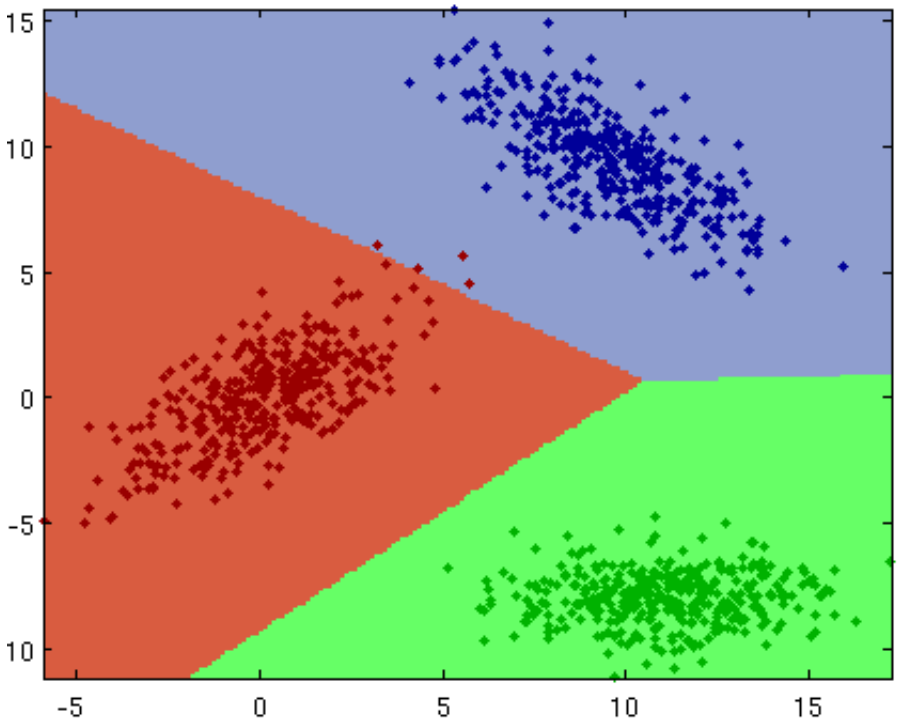

Figure 1: Bayes C_{mean}, Linearly separable data set

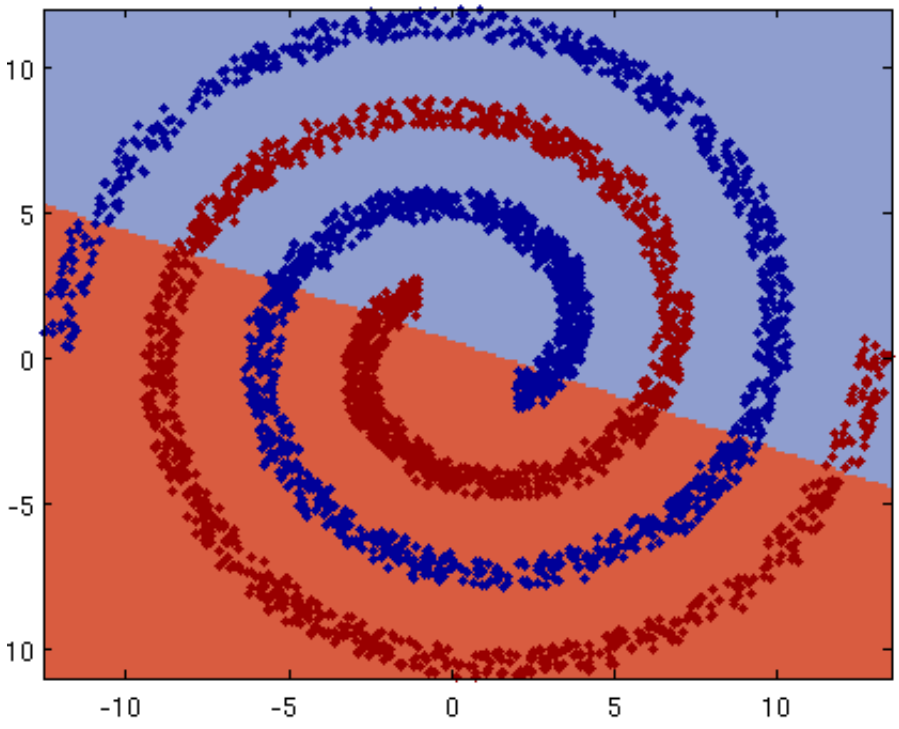

Figure 2: Bayes C_{mean}, Nonlinearly separable data set

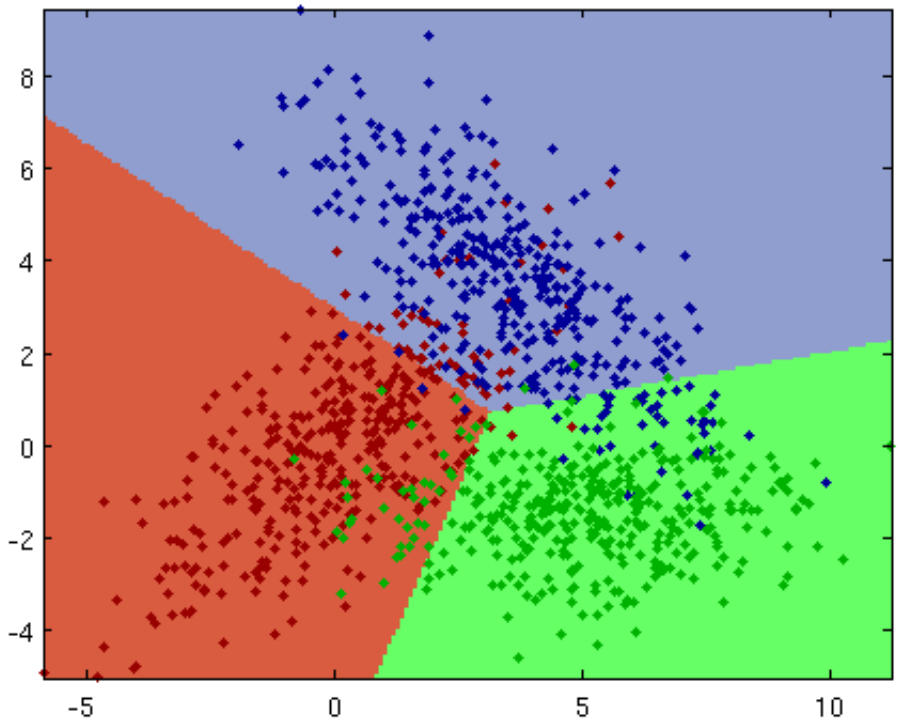

Figure 3: Bayes C_{mean}, Overlapping data set

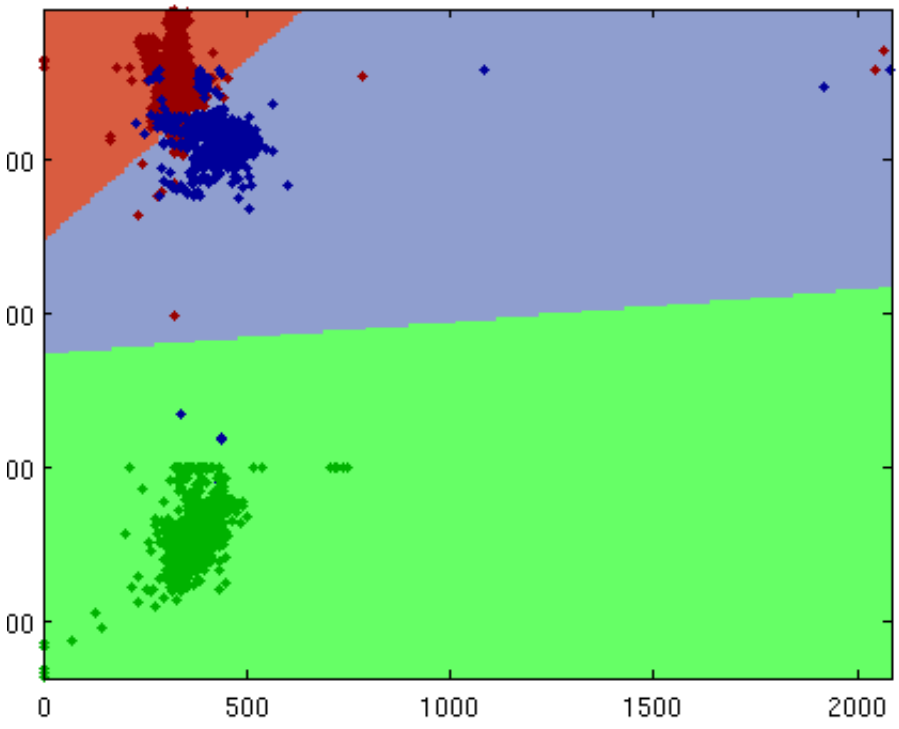

Figure 4: Bayes C_{mean}, Real world data set

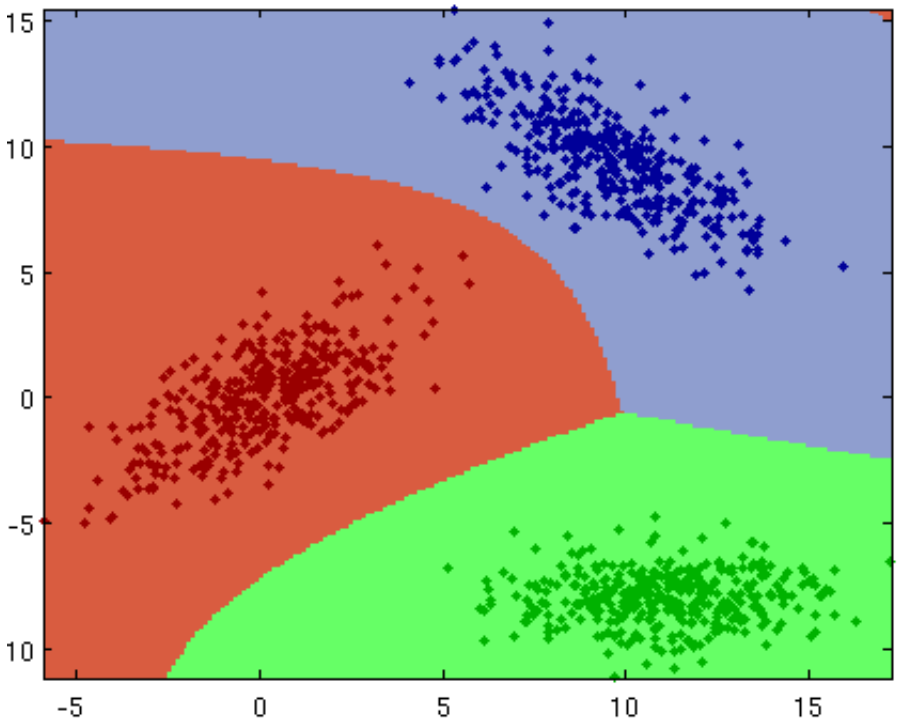

Figure 5: Bayes $C_{distinct}$, Linearly separable data set

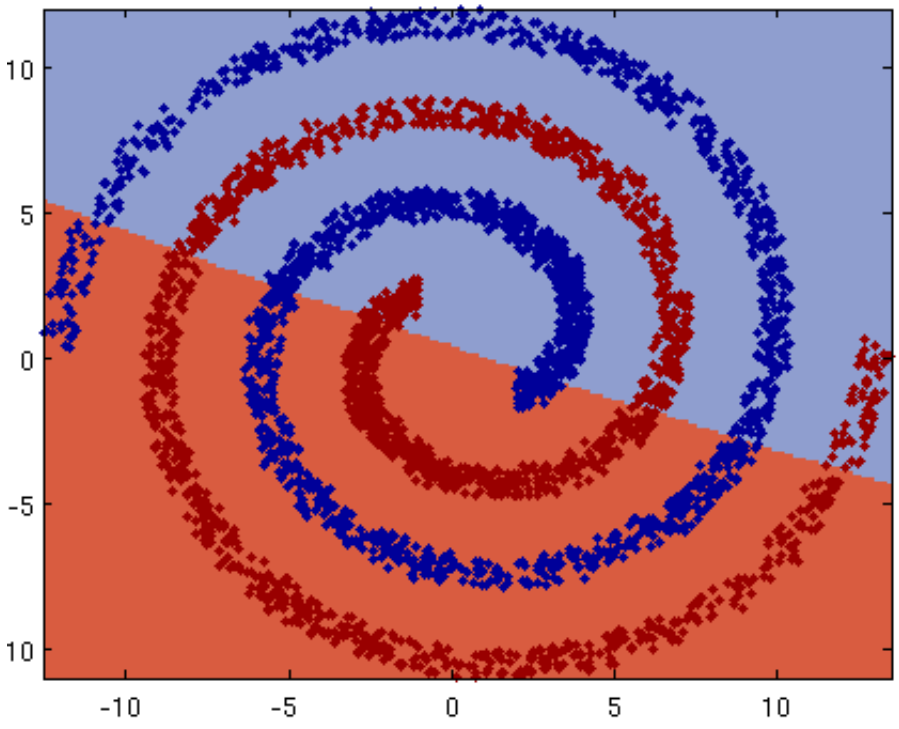

Figure 6: Bayes $C_{distinct}$, Nonlinearly separable data set

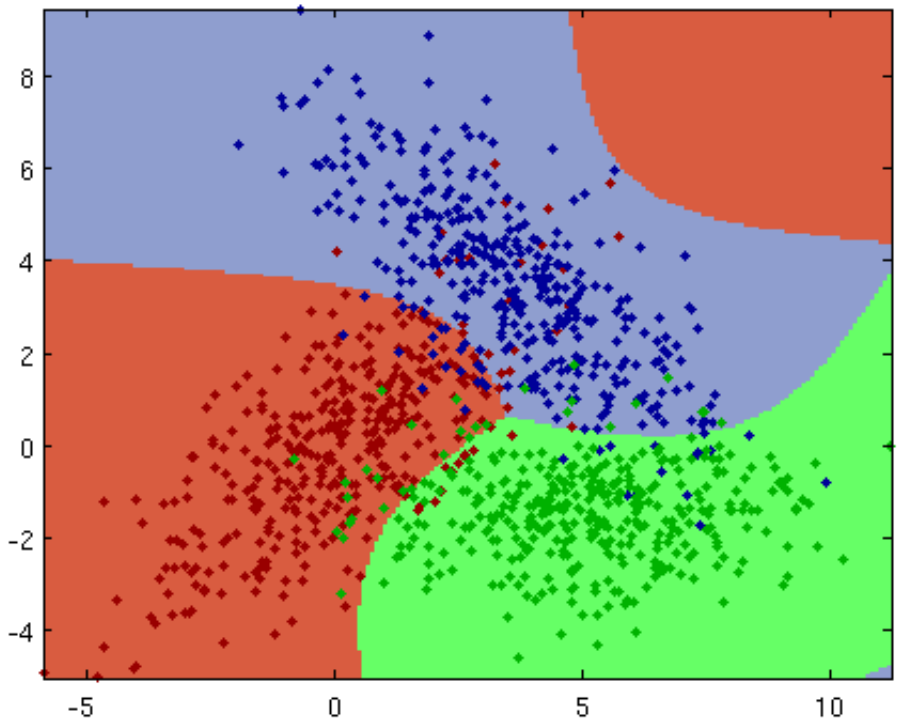

Figure 7: Bayes $C_{distinct}$, Overlapping data set

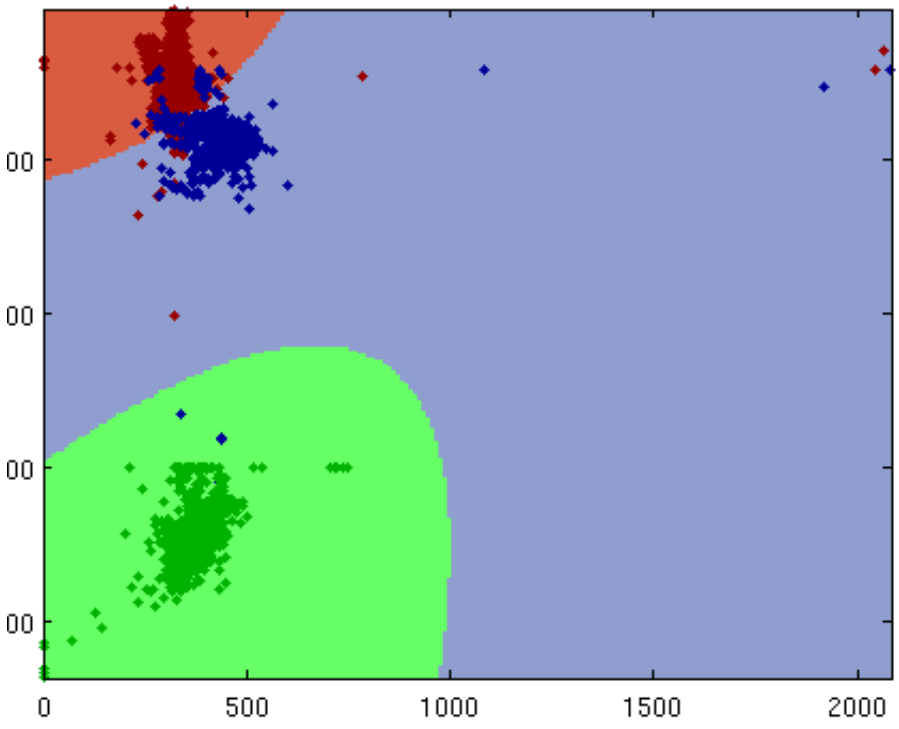

Figure 8: Bayes $C_{distinct}$, Real world data set

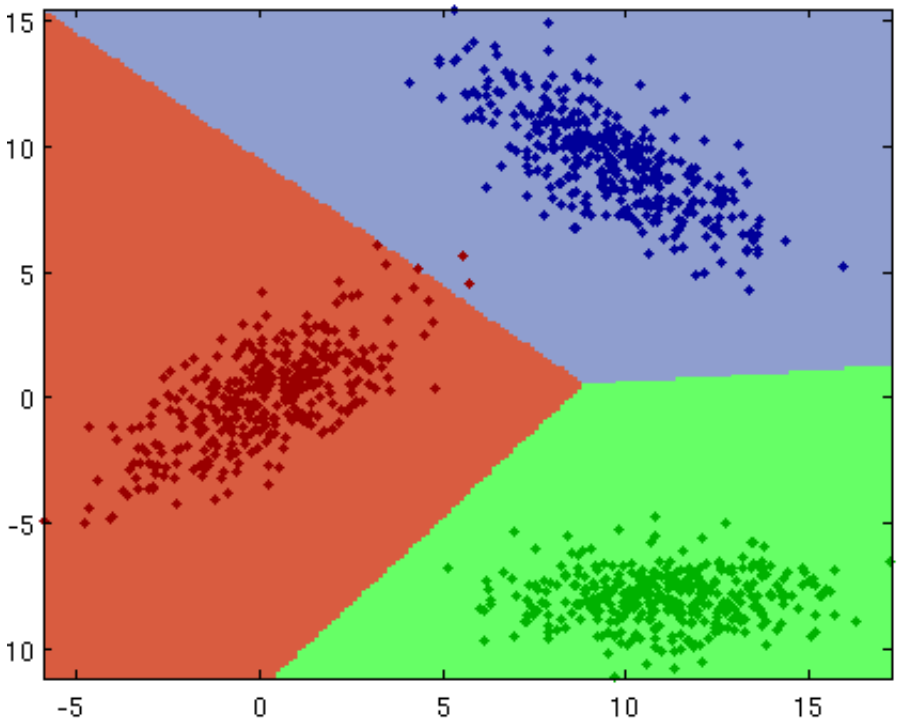

Figure 9: Naive Bayes $C = \sigma^2 I$, Linearly separable data set

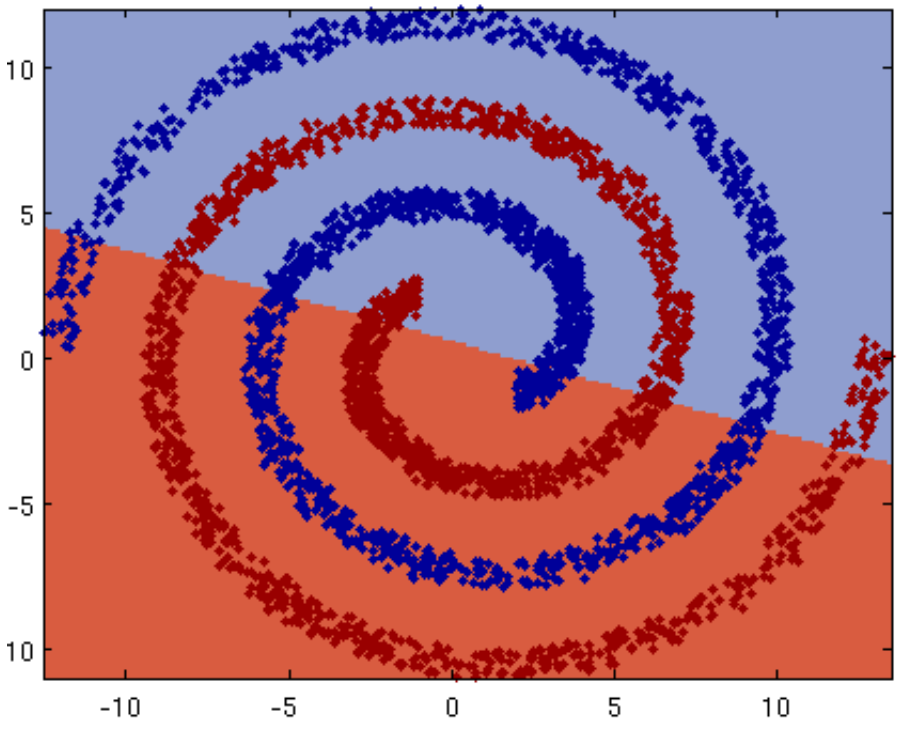

Figure 10: Naive Bayes $C = \sigma^2 I$, Nonlinearly separable data set

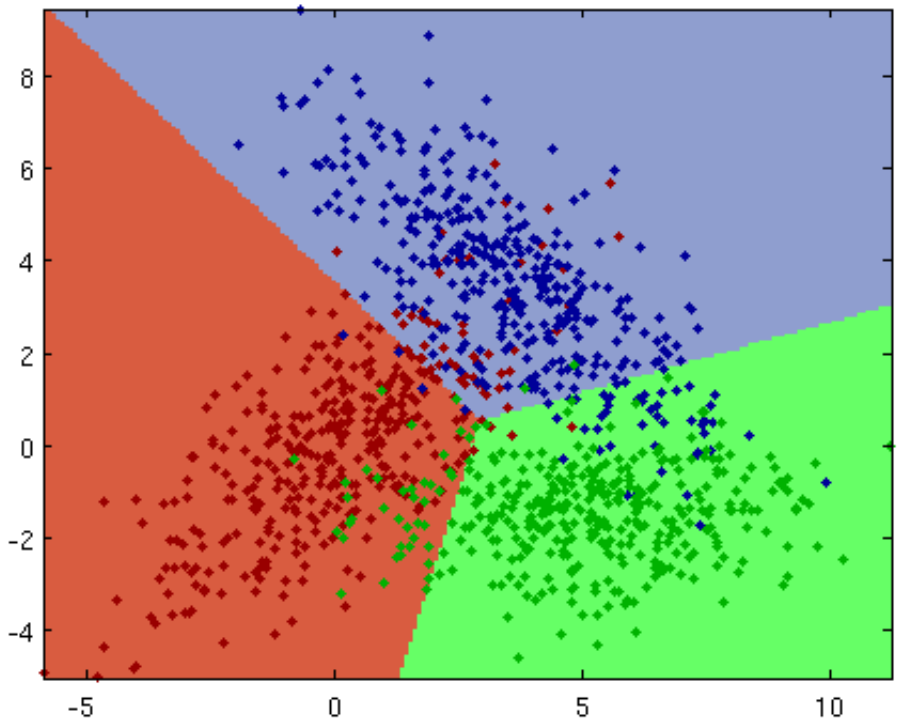

Figure 11: Naive Bayes $C = \sigma^2 I$, Overlapping data set

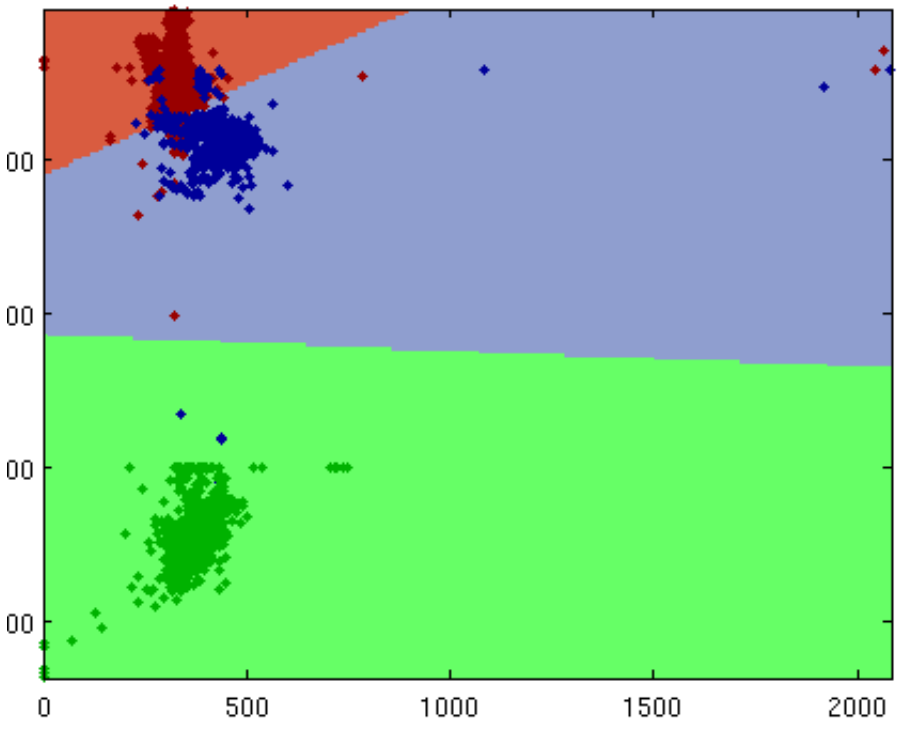

Figure 12: Naive Bayes $C = \sigma^2 I$, Real world data set

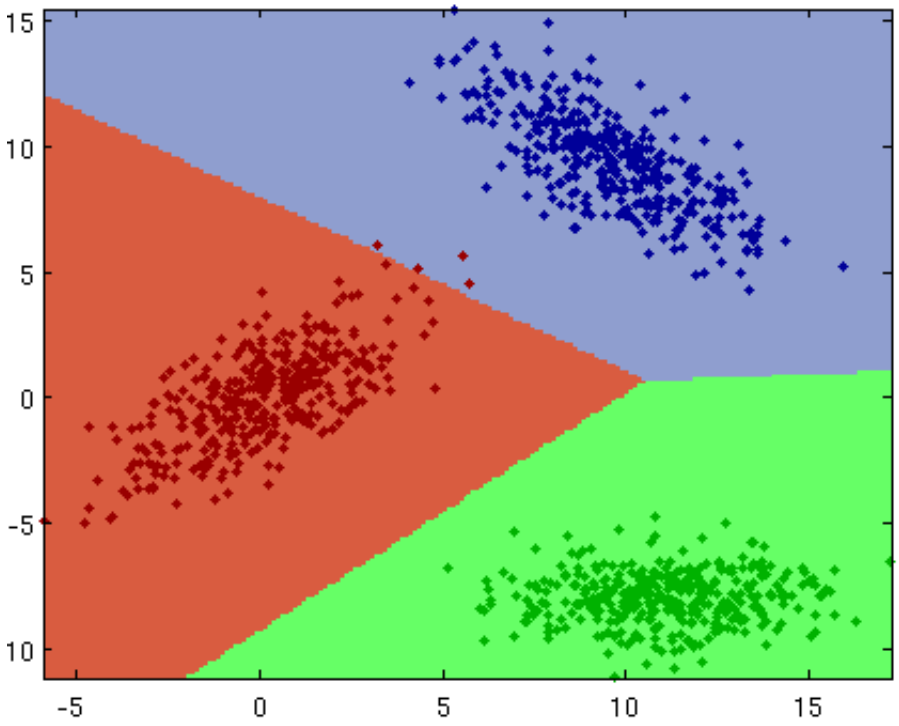

Figure 13: Naive Bayes C_{mean}, Linearly separable data set

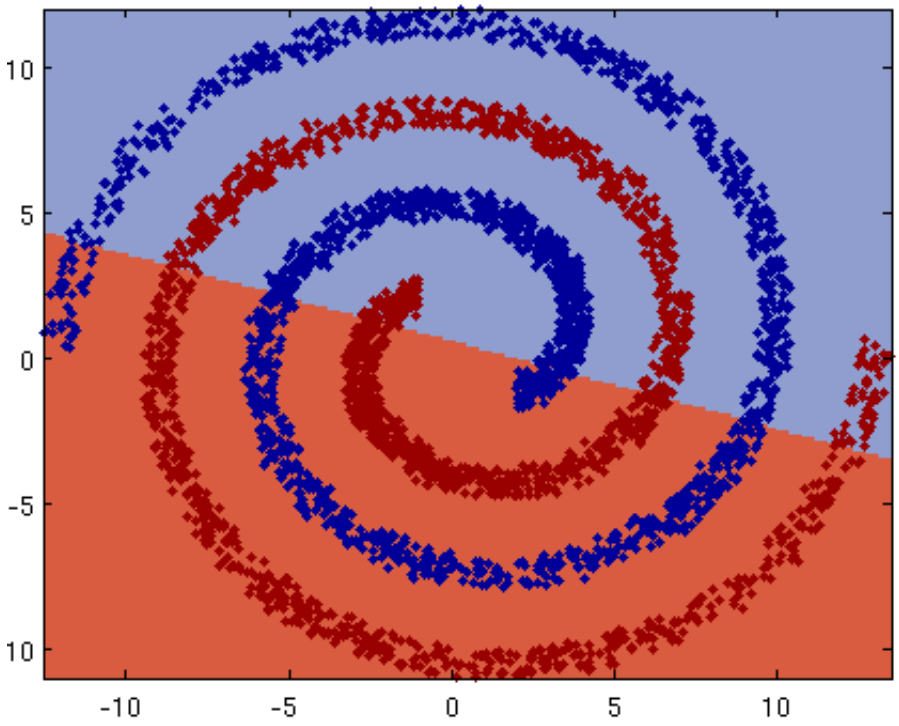

Figure 14: Naive Bayes C_{mean}, Noninearly separable data set

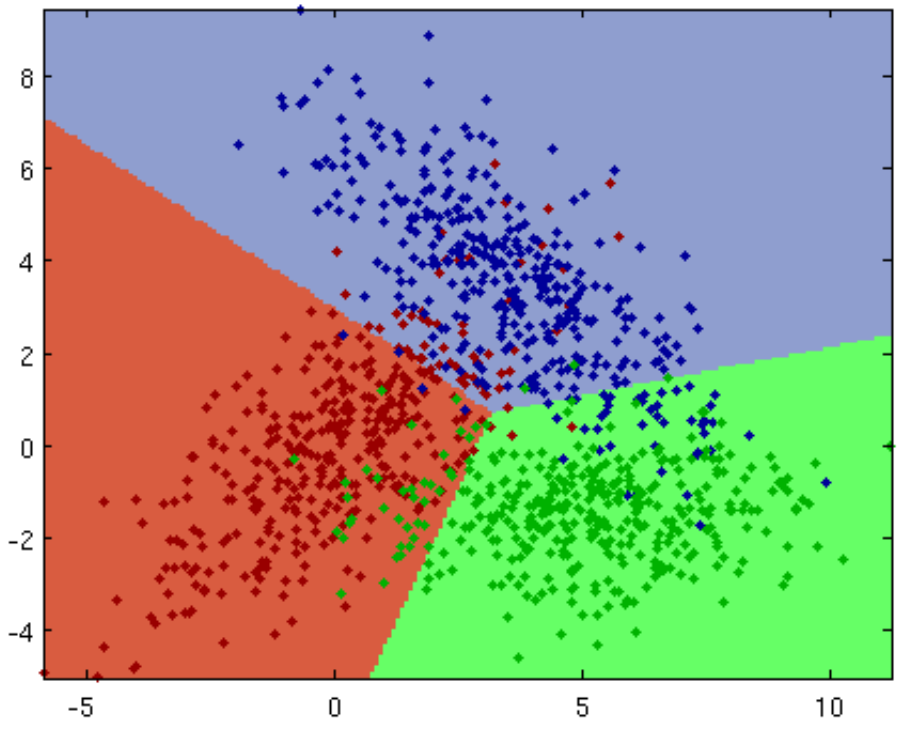

Figure 15: Naive Bayes C_{mean}, Overlapping data set

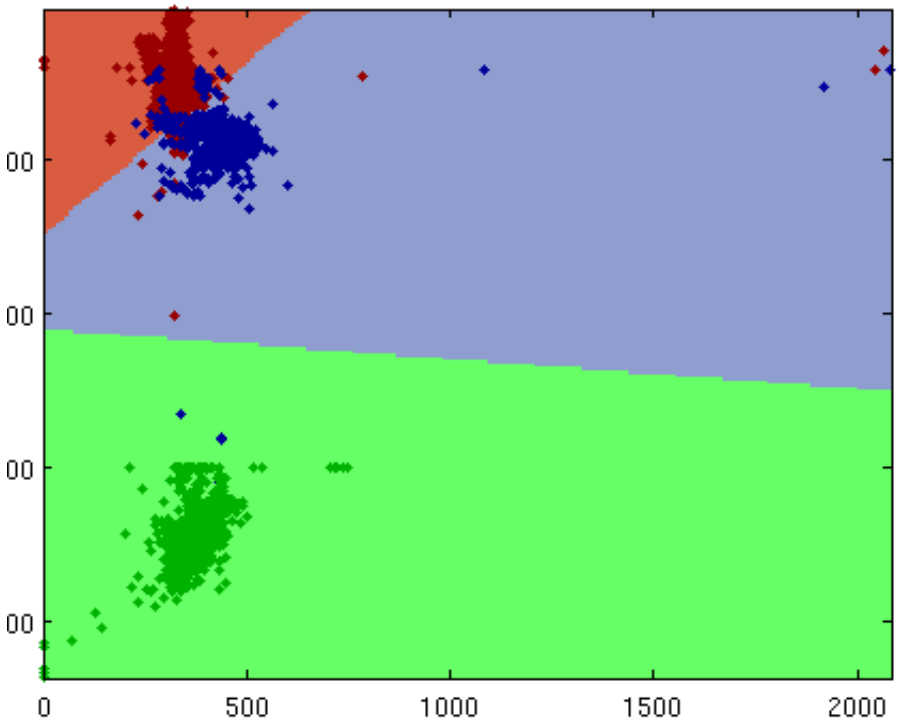

Figure 16: Naive Bayes C_{mean}, Real world data set

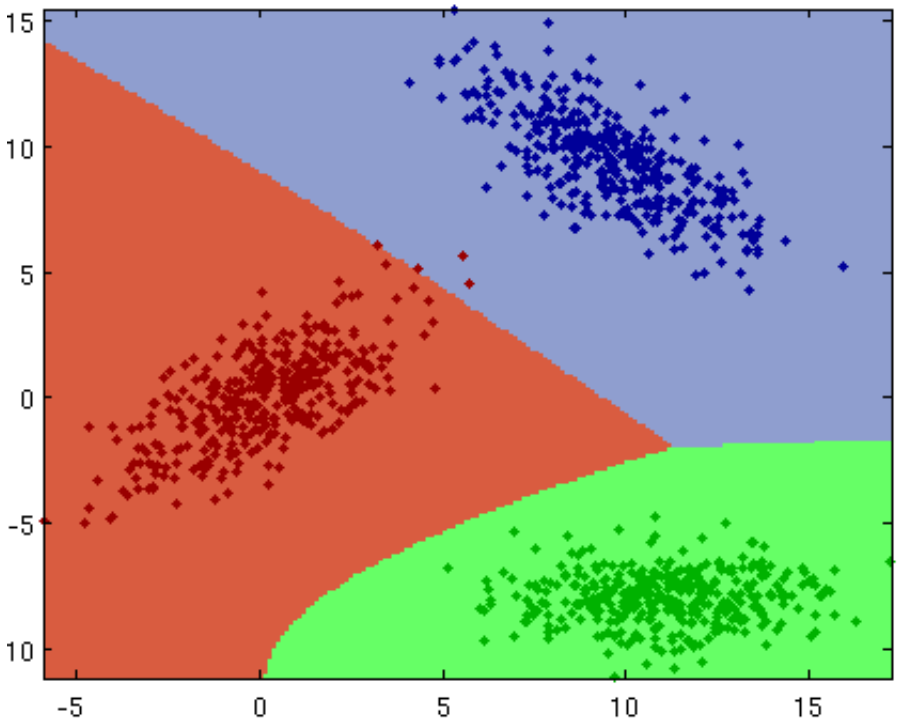

Figure 17: Naive Bayes $C_{distinct}$, Linearly separable data set

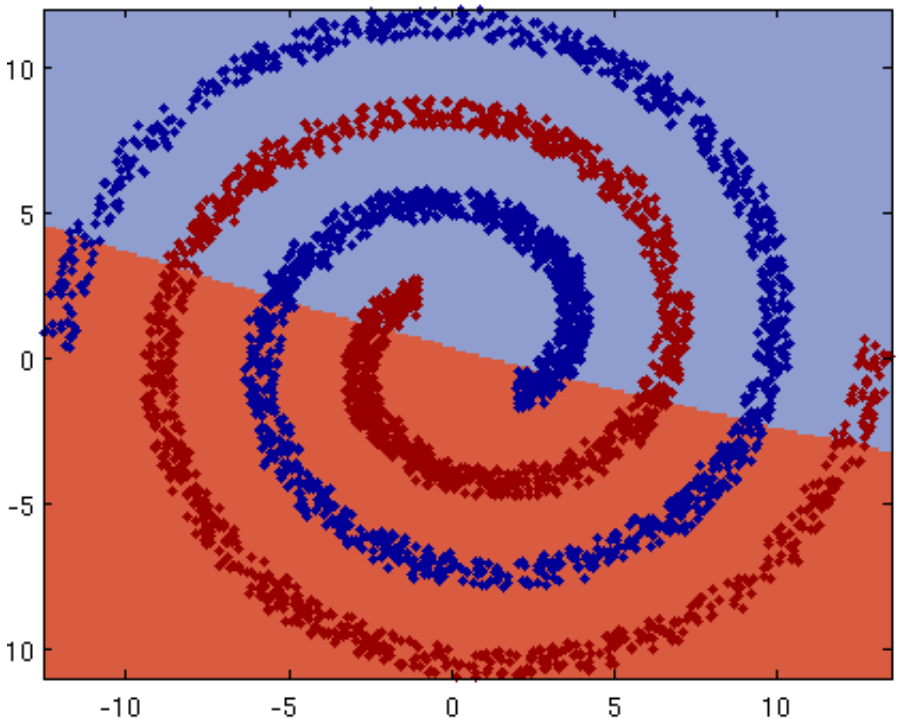

Figure 18: Naive Bayes $C_{distinct}$, Nonlinearly separable data set

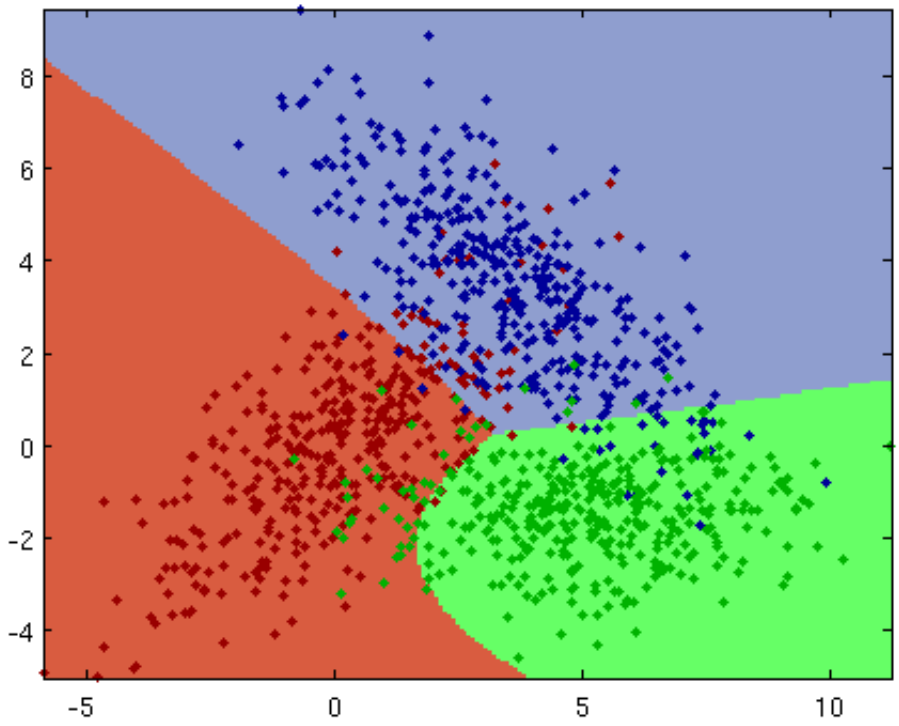

Figure 19: Naive Bayes $C_{distinct}$, Overlapping data set

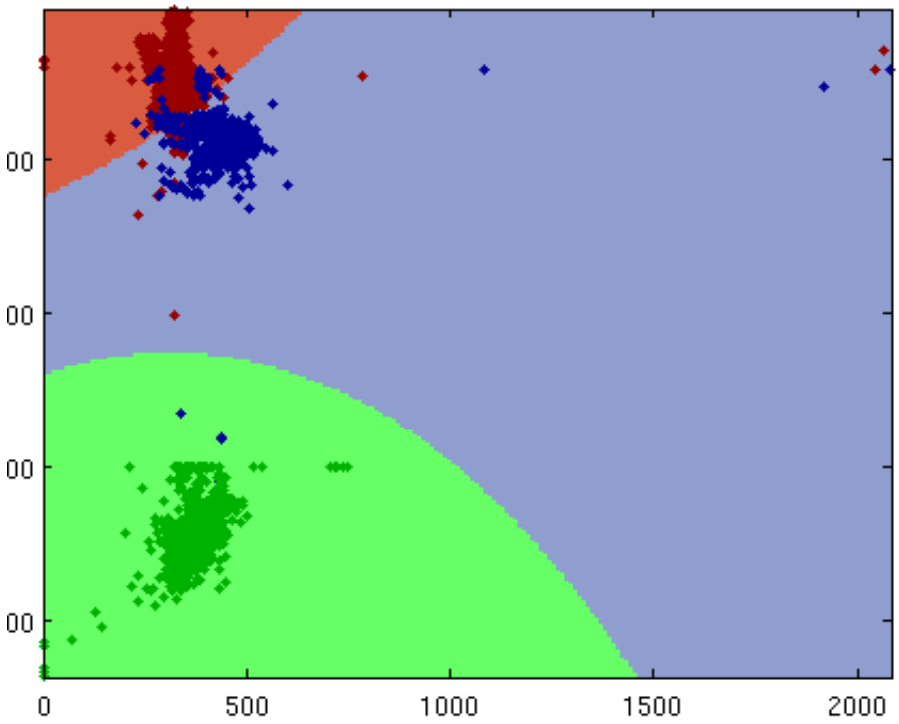

Figure 20: Naive Bayes $C_{distinct}$, Real world data set