Machine Learning Algorithms: From Math to Code Assignment for Perceptron

Kang Wang, Yuheng Zhang

1 Perceptron

For this problem, you should implement missing code in Ch18.m to fulfill linear kernel and RBF kernel perceptron for different datasets and write a report.

1.1 Ch18.m

After you implement missing code in Ch18.m and apply RBF kernel perceptron and linear kernel perceptron on different datasets, you should get the following output in command line, note that linear kernel results are not provided, but linear kernel could be easily caculated if you recall SVM kernel techniques.

```
>> Ch18
Dataset: linear (1), XOR (2), Iris (3) :1
d=3 N=400 K=8
Testing:
Cm =
    23     0     0     0     0     0     0     0
     4    19     0     0     0     0     0     0
     0     8    15     0     0     0     0     0
     0     0    12    16     0     0     0     0
     0     0     0     6    21     2     0     0
     0     0     0     0     0    22     4     0
     0     0     0     0     0     0    23     0
     0     0     0     0     0     0     0    25

Error rate is: 0.1800
```

and figure like Figure 1.

```
>> Ch18
Dataset: linear (1), XOR (2), Iris (3) :2
d=2 N=190 K=2
Testing:
Cm =
    40     8
    10    37

Error rate is: 0.1895
```

and figure like Figure 2.

```
>> Ch18
Dataset: linear (1), XOR (2), Iris (3) :3
d=4 N=150 K=3
Testing:
Cm =
    22     8     0
     7    12     2
     9     4    11

Error rate is: 0.4000
```
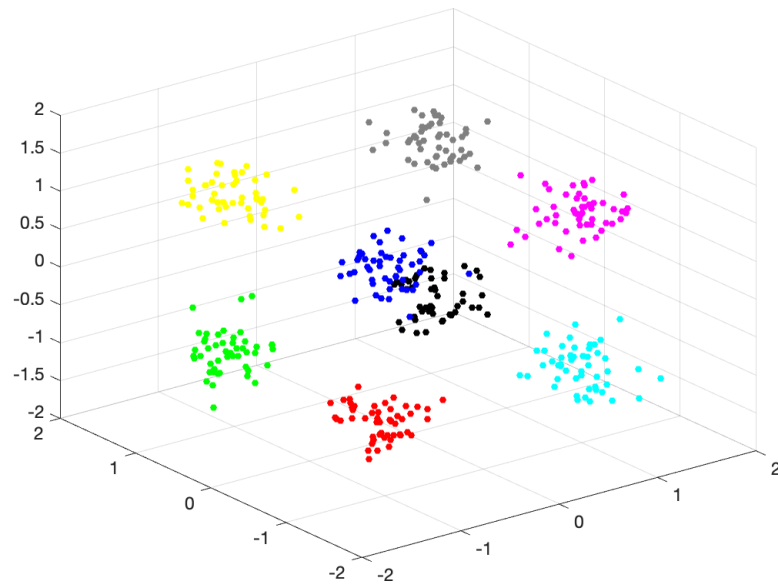
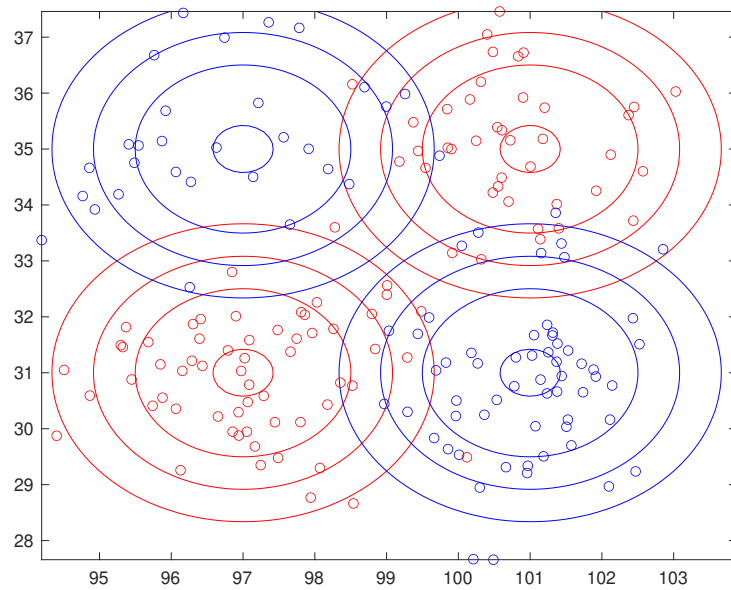Figure 1: Visualization for generated linearly separable dataset

Figure 2: Visualization for XOR dataset

Include generated plots in report. Report error rates in a compact way comparing kernel perceptron algorithms (both linear kernel and RBF kernel) on different datasets.

Notes

1. These two problems should be included in a single report with headings.

2. Source code and report should be compressed into a single .zip file and handed on the canvas before **next monday midnight, July 24 23:59**.