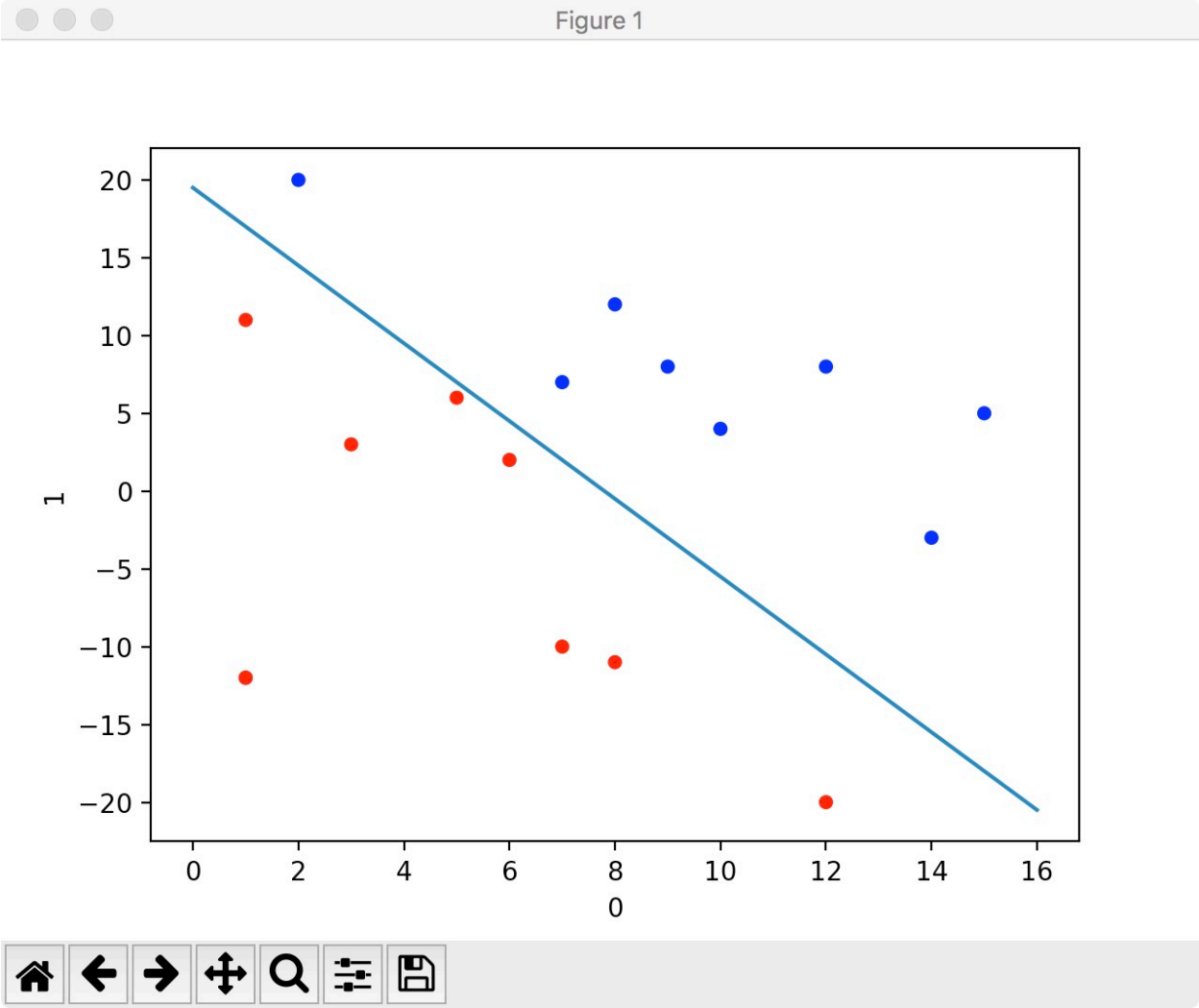
1 Perceptron



2 Linear Regression

The corresponding risks for learning rate alpha 0.001, 0.005, 0.01, 0.05, 0.1, 0.5, 1, 5, 10 are as follows:

0.501669908828
0.227305816937
0.0854020977287
0.00246295433887
0.00236915081948
0.00236405034404
0.00236405034404
1.0173157137e+173
1.10852732534e+238

From the risks shown above, we can see that when alpha = 0.5 and alpha = 1, the risks are the smallest. So I choose to set learning rate alpha to be 0.8. Since the risks for loop count

from 60 to 100 are the same, I choose the loop count to be 60, and the risk is 0.00236405034404.

3 Clustering

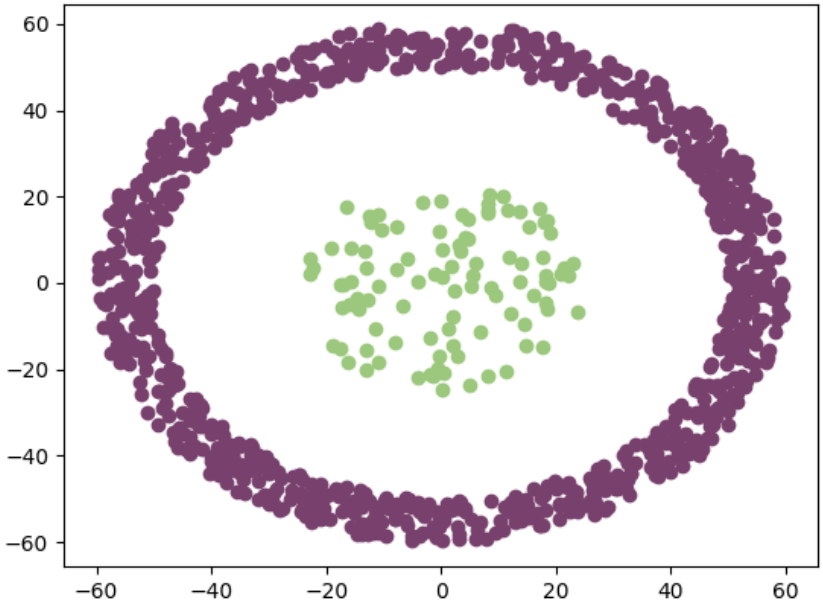
1. K = 2

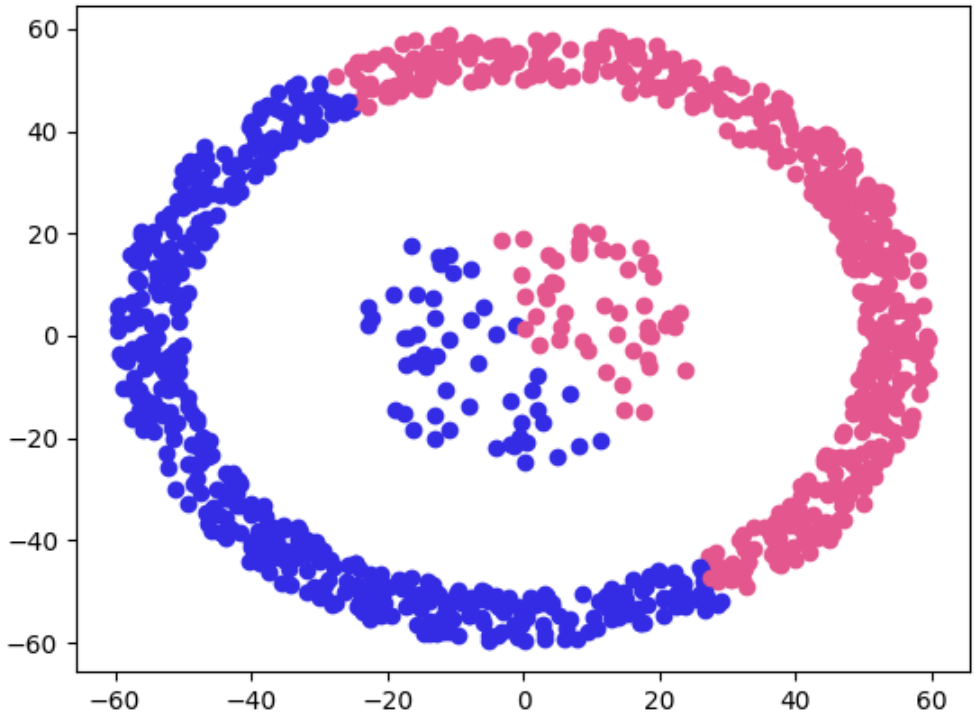
2. K = 8

3 k = 20

When K grows, the number of clustering sets grows, then the details of the picture are richer.

Bonus:





I use spectral clusting and k-means to process the ringData. The result is shown as follow. It can be seen that the K-means is trying to fit a square peg in a round hole- trying to find nice centers with neat spheres around them- and it failed. But spectral clusting can cluster the data right.