# Lab 6 Report

1. KNN:

   Here's part of the result table I test in the KNN part

| KNN num | PCA num | Result(accuracy) |
|---|---|---|
| 3 | 50 | 0.9752 |
| 3 | 55 | 0.9753 |
| 3 | 60 | 0.9762 |
| 3 | 65 | 0.9744 |
| 3 | 70 | 0.9742 |
| 4 | 60 | 0.9751 |
| 5 | 60 | 0.9753 |

   As we see the result in the table, while we change the KNN and PCA project numbers in the test, the accuracy of the result only changes a bit. When in the same K values, with the increase of the PCA number, the accuracy will slightly increase to a peak value then decrease down. When in the same PCA projection numbers, with the increase of the KNN number, it seems that the accuracy will have a small increase. However, it will have the largest number in a specific situation. I write a loop to test all k number and the PCA and get when KNN = 3 and PCA = 60 will get the max accuracy. The loop function is too big and need to run over 30 minutes, so I don't put it here.

2. SVM:

   Here's part of the table of the SVM test result

| C | PCA | Function | Accuracy |
|---|---|---|---|
| 1 | 35 | linear | 0.934 |
| 1 | 50 | linear | 0.941 |
| 1 | 35 | gaussian | 0.303 |
| 1 | 50 | gaussian | 0.249 |
| 1 | 56 | polynominal | 0.983 |
| 2 | 56 | polynominal | 0.983 |
| 1 | 60 | polynominal | 0.982 |
| 1 | 50 | polynominal | 0.982 |

   As we see the result in the table, same as the result in KNN. When in the same C values and same function, the increase of PCA will cause the accuracy increase to a peak and then slowly decrease. In the same C and PCA value, the guassian function works bad and the polnominal function works best. The C value changes only cause a little difference in the result of the accuracy. Finally, the best accuracy I get is when C =1, PCA = 56 in polynominal function, and the final accuracy is 0.983.