ECGR 4105 Homework 4

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GitHub Link

https://github.com/oopCole/ECGR4105/tree/main/HW4

Problem 1.

1. **Optimum Number of Principal Components:**

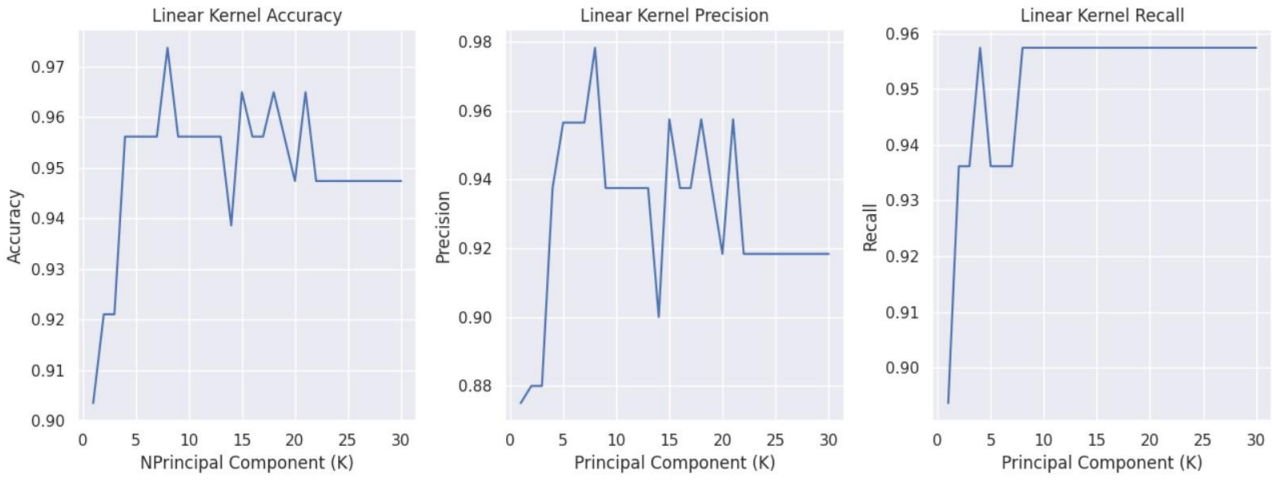
The optimum number of principal components that achieved the highest accuracy for various kernel tricks can be seen in the table below.

Kernel	K Value	Accuracy
Linear	8	0.9736842105263158
RBF	8	0.9912280701754386
Poly	4	0.9649122807017544

2. **Accuracy, Precision, and Recall Plots:**

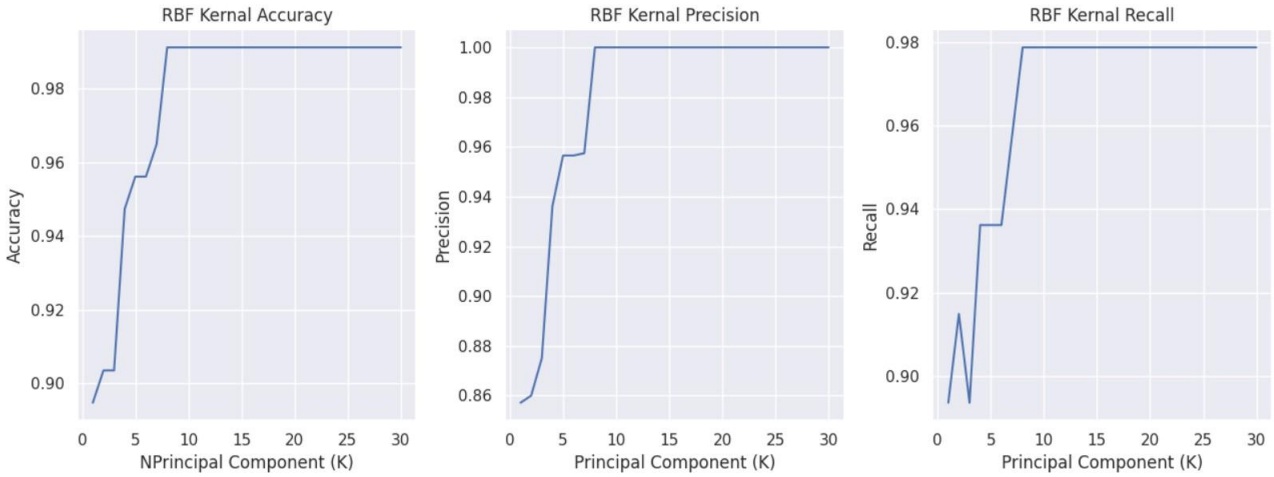
Shown below are the accuracy, precision, and recall plots for the Linear Kernel.

Figure 1: Plots for Linear Kernel



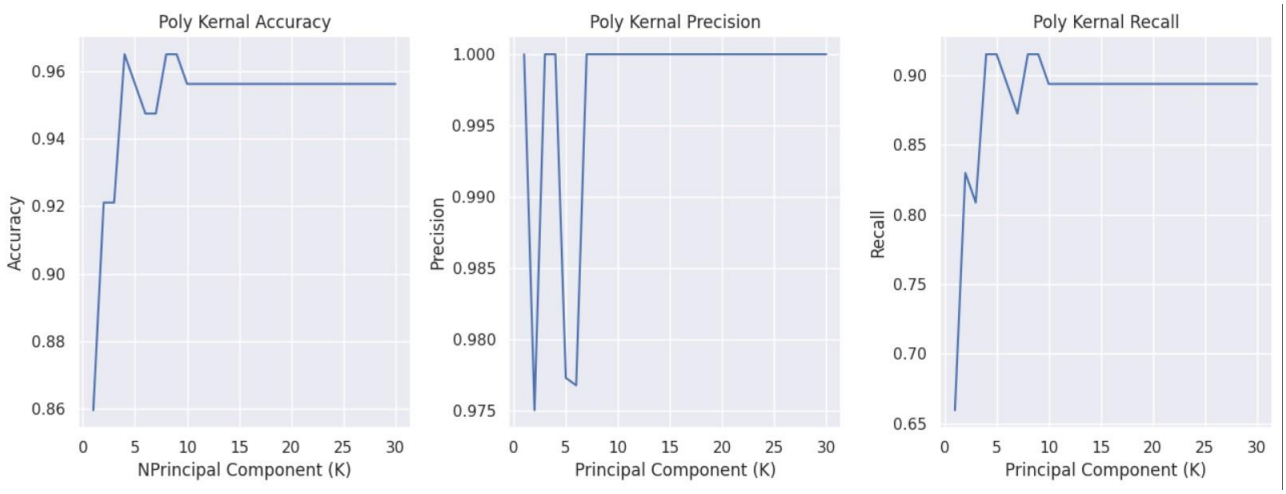
Shown below are the accuracy, precision, and recall plots for the RBF Kernel.

Figure 2: Plots for RBF Kernel



Shown below are the accuracy, precision, and recall plots for the Poly Kernel.

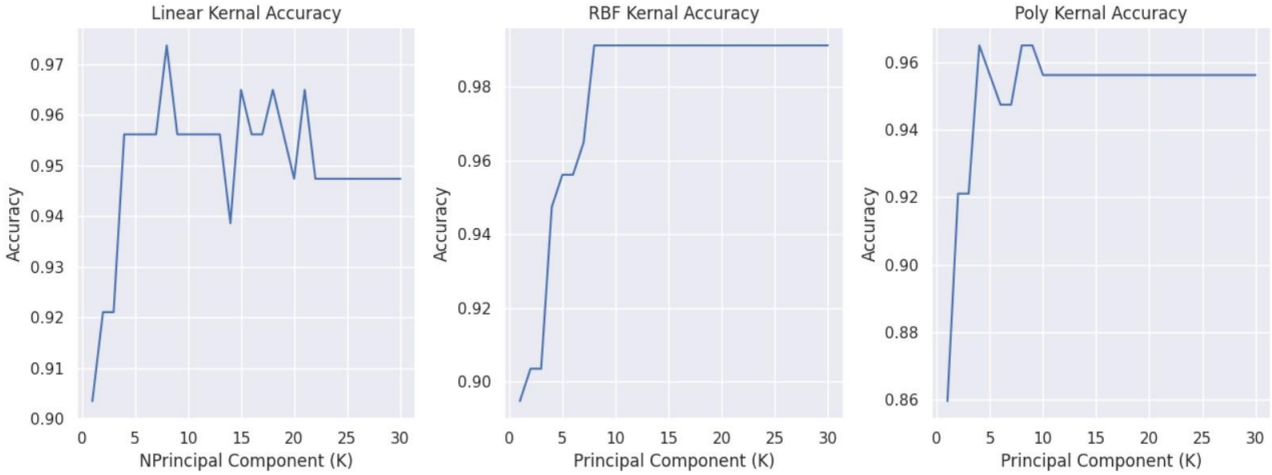
Figure 3: Plots for Poly Kernel



3. **Comparing Kernel Accuracies:**

Shown below are the kernel accuracy plots.

Figure 4: Comparing Accuracies with Various Kernels



4. **Compare Results to Homework 3:**

In Problem 4 of Homework 3, the optimal K value was found to be 11 principal components, compared to the 8 found in Problem 1 of this homework. The results can be seen in the table below:

Homework	K Value	Accuracy
Homework 4	8	0.9736842105263158
Homework 3	11	0.9649122807017544

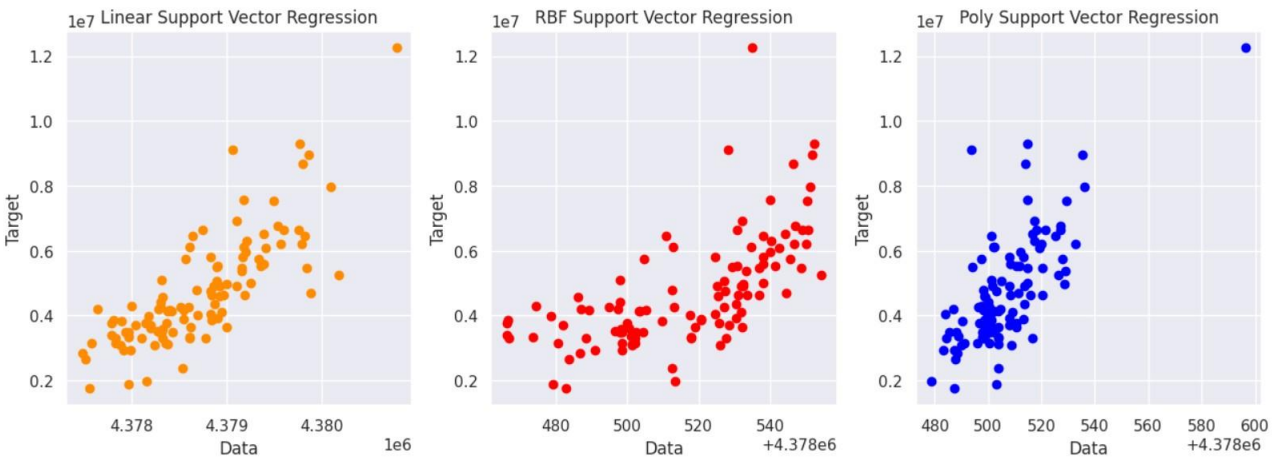
These results show that an SVM classifier is more accurate that a logistic regression classifier.

Problem 2.

1. **SVR Regression Plots for Various Kernels:**

The scatter plots for SVR regression for various kernels can be seen below:

Figure 5: Plots for SVR Regression



2. Compare Results to Homework 2:

The plot of mean-squared-error over the number of principal components looks similar to the shape of the linear regression plot from Problem 3 of Homework 2. However, SVR does not use linear regression, so this is why the curve is not as smooth as it is when it's plotted using linear regression.

3. Optimum Number of Principal Components:

The optimum number of principal components that achieved the highest accuracy for various kernel tricks can be seen in the table below.

Kernel	K Value	MSE
Linear	10	2035421831509.1892
RBF	1	3000141079406.065
Poly	1	2995778436314.8477

4. Comparing Kernel Accuracies:

The various kernel accuracies can be seen below:

Figure 6: Comparing Accuracies with Various Kernels