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I carried out the SVM algorithm with four different kernels and with different parameters. Each experiment was carried out 10 times and the accuracy was averaged. The results are below:

|  |  |  |
| --- | --- | --- |
| Kernel | Parameters | Avg. Accuracy |
| Rbf | Gamma=0.002 | 0.408 |
| Sigmoid | Gamma=0.002 | 0.413 |
| Polynomial | Degree=1 | 0.851 |
| Linear |  | 0.827 |

It was hard to improve the accuracy for rbf and sigmoid. For instance, I started with an averaged accuracy of 0.37 for rbf, but was able to only improve it to 0.41. Linear and Polynomial kernels seem to perform the best. They had accuracy of over 0.80 with the default parameters.

I then performed Principal Component Analysis with 100 attributes. I made sure that whiten was set to True and that copy was set to True. I did not want to mess up the original data.

Next, I performed a Grid Search with 3 of the original kernels. I tried different parameters for each and below are the results:

|  |  |  |  |
| --- | --- | --- | --- |
| Variations | Best Values for Attributes | Accuracy | Accuracy Increased By |
| Polynomial Kernel | | |  |
| 'degree':[1,2,3,5,10],  "C":[0.5, 1.0, 2.0, 3.0, 4.0, 5.0],  "coef0":[0.0, 0.5, 0.9, 1.5] | Degree = 2  C = 4.0  Coef0 = 0.5 | 0.864 | + 0.0131 |
| Sigmoid Kernel | | |  |
| "C":[0.5, 1.0, 2.0, 3.0, 4.0, 5.0],  "gamma":["auto", 1/10000, 1/2914, 1/500],  "coef0":[0.0, 0.5, 0.9, 1.5] | Degree = 5.0  Gamma = 0.002  Coef0 = 0.0 | 0.760 | + 0.347 |
| RBF Kernel |  |  |  |
| "C":[0.5, 1.0, 2.0, 3.0, 4.0, 5.0],  "gamma":["auto", 1/10000, 1/2914, 1/500] | C =5.0  Gamma = 0.002 | 0.798 | + 0.390 |

The “Accuracy Increased By” are positive for each kernel. This means that the algorithm performed better after we applied PCA. The algorithm also performed faster when PCA was applied. This is because they had less attributes to deal with.