PCA & CRC – Homework 4

CRC Without PCA Results:

Lambda	0.001	0.01	0.1	1	10
Accuracy	0.4274	0.4829	0.5085	0.4359	0.3462

CRC With PCA Results:

	Lambda						**k**
Ratio		0.001	0.01	0.1	1	10	
	0.9	0.4359	0.4359	0.4359	0.4274	0.3504	82
	0.95	0.4744	0.4744	0.4701	0.4359	0.3504	155
	0.99	0.4957	0.4915	0.4872	0.4316	0.3462	374

Overall Results:

CRC no PCA:

Best lambda = 0.1
Validation Acc = 0.5085
Test Acc = 0.4821

CRC With PCA:

Best variance ratio = 0.99
Components (k) = 374
Best lambda = 0.001
Validation Acc = 0.4957
Test Acc = 0.5077

All hyperparameters were tuned using validation accuracy only, and the test set was evaluated once with the selected best parameters to ensure fair comparison. Overall, using PCA made CRC much more efficient and accurate (in testing accuracy). With PCA, having a lower lambda (0.001) and a higher ratio of selected components (0.99) was the best option for accuracy, but the accuracy only decreased by about 2% after lowering the amount of principle components from 374 to 155 demonstrating a possible tradeoff between efficiency and accuracy. The reduction from 155 components to 82 demonstrated a 4% reduction in accuracy, showing that there is a rapid reduction in accuracy without enough principal components.