PYTHON PROJECT- 1

Statistical study of the independent variables

Covariance matrix:

	0	1	2	3	4
0	8.081299	4.405083	-4.666323	1.653338	-1.024310
1	4.405083	34.445710	-19.905119	-6.490033	-1.297386
2	-4.666323	-19.905119	18.576359	2.887241	0.333985
3	1.653338	-6.490033	2.887241	4.414256	-0.024464
4	-1.024310	-1.297386	0.333985	-0.024464	0.247112

From the correlation matrix above, the correlations are evident from underlined markings; Red means a strong negative correlation while green means a positive correlation. The variance of Wavelet Transformed image is negatively correlated to the entropy and weakly positively correlated to the kurtosis and skewness. On the other hand, skewness is highly negatively correlated to the kurtosis of Wavelet Transformed image. Overall, all the variables play an important role in detecting if the currency is authentic because the correlations are evident between several independant variables. So we will input the first 5 columns in the dataframe to apply different ML algorithms

	test_accuracy	test_precision	train_accuracy	train_precision
perceptron	0.974545	0.966942	0.985401	0.981707
logistic_regression	0.981818	0.967480	0.992701	0.987854
decision_tree	0.981818	0.975207	1.000000	1.000000
random_forest	0.992727	0.991667	1.000000	1.000000
knn_classifier	0.996364	0.991736	1.000000	1.000000
svm	1.000000	1.000000	1.000000	1.000000

A snapshot from the accuracy and precision matrix shows that SVM classifier could achieve 1 which means 100% accuracy in test and train data when data was fitted. Although, KNN and Random forest can also be alternatively used because the accuracy is almost 100% for both. Preceptron was tweaked for the parameters, but did not show much accuracy. However, SVM suits the best for the currency notes data and can be used relaiably for the authentication process by the Acme.