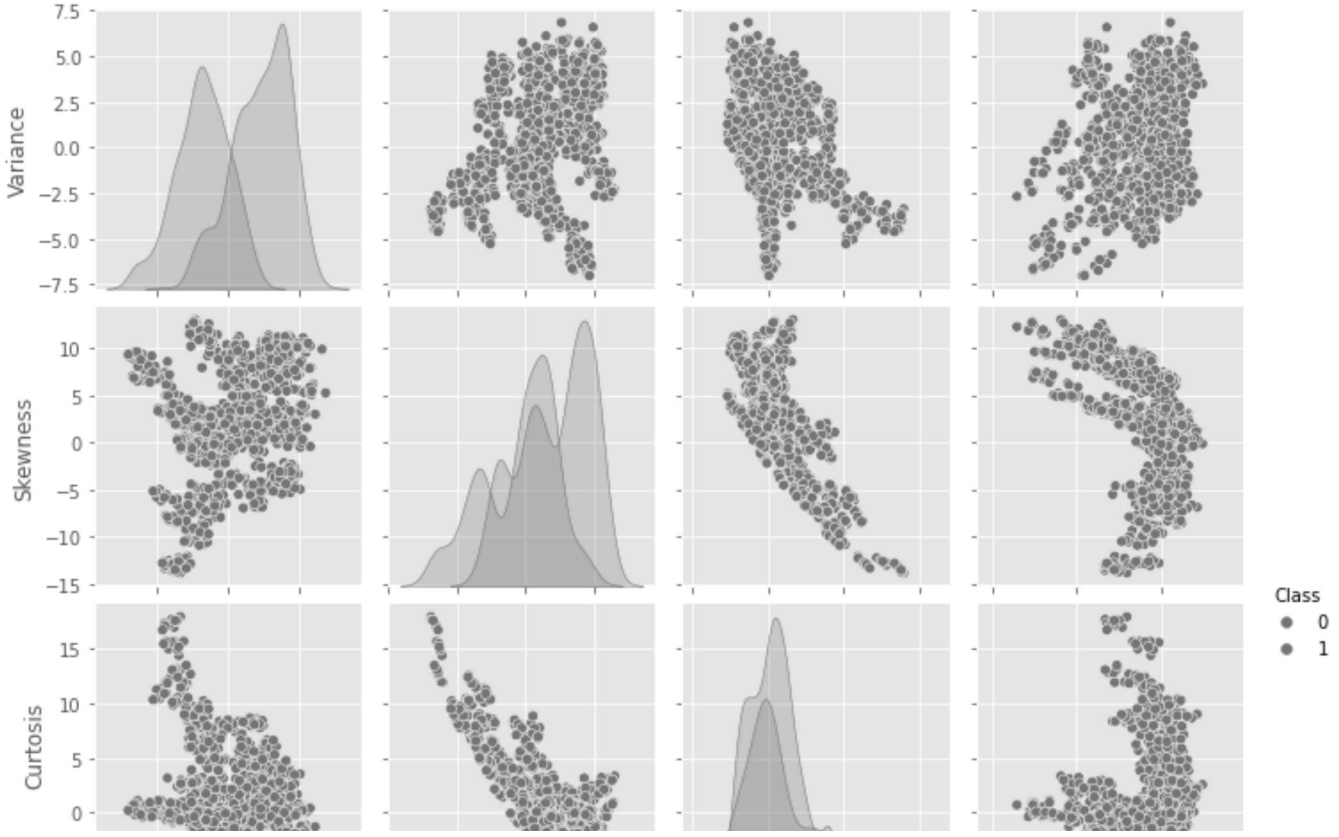
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
from matplotlib import style
style.use('ggplot')
```

```
df  = pd.read_csv('/content/bill_authentication.csv')
df.sample(10)
```

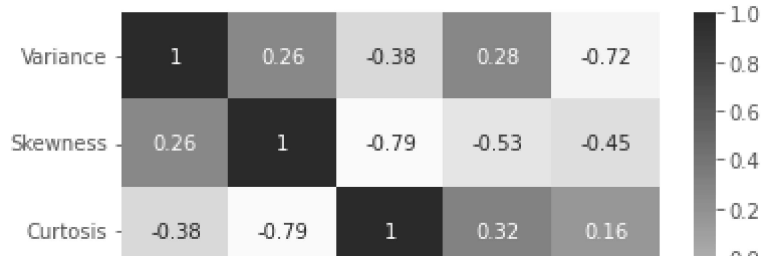
	Variance	Skewness	Curtosis	Entropy	Class
1227	-2.56400	-1.7051	1.50260	0.32757	1
886	-1.65140	-8.4985	9.11220	1.23790	1
1326	-1.29430	2.6735	-0.84085	-2.03230	1
938	-4.37730	-5.5167	10.93900	-0.40820	1
300	0.32920	-4.4552	4.57180	-0.98880	0
1202	-0.70346	2.9570	-3.59470	-3.14570	1
241	-1.39310	1.5664	7.53820	0.78403	0
1051	-3.77470	2.5162	0.83341	-0.30993	1
579	1.15880	8.9331	-2.08070	-1.12720	0
825	-2.23400	-7.0314	7.49360	0.61334	1

```
sns.pairplot(df,hue='Class')
plt.show()
```




```
df.hist(bins=200,color='lime')
plt.show()
```


```
sns.heatmap(df.corr().round(3),annot=True,cmap='Blues')
plt.show()
```




```
sns.scatterplot(x=df['Variance'],y=df['Skewness'] ,hue=df.Class)
plt.show()
```


```
X = df.drop(columns=['Entropy','Class'])
Y = df['Class']
```

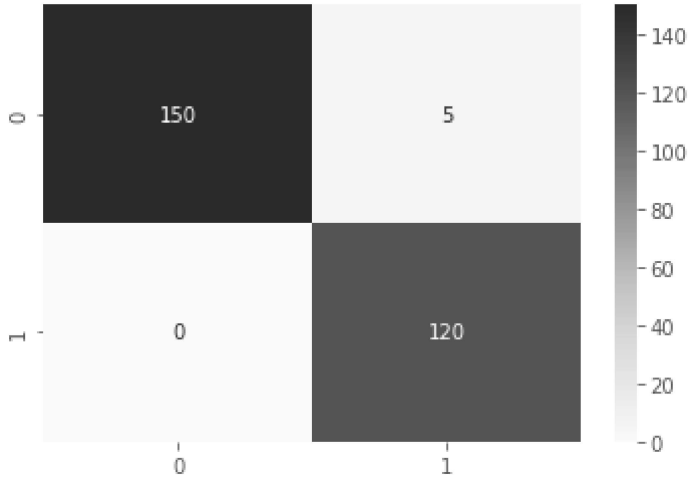
```
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split as tts
scale = MinMaxScaler()
scale.fit(X)
X_scaled = scale.transform(X)
X_train, X_test, Y_train, Y_test = tts(X_scaled,Y,train_size = 0.80,random_state = 50)
```

```
#@title Linearly seperable Kernel
from sklearn.svm import SVC
svc_l = SVC(kernel='linear')
svc_l.fit(X_train,Y_train)
```

Linearly seperable Kernel

```
SVC(C=1.0, break_ties=False, cache_size=200, class_weight=None, coef0=0.0,
    decision_function_shape='ovr', degree=3, gamma='scale', kernel='linear',
    max_iter=-1, probability=False, random_state=None, shrinking=True,
    tol=0.001, verbose=False)
```

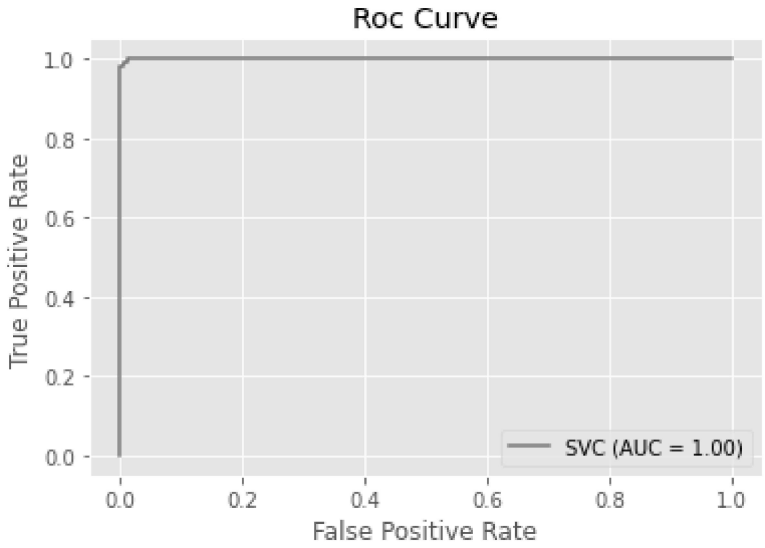
```
from sklearn.metrics import confusion_matrix,classification_report,plot_roc_curve,accuracy_sc
sns.heatmap(confusion_matrix(Y_test,svc_l.predict(X_test)),annot=True,fmt='g',cmap='Blues')
plt.show()
```



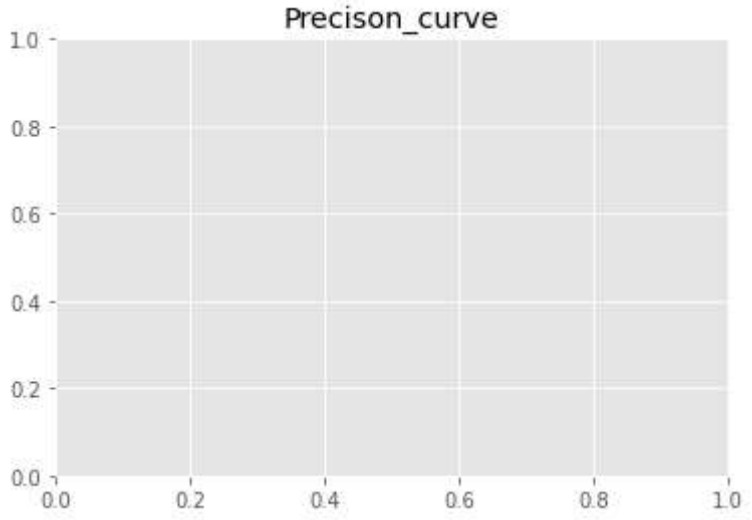

```
print(classification_report(Y_test,svc_l.predict(X_test)))
```

```
                  precision    recall  f1-score   support

               0       1.00      0.97      0.98       155
               1       0.96      1.00      0.98       120

        accuracy                           0.98       275
       macro avg       0.98      0.98      0.98       275
    weighted avg       0.98      0.98      0.98       275
```

```
plot_roc_curve(svc_l,X_test,Y_test)
plt.title('Roc Curve')
plt.show()
```




```
precision_recall_curve(Y_test,svc_l.predict(X_test))
plt.title('Precison_curve')
plt.show()
```

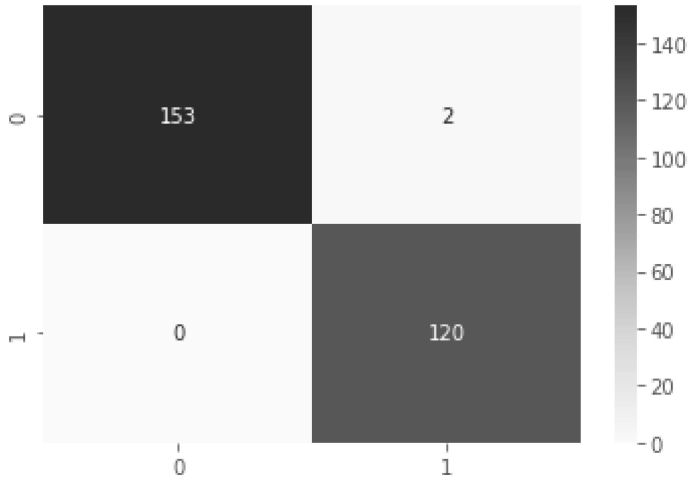



```
#@title Non-Linearly seperable Kernel
from sklearn.svm import SVC
svc_p = SVC(C=1.0,kernel='rbf')
svc_p.fit(X_train,Y_train)
```

Non-Linearly seperable Kernel

```
SVC(C=1.0, break_ties=False, cache_size=200, class_weight=None, coef0=0.0,
    decision_function_shape='ovr', degree=3, gamma='scale', kernel='rbf',
    max_iter=-1, probability=False, random_state=None, shrinking=True,
    tol=0.001, verbose=False)
```

```
sns.heatmap(confusion_matrix(Y_test,svc_p.predict(X_test)),annot=True,fmt='g',cmap='Blues')
plt.show()
```

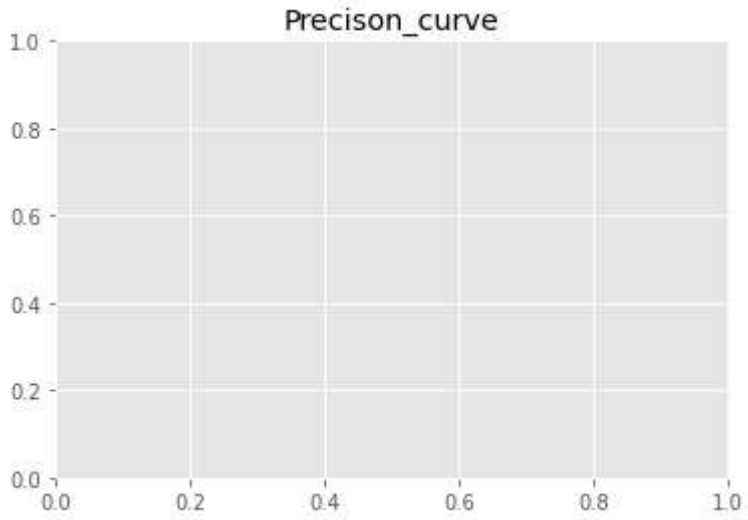



```
print(classification_report(Y_test,svc_p.predict(X_test)))
```

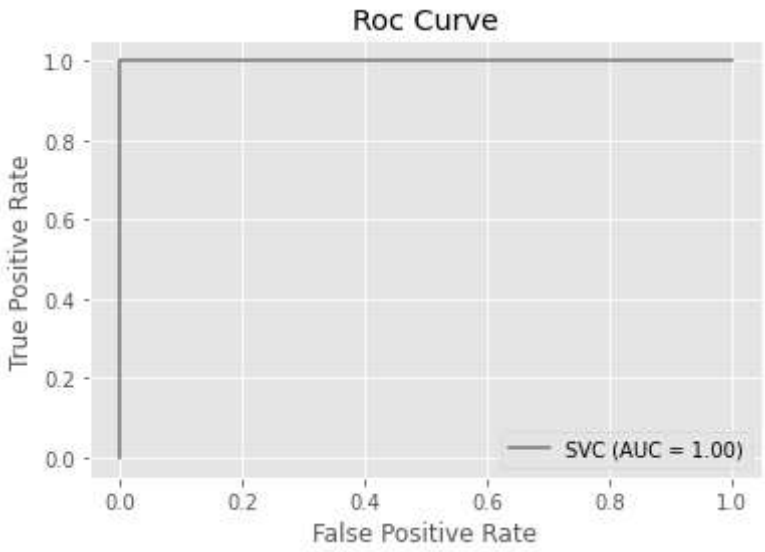
```
              precision    recall  f1-score   support

           0       1.00      0.99      0.99       155
           1       0.98      1.00      0.99       120

    accuracy                           0.99       275
   macro avg       0.99      0.99      0.99       275
```

```
weighted avg       0.99      0.99      0.99       275
```

```
precision_recall_curve(Y_test,svc_p.predict(X_test))
plt.title('Precison_curve')
plt.show()
```




```
plot_roc_curve(svc_p,X_test,Y_test)
plt.title('Roc Curve')
plt.show()
```



https://www.kaggle.com/mostafa32/banknote-authentication-classification-svm

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