Aadarsh Goyal

MIS: 111915001

Import basic Libraries

In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [2]:

```
df = pd.read_csv("wine_fraud.csv")
df.head()
```

Out[2]:

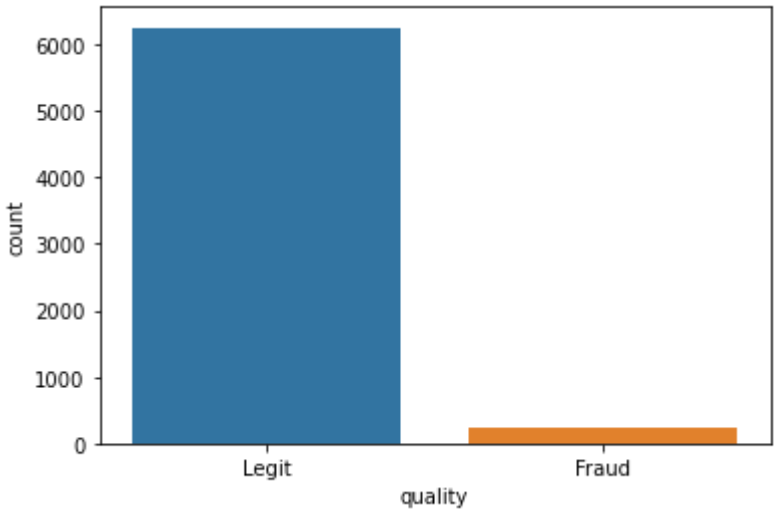
	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcoh
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	9
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	9
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	9
4	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9

In [3]:

```
sns.countplot(x='quality',data=df)
```

Out[3]:

```
<AxesSubplot:xlabel='quality', ylabel='count'>
```



Preprocessing

In [4]:

```
df['type'] = pd.get_dummies(df['type'],drop_first=True)
df['quality']= df['quality'].map({'Legit':0,'Fraud':1})

df.head()
```

Out[4]:

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcoh
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	9
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	9
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	9
4	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9

Split data into training and testing

In [5]:

```
X = df.drop('quality',axis=1)
y = df['quality']
```

In [6]:

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.1, random_state=101)
```

In [7]:

```
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()

scaled_X_train = scaler.fit_transform(X_train)
scaled_X_test = scaler.transform(X_test)
```

Lets move to SVM model

In [8]:

```
from sklearn.svm import SVC

svc = SVC(class_weight='balanced')
```

Using GridSearchCV to run a grid search for the best C and gamma parameters.

In [9]:

```
from sklearn.model_selection import GridSearchCV

param_grid = {'C':[0.001,0.01,0.1,0.25,0.5,0.75,1]}
grid = GridSearchCV(svc,param_grid)
```

In [10]:

```
grid.fit(scaled_X_train,y_train)
```

Out[10]:

```
GridSearchCV(estimator=SVC(class_weight='balanced'),
             param_grid={'C': [0.001, 0.01, 0.1, 0.25, 0.5, 0.75, 1]})
```

In [11]:

```
grid.best_params_
```

Out[11]:

```
{'C': 1}
```

Displaying Confusion matrix and Classification Report

In [12]:

```
from sklearn.metrics import confusion_matrix,classification_report,plot_confusion_matrix,ac

grid_pred = grid.predict(scaled_X_test)
confusion_matrix(y_test,grid_pred)
```

Out[12]:

```
array([[531,  92],
       [ 10,  17]], dtype=int64)
```

In [13]:

```
y_pred = grid.predict(scaled_X_test)
accuracy_score(y_test,y_pred)
```

Out[13]:

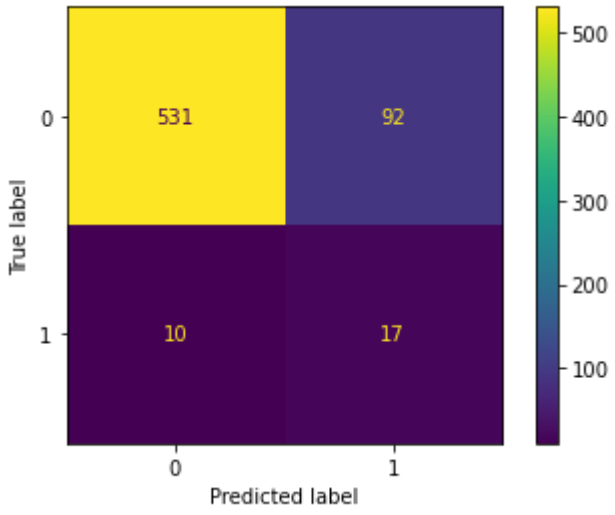
```
0.8430769230769231
```

In [14]:

```
plot_confusion_matrix(grid,scaled_X_test,y_test)
```

Out[14]:

```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x2990476e
308>
```

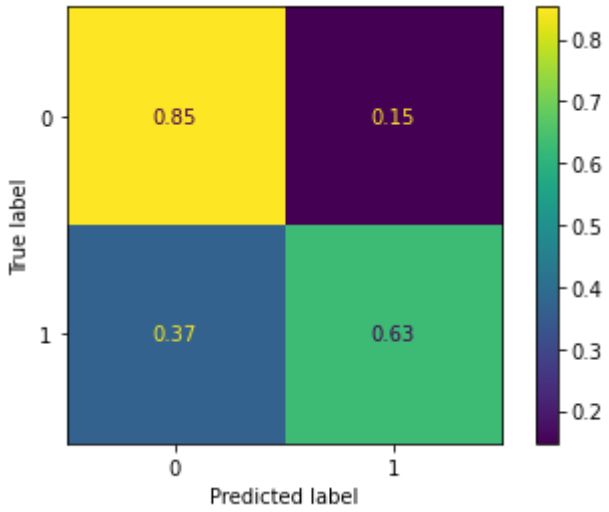


In [15]:

```
# Scaled so highest value=1
plot_confusion_matrix(grid,scaled_X_test,y_test,normalize='true')
```

Out[15]:

```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x2990477e
488>
```



In [16]:

```
print(classification_report(y_test,grid_pred))
```

```
              precision    recall  f1-score   support

           0       0.98      0.85      0.91       623
           1       0.16      0.63      0.25        27

    accuracy                           0.84       650
   macro avg       0.57      0.74      0.58       650
weighted avg       0.95      0.84      0.88       650
```

In [ ]:

```

```