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

from sklearn.datasets import make_blobs
```

```
#FAKE DATASET
data = make_blobs(n_samples=300, n_features=5, centers=2, cluster_std=6.0, random_state=101)
data
```

```
(array([[ -0.95757537,   3.36332609, -15.54675979, -14.02967497,
           1.50545246],
        [-11.12008037,  -0.86726927, -19.42687054, -22.99153445,
          12.8409123 ],
        [  5.02786886,  -2.84037069,  -5.9094317 , -16.29765383,
           7.77075032],
        ...,
        [ -8.02114181,   2.29827056, -13.80731349, -10.89022536,
           1.99399904],
        [ 10.87670302,   3.25562702,  -6.25095388,  -0.92884525,
           8.18286695],
        [  7.86530195, -11.18764669,   6.36417619,  -2.87676038,
           1.31626729]]),
 array([0, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0,
        1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 0, 0, 0,
        1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1,
        0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 0, 1, 1, 1, 0,
        1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 0, 1, 0, 0, 1,
        0, 1, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1,
        0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 1, 1, 1, 1,
        1, 0, 1, 0, 1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 0, 1, 0, 0, 1, 0,
        0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0, 0, 1, 1, 0,
        0, 1, 1, 0, 1, 0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 0, 1,
        0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1]))
```

```
df_feat = pd.DataFrame(data[0],
                       columns=['feature_'+str(i) for i in range(1,6)]
                       )
df_feat.head(2)
```

	feature_1	feature_2	feature_3	feature_4	feature_5
0	-0.957575	3.363326	-15.546760	-14.029675	1.505452
1	-11.120080	-0.867269	-19.426871	-22.991534	12.840912

```
y = data[1]
y
```

```
array([0, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0,
       1, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 0, 0, 0,
       1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1,
       0, 1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 0, 1, 1, 1, 0,
       1, 0, 1, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 0, 1, 0, 0, 1,
       0, 1, 0, 0, 0, 0, 1, 0, 0, 1, 1, 0, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1,
       0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 1, 1, 1, 1,
       1, 0, 1, 0, 1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 0, 1, 0, 0, 1, 0,
       0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0, 0, 1, 1, 0,
       0, 1, 1, 0, 1, 0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 0, 1,
       1, 1, 1, 1, 1, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1,
```

```
       1, 1, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0,
       0, 1, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 1, 0, 1, 1, 0, 0, 1, 0, 1, 1,
       0, 0, 1, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1])
```

Scaling

using MinMaxScaler

```
from sklearn.preprocessing import MinMaxScaler

scaler = MinMaxScaler()
X = scaler.fit_transform(df_feat)
```

Pembagian Data

```
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=101)
```

Modelling

```
from sklearn.neighbors import KNeighborsClassifier

knn = KNeighborsClassifier(n_neighbors=1)
```

```
knn.fit(X_train, y_train)
```

```
KNeighborsClassifier(n_neighbors=1)
```

```
predictions = knn.predict(X_test)
predictions
```

```
array([0, 1, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0,
       1, 0, 1, 1, 1, 1, 1, 0, 0, 0, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 1, 1,
       0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 1, 0])
```

Evaluation

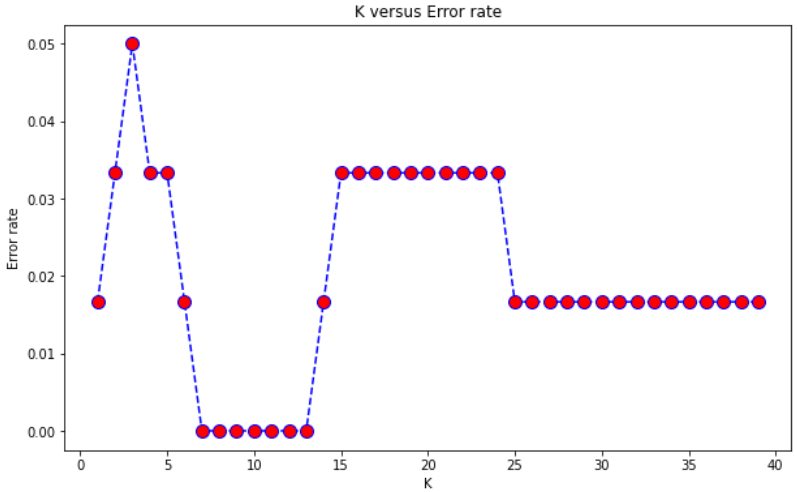
```
from sklearn.metrics import confusion_matrix, classification_report

print(confusion_matrix(y_test, predictions))
print(classification_report(y_test, predictions))
```

```
[[31  0]
 [ 1 28]]
              precision    recall  f1-score   support

           0       0.97      1.00      0.98        31
           1       1.00      0.97      0.98        29

    accuracy                           0.98        60
   macro avg       0.98      0.98      0.98        60
weighted avg       0.98      0.98      0.98        60
```

Tunning

```
error_rate = []

for i in range(1, 40):
    knn = KNeighborsClassifier(n_neighbors=i)
    knn.fit(X_train, y_train)
    pred_i = knn.predict(X_test)

    error_rate.append(np.mean(pred_i != y_test))


plt.figure(figsize=(10, 6))

plt.plot(range(1, 40), error_rate, color='blue', linestyle='--',
         markersize=10, markerfacecolor='red', marker='o')
plt.title('K versus Error rate')
plt.xlabel('K')
plt.ylabel('Error rate')
```

```
Text(0, 0.5, 'Error rate')
```




```
knn = KNeighborsClassifier(n_neighbors=5)
knn.fit(X_train, y_train)
predictions = knn.predict(X_test)
```

```
print(confusion_matrix(y_test, predictions))
print(classification_report(y_test, predictions))
```

```
[[30  1]
 [ 1 28]]
              precision    recall  f1-score   support

           0       0.97      0.97      0.97        31
           1       0.97      0.97      0.97        29

    accuracy                           0.97        60
   macro avg       0.97      0.97      0.97        60
weighted avg       0.97      0.97      0.97        60
```