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```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.pipeline import Pipeline
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsRegressor
from sklearn.metrics import mean_squared_error, r2_score,
accuracy_score, confusion_matrix, classification_report
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.naive_bayes import BernoulliNB
```

```
df = pd.read_csv("energy-cool.csv")
df.head()
```

```
     X1     X2     X3      X4   X5  X6   X7  X8     Y2
0  0.98  514.5  294.0  110.25  7.0   2  0.0   0  21.33
1  0.98  514.5  294.0  110.25  7.0   3  0.0   0  21.33
2  0.98  514.5  294.0  110.25  7.0   4  0.0   0  21.33
3  0.98  514.5  294.0  110.25  7.0   5  0.0   0  21.33
4  0.90  563.5  318.5  122.50  7.0   2  0.0   0  28.28
```

```
df.shape
```

```
(768, 9)
```

```
print(df.isna().sum())
```

```
X1    0
X2    0
X3    0
X4    0
X5    0
X6    0
X7    0
X8    0
Y2    0
dtype: int64
```

```
x = df[['X1','X2','X3','X4','X5','X6','X7','X8']]
y = df['Y2']
```

```
print(x.shape)
print(y.shape)
```

```
(768, 8)
(768,)
```

```
x_train, x_test, y_train, y_test = train_test_split(x, y,
test_size=0.3)
print(x_train.shape, x_test.shape, y_train.shape, y_test.shape)
```

```
(537, 8) (231, 8) (537,) (231,)
```

```
knn_acc = []
knn_values = range(1, 13)

for k in knn_values:
    knnreg = Pipeline([
        ('scaler', StandardScaler()),
        ('knn', KNeighborsRegressor(n_neighbors=k))
    ])
    score = cross_val_score(knnreg, x_train, y_train, cv=5,
scoring="neg_root_mean_squared_error")
    knn_acc.append(-score.mean())
```

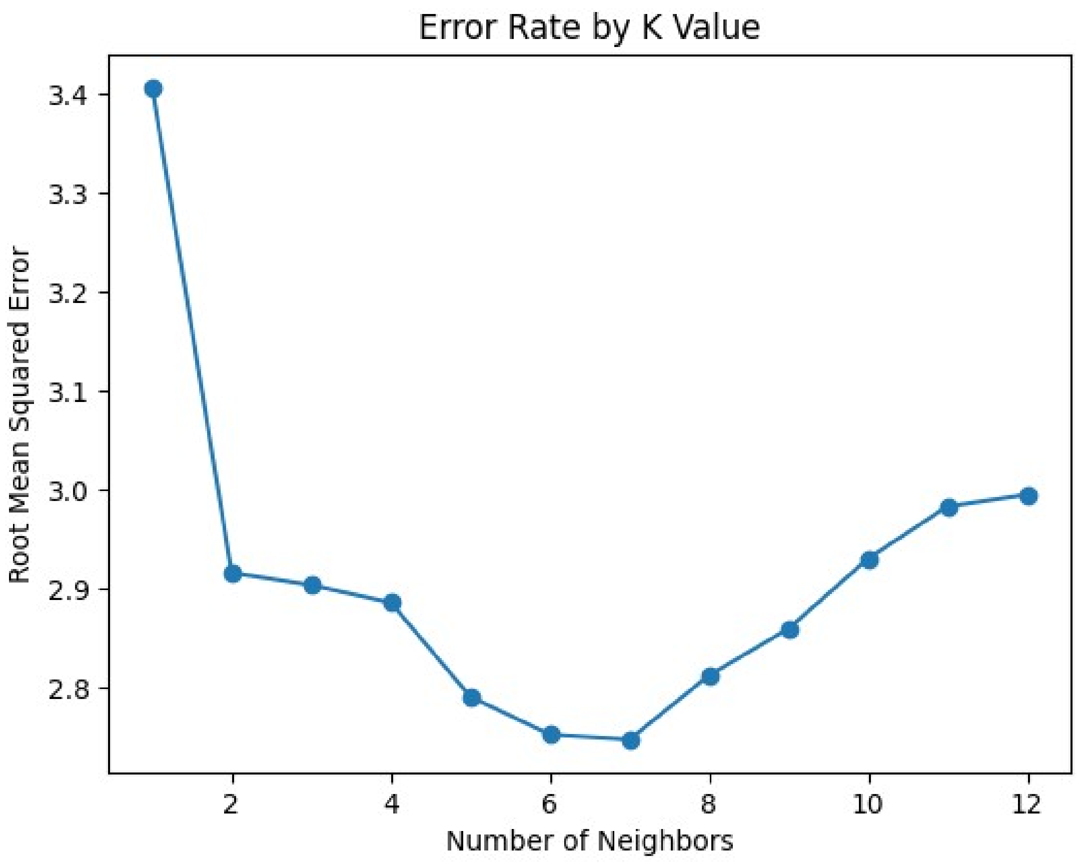
```
best_k=knn_values[np.argmin(knn_acc)]
best_k
```

```
7
```

```
model = KNeighborsRegressor(n_neighbors=best_k)
model.fit(x_train, y_train)
```

```
KNeighborsRegressor(n_neighbors=7)
```

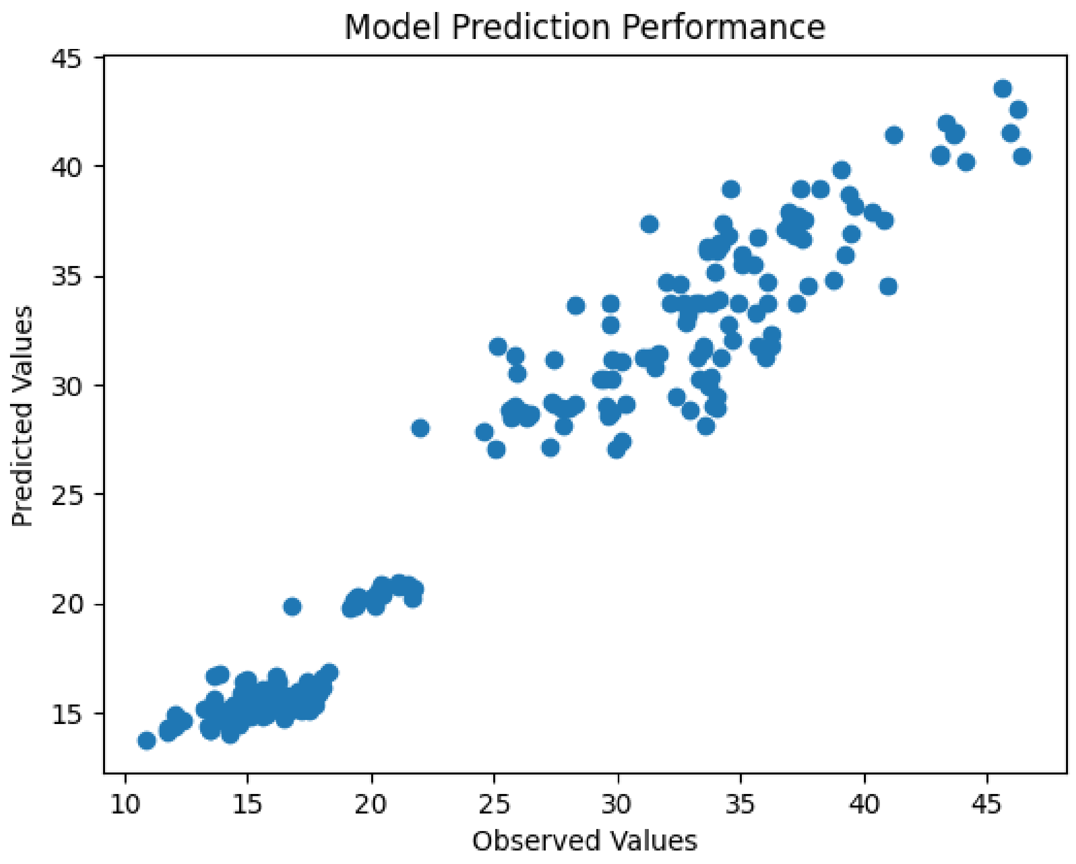
```
plt.plot(knn_values, knn_acc, marker='o')
plt.xlabel("Number of Neighbors")
plt.ylabel("Root Mean Squared Error")
plt.title("Error Rate by K Value")
plt.show()
```



```
y_pred = model.predict(x_test)

rmse = np.sqrt(mean_squared_error(y_test, y_pred))
r2 = r2_score(y_test, y_pred)

print("RMSE:", rmse)
print("R2 Score:", r2)
```

```
RMSE: 2.2014899459579413
R2 Score: 0.9486764601283688
```

```
plt.scatter(y_test, y_pred)
plt.xlabel("Observed Values")
plt.ylabel("Predicted Values")
plt.title("Model Prediction Performance")
plt.show()
```



```
train_data = pd.read_csv("politifakenews/train.csv")
test_data = pd.read_csv("politifakenews/test.csv")

train_data.head()

   Unnamed: 0                                               news
label
0           0  “Pennsylvania is under a court order to count ...
0
1           1  “Biden and Democrats have dismantled border se...
0
2           2  Katie Hobbs “has voted to double our gas tax. ...
1
3           3  Reuters reported that Nancy Pelosi bought 10 m...
0
4           4  It's not true that "the United States was buil...
0

print(train_data.columns)
print(test_data.columns)

Index(['Unnamed: 0', 'news', 'label'], dtype='object')
Index(['Unnamed: 0', 'news', 'label'], dtype='object')
```

```
X_train = train_data["news"]
y_train = train_data["label"]

X_test = test_data["news"]
y_test = test_data["label"]

vectorizer = CountVectorizer(binary=True, stop_words="english")

X_train_vec = vectorizer.fit_transform(X_train)
X_test_vec = vectorizer.transform(X_test)

model = BernoulliNB()
model.fit(X_train_vec, y_train)
```

```
BernoulliNB()
```

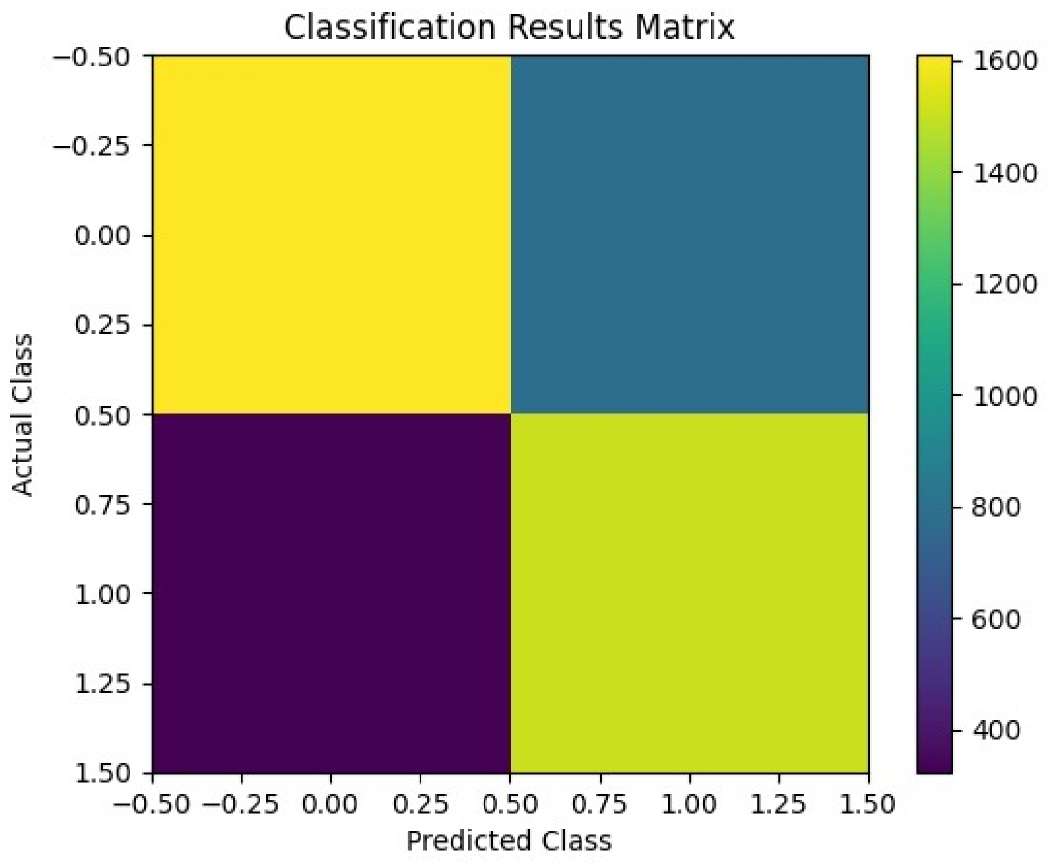
```
train_pred = model.predict(X_train_vec)
test_pred = model.predict(X_test_vec)

print("Training Accuracy:", accuracy_score(y_train, train_pred))
print("Testing Accuracy:", accuracy_score(y_test, test_pred))

print("\nClassification Report (Test Data):")
print(classification_report(y_test, test_pred))
```

```
Training Accuracy: 0.7933879461673493
Testing Accuracy: 0.7367549668874173

Classification Report (Test Data):
              precision    recall  f1-score   support

           0       0.83      0.67      0.74      2399
           1       0.66      0.82      0.73      1829

    accuracy                           0.74      4228
   macro avg       0.74      0.75      0.74      4228
weighted avg       0.76      0.74      0.74      4228
```

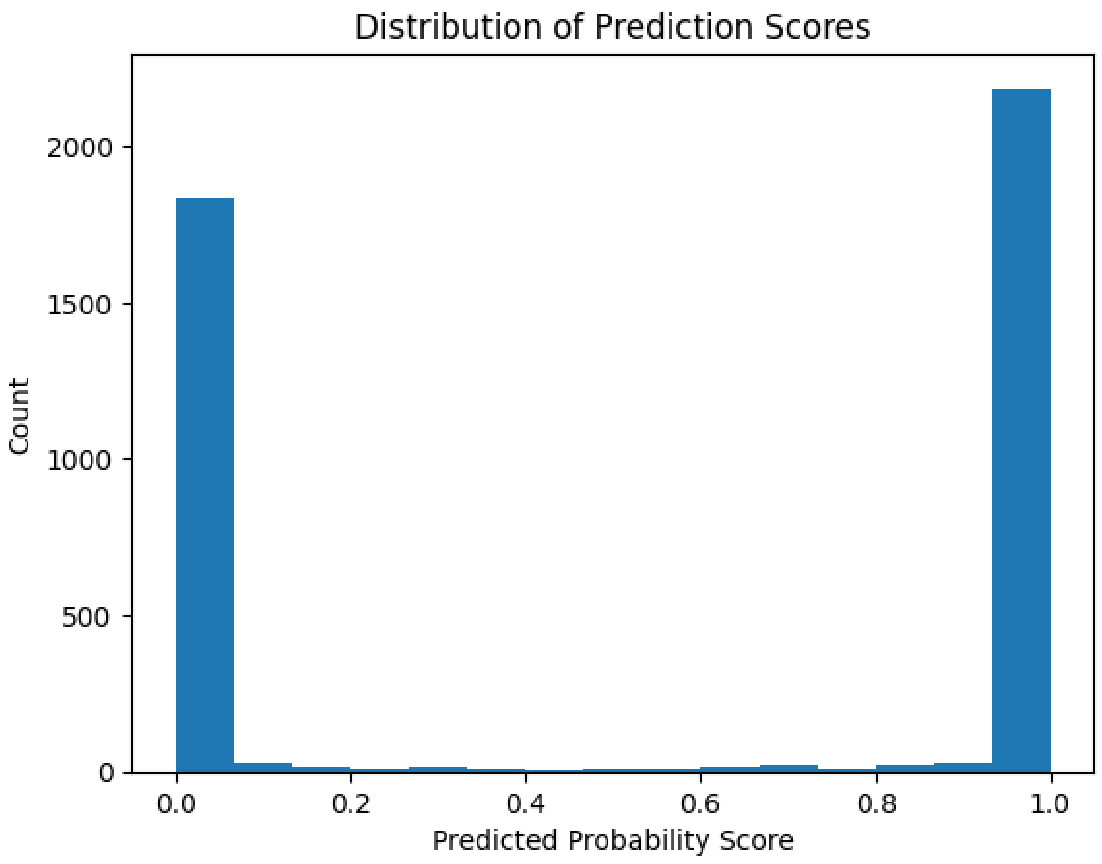
```
cm = confusion_matrix(y_test, test_pred)
cm
```

```
array([[1609,  790],
       [ 323, 1506]])
```

```
plt.imshow(cm)
plt.colorbar()
plt.xlabel("Predicted Class")
plt.ylabel("Actual Class")
plt.title("Classification Results Matrix")
plt.show()
```



```
probs = model.predict_proba(X_test_vec)

plt.hist(probs[:, 1], bins=15)
plt.xlabel("Predicted Probability Score")
plt.ylabel("Count")
plt.title("Distribution of Prediction Scores")
plt.show()
```


Distribution of Prediction Scores
Count
2000
1500
1000
500
0
0.0
0.2
0.4
0.6
0.8
1.0
Predicted Probability Score