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1 Predict stock sentiment using Natural Language Processing

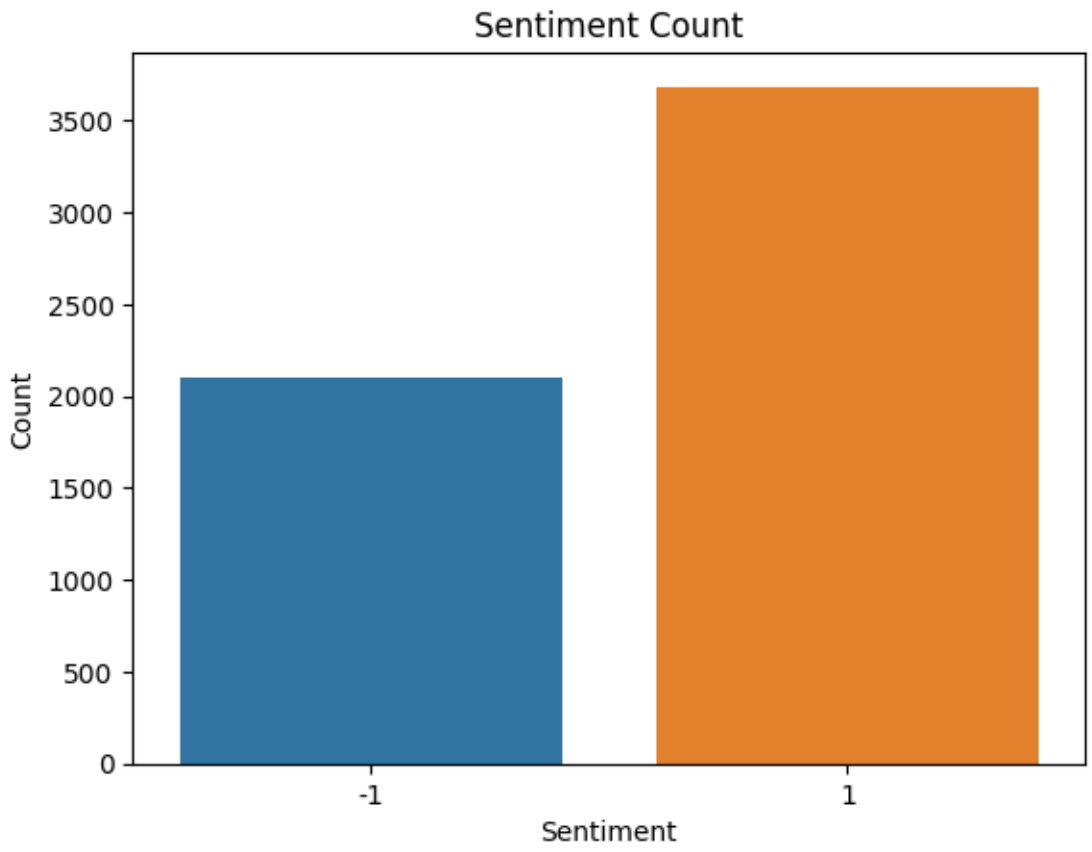
[1]:
```
# Load the libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import sklearn as sk
import nltk
```

[2]:
```
# Load the data from the csv file
data = pd.read_csv("stock_data.csv")
data.head()
```

[2]:

	Text	Sentiment
0	Kickers on my watchlist XIDE TIT SOQ PNK CPW B…	1
1	user: AAP MOVIE. 55% return for the FEA/GEED i…	1
2	user I'd be afraid to short AMZN - they are lo…	1
3	MNTA Over 12.00	1
4	OI Over 21.37	1

[3]:
```
# Plot the Sentiment count for -1 and 1
sns.countplot(x='Sentiment', data=data)
plt.title('Sentiment Count')
plt.xlabel('Sentiment')
plt.ylabel('Count')
plt.show()
```



[4]:
```
data['Sentiment'].value_counts(normalize=True)
```

[4]:
```
 1    0.636332
-1    0.363668
Name: Sentiment, dtype: float64
```

[5]:
```
# Split the data into train and test
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(data['Text'],␣
 ↪data['Sentiment'], test_size=0.2, random_state=42)

# Print the shape of the train and test data
print(X_train.shape)
print(X_test.shape)
print(y_train.shape)
print(y_test.shape)
```

```
(4632,)
(1159,)
(4632,)
```

```
(1159,)
```

[6]:
```
from sklearn.feature_extraction.text import CountVectorizer

# Create a CountVectorizer object
count_vect = CountVectorizer()
X_train_counts = count_vect.fit_transform(X_train)
X_train_counts.shape
```

[6]:
```
(4632, 8807)
```

[7]:
```
from sklearn.feature_extraction.text import TfidfTransformer

# Create a TfidfTransformer object
tfidf_transformer = TfidfTransformer()
X_train_tfidf = tfidf_transformer.fit_transform(X_train_counts)
X_train_tfidf.shape
```

[7]:
```
(4632, 8807)
```

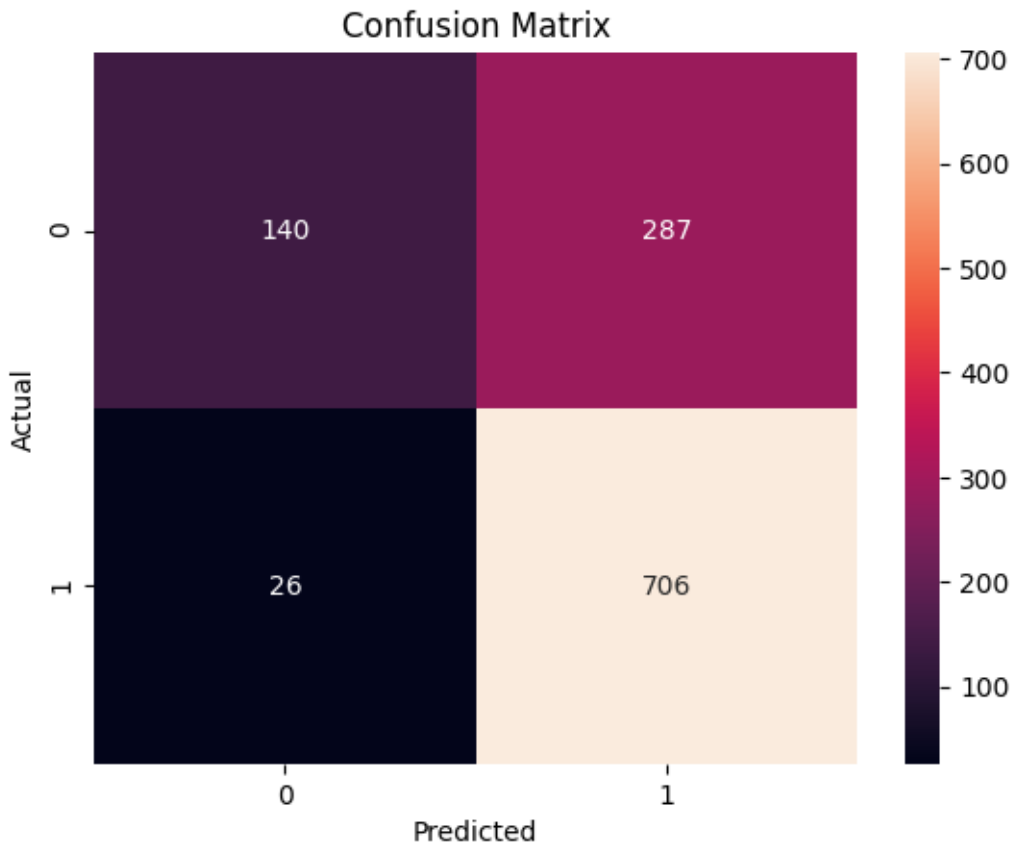
[8]:
```
from sklearn.naive_bayes import MultinomialNB
clf = MultinomialNB().fit(X_train_tfidf, y_train)
```

[9]:
```
from sklearn.pipeline import Pipeline
text_clf = Pipeline([('vect', CountVectorizer(stop_words='english')), ('tfidf',␣
 ↪TfidfTransformer()), ('clf', MultinomialNB()),])
text_clf = text_clf.fit(X_train, y_train)
```

[10]:
```
predicted = text_clf.predict(X_test)
np.mean(predicted == y_test)
```

[10]:
```
0.7299396031061259
```

[11]:
```
# Plot the confusion matrix
from sklearn.metrics import confusion_matrix
conf_metr = confusion_matrix(y_test, predicted)
sns.heatmap(conf_metr, annot=True, fmt='d')
plt.title('Confusion Matrix')
plt.xlabel('Predicted')
plt.ylabel('Actual')
plt.show()
```



[12]:
```
# Get the classification report
from sklearn.metrics import classification_report
from sklearn import metrics


print(metrics.classification_report(y_test,predicted))
print("Accuracy:",metrics.accuracy_score(y_test, predicted))
print("Recall/Sensitivity/True Positive Rate:",metrics.recall_score(y_test,␣
 ↪predicted))
print("Precision:",metrics.precision_score(y_test, predicted))
print("F1 Score:",metrics.f1_score(y_test, predicted))
```

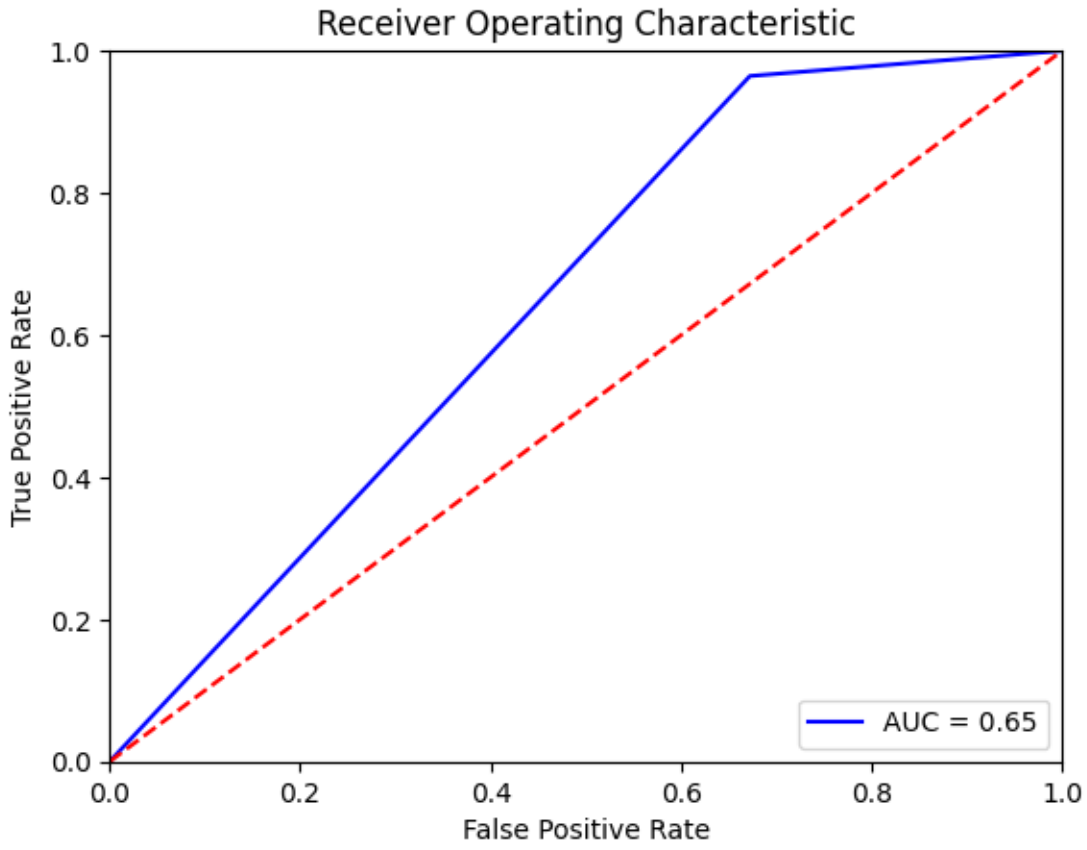
```
              precision    recall  f1-score   support

          -1       0.84      0.33      0.47       427
           1       0.71      0.96      0.82       732

    accuracy                           0.73      1159
   macro avg       0.78      0.65      0.65      1159
weighted avg       0.76      0.73      0.69      1159
```

```
Accuracy: 0.7299396031061259
Recall/Sensitivity/True Positive Rate: 0.9644808743169399
Precision: 0.7109768378650554
F1 Score: 0.8185507246376811
```

[13]:
```
# Plot the ROC curve
from sklearn.metrics import roc_curve, auc
fpr, tpr, thresholds = roc_curve(y_test, predicted)
roc_auc = auc(fpr, tpr)
plt.title('Receiver Operating Characteristic')
plt.plot(fpr, tpr, 'b', label = 'AUC = %0.2f' % roc_auc)
plt.legend(loc = 'lower right')
plt.plot([0, 1], [0, 1],'r--')
plt.xlim([0, 1])
plt.ylim([0, 1])
plt.ylabel('True Positive Rate')
plt.xlabel('False Positive Rate')
plt.show()
```



[14]:
```
# Get the K-S statistic
from scipy.stats import ks_2samp
ks_2samp(y_test, predicted)
```

[14]:
```
KstestResult(statistic=0.22519413287316653, pvalue=3.682417003450075e-26)
```