```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, classification_report,confusion_matrix,r2_score
from sklearn.preprocessing import LabelEncoder
from sklearn.linear_model import LogisticRegression
```

```
df_test=pd.read_csv('/content/test_data.txt',sep=":::",header=0,engine='python')
df_train=pd.read_csv('/content/train_data.txt',sep=":::",header=0,engine='python')
df_train.columns=['SN','movie_name','category','confession']
df_test.columns=['SN','movie_name','confession']
```

```
df_test.head()
```

	SN	movie_name	confession
0	2	La guerra de papá (1977)	Spain, March 1964: Quico is a very naughty ch...
1	3	Off the Beaten Track (2010)	One year in the life of Albin and his family ...
2	4	Meu Amigo Hindu (2015)	His father has died, he hasn't spoken with hi...
3	5	Er nu zhai (1955)	Before he was known internationally as a mart...
4	6	Riddle Room (2016)	Emily Burns is being held captive in a room w...

Next steps: Generate code with df_test View recommended plots

```
df_train.head()
```

	SN	movie_name	category	confession
0	2	Cupid (1997)	thriller	A brother and sister with a past incestuous r...
1	3	Young, Wild and Wonderful (1980)	adult	As the bus empties the students for their fie...
2	4	The Secret Sin (1915)	drama	To help their unemployed father make ends mee...
3	5	The Unrecovered (2007)	drama	The film's title refers not only to the un-re...
4	6	Quality Control (2011)	documentary	Quality Control consists of a series of 16mm ...

Next steps: Generate code with df_train View recommended plots

```
df_train.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 54213 entries, 0 to 54212
Data columns (total 4 columns):
 #   Column      Non-Null Count  Dtype 
---  ------      --------------  ----- 
 0   SN          54213 non-null  int64 
 1   movie_name  54213 non-null  object
 2   category    54213 non-null  object
 3   confession  54213 non-null  object
dtypes: int64(1), object(3)
memory usage: 1.7+ MB
```

```
df_test.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 54199 entries, 0 to 54198
```

```
Data columns (total 3 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   SN          54199 non-null  int64
 1   movie_name  54199 non-null  object
 2   confession  54199 non-null  object
dtypes: int64(1), object(2)
memory usage: 1.2+ MB
```

```
df_train.describe()
```

	SN
count	54213.000000
mean	27108.000000
std	15650.089409
min	2.000000
25%	13555.000000
50%	27108.000000
75%	40661.000000
max	54214.000000

```
df_test.describe()
```

	SN
count	54199.000000
mean	27101.000000
std	15646.047957
min	2.000000
25%	13551.500000
50%	27101.000000
75%	40650.500000
max	54200.000000

```
df_train.isnull().sum()
```

```
SN            0
movie_name    0
category      0
confession    0
dtype: int64
```

```
df_test.isnull().sum()
```

```
SN            0
movie_name    0
confession    0
dtype: int64
```

```
df_train.count()
```

```
SN            54213
movie_name    54213
category      54213
confession    54213
dtype: int64
```

```
df_test.count()
```

```
SN            54199
movie_name    54199
confession    54199
dtype: int64
```

```
df_train.iloc[0:3]
```

	SN	movie_name	category	confession
0	2	Cupid (1997)	thriller	A brother and sister with a past incestuous r...
1	3	Young, Wild and Wonderful (1980)	adult	As the bus empties the students for their fie...
2	4	The Secret Sin (1915)	drama	To help their unemployed father make ends mee...

```
df_train.shape
```

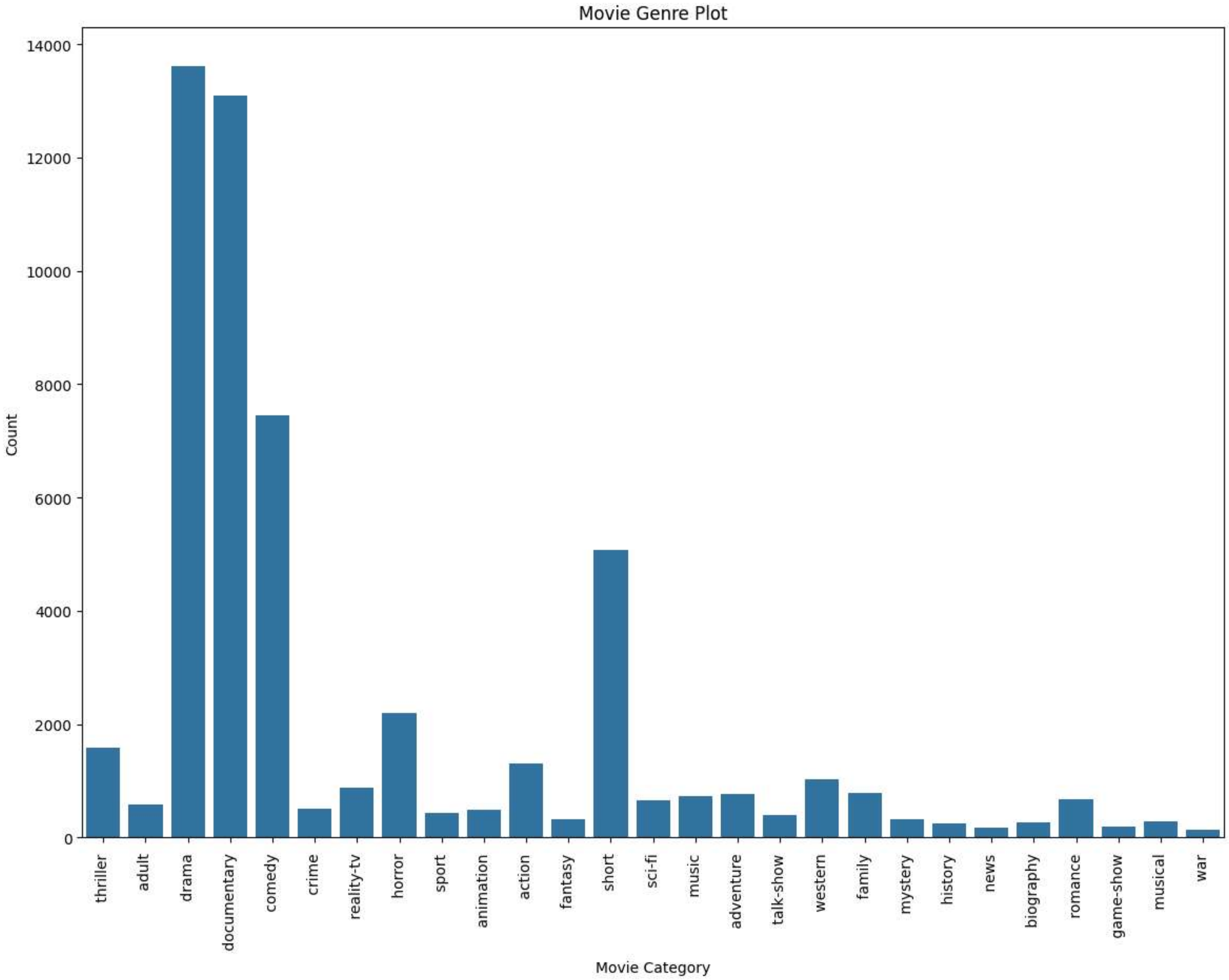
```
(54213, 4)
```

```
df_test.shape
```

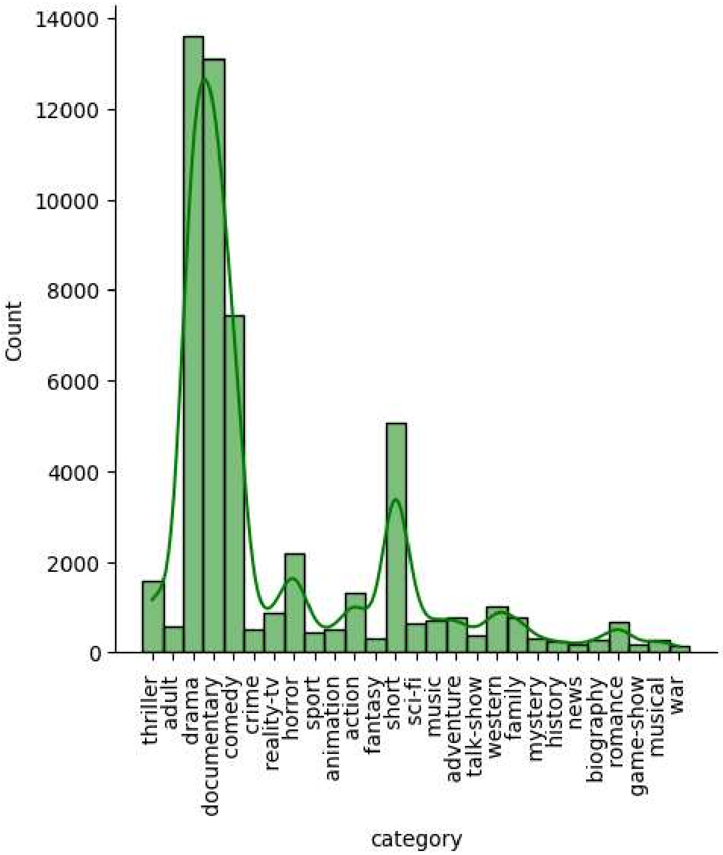
```
(54199, 3)
```

VISUALIZATION OF DATA

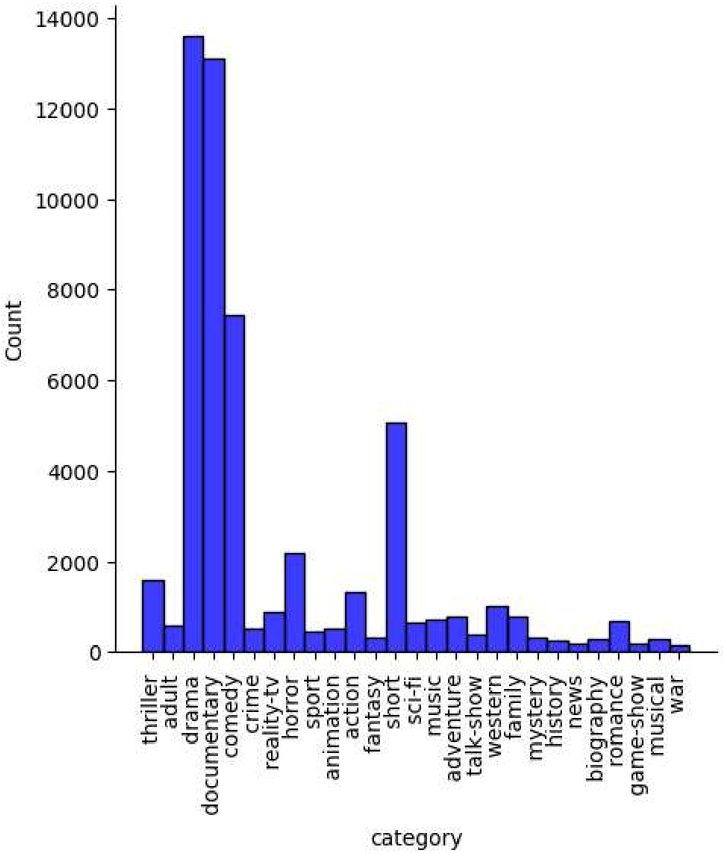
```
plt.figure(figsize=(14,10))
sns.countplot(x='category',data=df_train)
plt.xlabel('Movie Category')
plt.ylabel('Count')
plt.title('Movie Genre Plot')
plt.xticks(rotation=90);
plt.show()
```



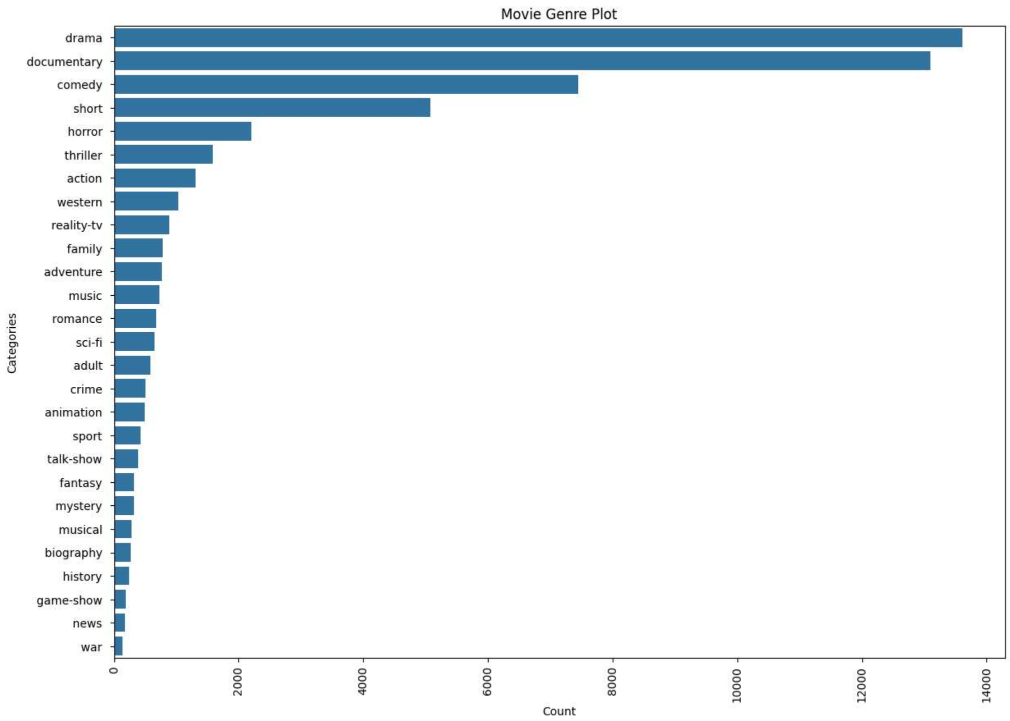
```
sns.displot(df_train.category,kde=True,color='Green')
plt.xticks(rotation=90);
```



```
sns.displot(df_train.category,kde=False,color='blue')
plt.xticks(rotation=90);
```



```
plt.figure(figsize=(14,10))
count1=df_train.category.value_counts()
sns.barplot(x=count1,y=count1.index,orient='h')
plt.xlabel('Count')
plt.ylabel('Categories')
plt.title('Movie Genre Plot')
plt.xticks(rotation=90);
plt.show()
```



```
data_frame=pd.concat([df_train,df_test],axis=0)
data_frame
```

	SN	movie_name	category	confession
0	2	Cupid (1997)	thriller	A brother and sister with a past incestuous r...
1	3	Young, Wild and Wonderful (1980)	adult	As the bus empties the students for their fie...
2	4	The Secret Sin (1915)	drama	To help their unemployed father make ends mee...
3	5	The Unrecovered (2007)	drama	The film's title refers not only to the un-re...
4	6	Quality Control (2011)	documentary	Quality Control consists of a series of 16mm ...
...	...	...	...	...
54194	54196	"Tales of Light & Dark" (2013)	NaN	Covering multiple genres, Tales of Light & Da...
54195	54197	Der letzte Mohikaner (1965)	NaN	As Alice and Cora Munro attempt to find their...
54196	54198	Oliver Twink (2007)	NaN	A movie 169 years in the making. Oliver Twist...
54197	54199	Slipstream (1973)	NaN	Popular, but mysterious rock D.J Mike Mallard...
54198	54200	Curitiba Zero Grau (2010)	NaN	Curitiba is a city in movement, with rhythms ...

108412 rows × 4 columns

```
data_frame.shape
```

```
(108412, 4)
```

```
data_frame.isnull().sum()
```

```
SN                0
movie_name        0
category      54199
confession        0
dtype: int64
```

```
data_frame.count()
```

```
SN            108412
movie_name    108412
category       54213
confession    108412
dtype: int64
```

```
lab=LabelEncoder()
data_frame['category']=lab.fit_transform(data_frame['category'].values)
data_frame['movie_name']=lab.fit_transform(data_frame['movie_name'].values)
```

```
data_frame.head()
```

	SN	movie_name	category	confession
0	2	31219	24	A brother and sister with a past incestuous r...
1	3	107506	1	As the bus empties the students for their fie...
2	4	96119	8	To help their unemployed father make ends mee...
3	5	97557	8	The film's title refers not only to the un-re...
4	6	74516	7	Quality Control consists of a series of 16mm ...

```
a=data_frame['category'].mean()
data_frame['category'].fillna(a,inplace=True)
```

```
data_frame.count()
```

```
SN            108412
movie_name    108412
category      108412
confession    108412
dtype: int64
```

```
data_frame.duplicated().values.any()
```

```
False
```

PREPROCESS THE DATA

```
vectorizer=TfidfVectorizer()
```

```
x=vectorizer.fit_transform(data_frame['confession'])
```

```
data_frame.head()
```

	SN	movie_name	category	confession
0	2	31219	24	A brother and sister with a past incestuous r...
1	3	107506	1	As the bus empties the students for their fie...
2	4	96119	8	To help their unemployed father make ends mee...
3	5	97557	8	The film's title refers not only to the un-re...
4	6	74516	7	Quality Control consists of a series of 16mm ...

```
y=data_frame['category']
```

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.30,random_state=42)
```

TRAIN NAIVE BAYES CLASSIFIER

```
naive_bayes_model=MultinomialNB()
naive_bayes_model.fit(x_train,y_train)
```

```
▾ MultinomialNB
MultinomialNB()
```

```
y_pred=naive_bayes_model.predict(x_test)
y_pred
```

```
array([27, 27, 27, ..., 27, 27, 27])
```

```
y_test
```

```
2540     27
34096    27
53456     5
48931    21
39301     8
         ..
52645    27
33347    27
736      27
27455     5
```

```
48691    27
Name: category, Length: 32524, dtype: int64
```

```
print("Naive Bayes Model: ")
print(confusion_matrix(y_test,y_pred))
print(classification_report(y_test,y_pred))
print("Accuracy : ",accuracy_score(y_test,y_pred))
```

```
 [    0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0   123]
 [    0     0     0     0     0     1     0     0     2     0     0     0
      0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0   480]
 [    0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0    43]
 [    0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0   320]
 [    0     0     0     0     0    55     0     0    13     0     0     0
      0     0     0     0     0     0     0     0     0     0     0     0
      0     0     0 16167]]
              precision    recall  f1-score   support

           0       0.00      0.00      0.00       365
           1       0.00      0.00      0.00       185
           2       0.00      0.00      0.00       230
           3       0.00      0.00      0.00       136
           4       0.00      0.00      0.00        67
           5       0.21      0.01      0.02      2282
           6       0.00      0.00      0.00       151
           7       0.50      0.00      0.00      3938
           8       0.15      0.00      0.00      4098
           9       0.00      0.00      0.00       235
          10       0.00      0.00      0.00        95
          11       0.00      0.00      0.00        74
          12       0.00      0.00      0.00        66
          13       0.00      0.00      0.00       685
          14       0.00      0.00      0.00       223
          15       0.00      0.00      0.00        79
          16       0.00      0.00      0.00        99
          17       0.00      0.00      0.00        67
          18       0.00      0.00      0.00       257
          19       0.00      0.00      0.00       210
          20       0.00      0.00      0.00       178
          21       0.00      0.00      0.00      1460
          22       0.00      0.00      0.00       140
          23       0.00      0.00      0.00       123
          24       0.00      0.00      0.00       483
          25       0.00      0.00      0.00        43
          26       0.00      0.00      0.00       320
          27       0.50      1.00      0.66     16235

    accuracy                           0.50     32524
   macro avg       0.05      0.04      0.02     32524
weighted avg       0.34      0.50      0.33     32524

Accuracy :  0.49784774320501785
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classification.py:1344: UndefinedMetricWarning: Precision a
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classification.py:1344: UndefinedMetricWarning: Precision a
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classification.py:1344: UndefinedMetricWarning: Precision a
  _warn_prf(average, modifier, msg_start, len(result))
```

TRAIN LOGISTIC REGRESSION MODEL

```
reg_model=LogisticRegression()
reg_model.fit(x_train,y_train)
lr_pred=reg_model.predict(x_test)
lr_pred
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:458: ConvergenceWarning: lbfgs failed to con
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
array([27, 27, 27, ..., 27, 27, 27])
```

```
y_test
```

```
2540     27
34096    27
53456     5
48931    21
39301     8
         ..
52645    27
33347    27
736      27
27455     5
48691    27
Name: category, Length: 32524, dtype: int64
```

```
print("Logistic Regression Model: ")
print(confusion_matrix(y_test,lr_pred))
print(classification_report(y_test,lr_pred))
print("Accuracy : ",accuracy_score(y_test,lr_pred))
print("R2 Score :",r2_score(y_test,lr_pred))
```

```
      0     0     0     0     0     0     2     0     0     0     0     1
      0     0     0   116]
 [    1     0     0     0     0     1     0     0    15     0     0     0
```