IPREDICTING IMDB SCORES - ADS_Phase_5

712221205001 - ABINESH M

3.1 Final Submission

[6]:
```
#importing necessary libraries import pandas as pd
from sklearn.preprocessing import StandardScaler,
LabelEncoder from sklearn.impute import SimpleImputer
from sklearn.model_selection import train_test_split
import warnings
warnings.simplefilter(action='ignore', category=FutureWarning)

#importing the netflix dataset
file_path =
r"C:\Users\Saranya\Desktop\IBM\NetflixOriginals.csv"
encoding = "ISO-8859-1" df = pd.read_csv(file_path,
encoding=encoding) df
```

[6]:

	Title	Genre	Premiere	Runtime	IMDB Score	Language
0	Enter the Anime	Documentary	August 5, 2019	58	2.5	English/Japanese
1	Dark Forces	Thriller	August 21, 2020	81	2.6	Spanish
2	The App	Science fiction/Drama	December 26, 2019	79	2.6	Italian
3	The Open House	Horror thriller	January 19, 2018	94	3.2	English
4	Kaali Khuhi	Mystery	October 30, 2020	90	3.4	Hindi
..	…	…	…	…	…	…
579	Taylor Swift: Reputation Stadium Tour	Concert Film				
580	Winter on Fire: Ukraine's Fight for Freedom	Documentary				
581	Springsteen on Broadway	One-man show				
582	Emicida: AmarElo - It's All For Yesterday	Documentary				
583	David Attenborough: A Life on Our Planet	Documentary				

```
579 December 31, 2018    125        8.4                  English
580  October 9, 2015      91        8.4
                                     English/Ukranian/Russian
581 December 16, 2018    153        8.5                  English
582 December 8, 2020      89        8.6               Portuguese
583  October 4, 2020      83        9.0                  English
[584 rows x 6 columns]
```

[7
```
d  info(
```

```
<class
'pandas.core.frame.DataFrame'>
RangeIndex: 584 entries, 0 to
583 Data columns (total 6
columns):
 #  Column     Non-Null Count Dtype
--- ------  -------------- ----0
      Title 584 non-null
      object
 1    Genre 584 non-null    object
 2    Premiere   584 non-null
      object
 3    Runtime    584 non-null    int64
 4    IMDB Score 584 non-null    float64
 5    Language   584 non-null    object dtypes: float64(1), int64(1),
 object(4) memory usage: 27.5+ KB
```

[8
```
d  head(
```

[8]:
```
            Title                Genre         Premiere Runtime \
0 Enter the Anime          Documentary   August 5, 2019      58
1    Dark Forces             Thriller  August 21, 2020      81
2      The App Science fiction/Drama December 26, 2019      79
3 The Open House      Horror thriller January 19, 2018      94
4    Kaali Khuhi                Mystery October 30, 2020      90
  IMDB Score         Language
0        2.5 English/Japanese
1        2.6   Spanish 2  2.6   Italian 3  3.2
              English
4          3.4            Hindi
```

[9
```
#to display null values
d  isnull()
```

[9]:
```
   Title Genre Premiere Runtime IMDB Score Language
0   False False    False   False      False    False
1   False False    False   False      False    False
```

```
2   False False    False   False      False    False
3   False False    False   False      False    False
4   False False    False   False      False    False
..    …    …       …       …          …       …
579 False False    False   False      False    False
580 False False    False   False      False    False
581 False False    False   False      False    False
582 False False    False   False      False    False
583 False False    False   False      False    False
 [5   rows x 6 columns
```

[10]:
```
#handling null values

d  fillna(df mean(), inplace Tr
d  dropna(inplace Tr
```

[11]:
```
#Display distinct languages
value_lang   d   Language   value_counts()
prin   \ Distinct languages:
prin  value_lang
```

```
Distinct languages:

English                 401
Hindi                    33
Spanish                  31
French                   20
Italian                  14
Portuguese               12
Indonesian                9
Japanese                  6
Korean                    6
German                    5
Turkish                   5
English/Spanish           5
Polish                    3
Dutch                     3
Marathi                   3
English/Hindi             2
Thai                      2
English/Mandarin          2
English/Japanese          2
Filipino                  2
English/Russian           1
Bengali                   1
English/Arabic            1
```

```
English/Korean                1
Spanish/English               1
Tamil                         1
English/Akan                  1
Khmer/English/French          1
Swedish                       1
Georgian                      1
Thia/English                  1
English/Taiwanese/Mandarin    1
English/Swedish               1
Spanish/Catalan               1
Spanish/Basque                1
Norwegian                     1
Malay                         1
English/Ukranian/Russian      1
Name: Language, dtype:
int64
```

[12]:
```
distinct_lang   d   Language   unique()
 prin  distinct_lang
```

```
['English/Japanese' 'Spanish' 'Italian' 'English' 'Hindi' 'Turkish'
 'Korean' 'Indonesian' 'Malay' 'Dutch' 'French' 'English/Spanish'
 'Portuguese' 'Filipino' 'German' 'Polish' 'Norwegian' 'Marathi'
 'Thai'
 'Swedish' 'Japanese' 'Spanish/Basque' 'Spanish/Catalan'
 'English/Swedish'
 'English/Taiwanese/Mandarin' 'Thia/English' 'English/Mandarin'
 'Georgian'
 'Bengali' 'Khmer/English/French' 'English/Hindi' 'Tamil'
 'Spanish/English' 'English/Korean' 'English/Arabic'
 'English/Russian'
 'English/Akan' 'English/Ukranian/Russian']
```

[13]:
```
#label encoder for language column

label_encoder   LabelEncoder()
d   Language     label_encoder fit_transform(df[ Language ]
d
```

[13]:

	Titl	Genre
0	Enter the Anime Documentary 1	Dark Forces Thriller
2	The App	Science fiction/Drama
3	The Open House	Horror thriller
4	Kaali Khuhi	Mystery
..	…	…
579	Taylor Swift: Reputation Stadium Tour	Concert Film

```
     580 Winter on Fire: Ukraine's Fight for Freedom    Documentary
581   Springsteen on Broadway    One-man show
582   Emicida: AmarElo - It's All For Yesterday   Documentary
583   David Attenborough: A Life on Our Planet    Documentary

Premiere Runtime IMDB Score Language
0     August 5, 2019   58    2.5   6
1     August 21, 2020  81    2.6   29
2     December 26, 2019      79    2.6   20
3     January 19, 2018 94    3.2   2
4     October 30, 2020 90    3.4   18
      ..                …      …          …        …
579   December 31, 2018 125 8.4 2
580   October 9, 2015 91 8.4 13
581   December 16, 2018 153 8.5 2
582   December 8, 2020 89 8.6 28
583   October 4, 2020  83    9.0   2

       [5   rows x 6 columns
```

[14]:
```
#scaling

scale    StandardScaler()
d   Runtim      scale  fit_transform(df[ Runtim    value  reshape(     )
d
```

[14]:
```
                                          Titl                        Genre  \
     0 Enter the Anime Documentary 1   Dark Forces Thriller
2     The App Science fiction/Drama
3     The Open House                    Horror thriller
4     Kaali Khuhi                       Mystery
      ..                                      …                        …
579   Taylor Swift: Reputation Stadium Tour  Concert Film
580   Winter on Fire: Ukraine's Fight for Freedom Documentary
581   Springsteen on Broadway    One-man show
582   Emicida: AmarElo - It's All For Yesterday   Documentary
```

```
583   David Attenborough: A Life on Our Planet    Documentary
Premiere Runtime IMDB Score Language
0     August 5, 2019 -1.282615 2.5 6
1     August 21, 2020 -0.453425 2.6 29
2     December 26, 2019 -0.525528 2.6   20
3     January 19, 2018 0.015248  3.2   2
4     October 30, 2020 -0.128959 3.4   18
      ..                 …       …         …       …
579   December 31, 2018 1.132852 8.4   2
580   October 9, 2015 -0.092907  8.4   13

581   December 16, 2018 2.142301 8.5   2
582   December 8, 2020 -0.165011 8.6   28
583   October 4, 2020 -0.381321  9.0   2
```

[5 rows x 6 columns

[15]:
```
#train_test split

#X = df.drop('IMDB Score', axis=1)
#y = df['IMDB Score']

#X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,
   random_state=42)
```

[16]:
```
#print("\n X_test info")
#print(X_test.info())
```

[17]:
```
# Drop non-numeric columns
    d  drop(  IMDB Score    Titl     Genr     Premiere  ,
    d   IMDB Score

# Import necessary libraries for model training and evaluation
fr   sklear  linear_model impor  LinearRegression
fr   sklear  metric  impor  mean_absolute_error, mean_squared_error, r2_score

# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test   train_test_split(X, y, test_size 0.
   random_state 4

# Initialize the Linear Regression model
mode    LinearRegression()

# Train the model on the training data
mode  fit(X_train, y_train)

# Make predictions on the test data
y_pre    mode  predict(X_test)

# Evaluate the model
m     mean_absolute_error(y_test, y_pred)
m     mean_squared_error(y_test, y_pred)
rm     mean_squared_error(y_test, y_pred, squared Fals
r    r2_score(y_test, y_pred)

prin    Mean Absolute Error (MAE):   m
prin    Mean Squared Error (MSE):   m
prin    Root Mean Squared Error (RMSE):   rm

prin    R-squared (R2):  r
```

```
Mean Absolute Error (MAE): 0.8066643972186746
```

```
Mean Squared Error (MSE): 0.9998118486476895
Root Mean Squared Error (RMSE): 0.999905919898312
R-squared (R2): 0.03673575762062808 4
```

[18]:
```
pip install matplotlib
```

```
Requirement already satisfied: matplotlib in
c:\users\saranya\anaconda3\lib\site-packages (3.5.1)
Requirement already satisfied: fonttools>=4.22.0 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(4.25.0) Requirement already satisfied: python-dateutil>=2.7 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(2.8.2) Requirement already satisfied: cycler>=0.10 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(0.11.0) Requirement already satisfied: pyparsing>=2.2.1 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(3.0.4) Requirement already satisfied: kiwisolver>=1.0.1 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(1.3.2) Requirement already satisfied: pillow>=6.2.0 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(9.0.1) Requirement already satisfied: packaging>=20.0 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib) (21.3)
Requirement already satisfied: numpy>=1.17 in
c:\users\saranya\anaconda3\lib\site-packages (from matplotlib)
(1.23.5) Requirement already satisfied: six>=1.5 in
c:\users\saranya\anaconda3\lib\site-
packages (from python-dateutil>=2.7->matplotlib) (1.16.0)
Note: you may need to restart the kernel to use updated packages.
```

[19]:
```
# Import necessary libraries for model training and
evaluation from sklearn.linear_model import
LinearRegression
from sklearn.metrics import mean_absolute_error, mean_squared_error,
r2_score
```

[20]:
```
# Split the dataset into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
 test_size=0.2,␣ ↪random_state=42)
```

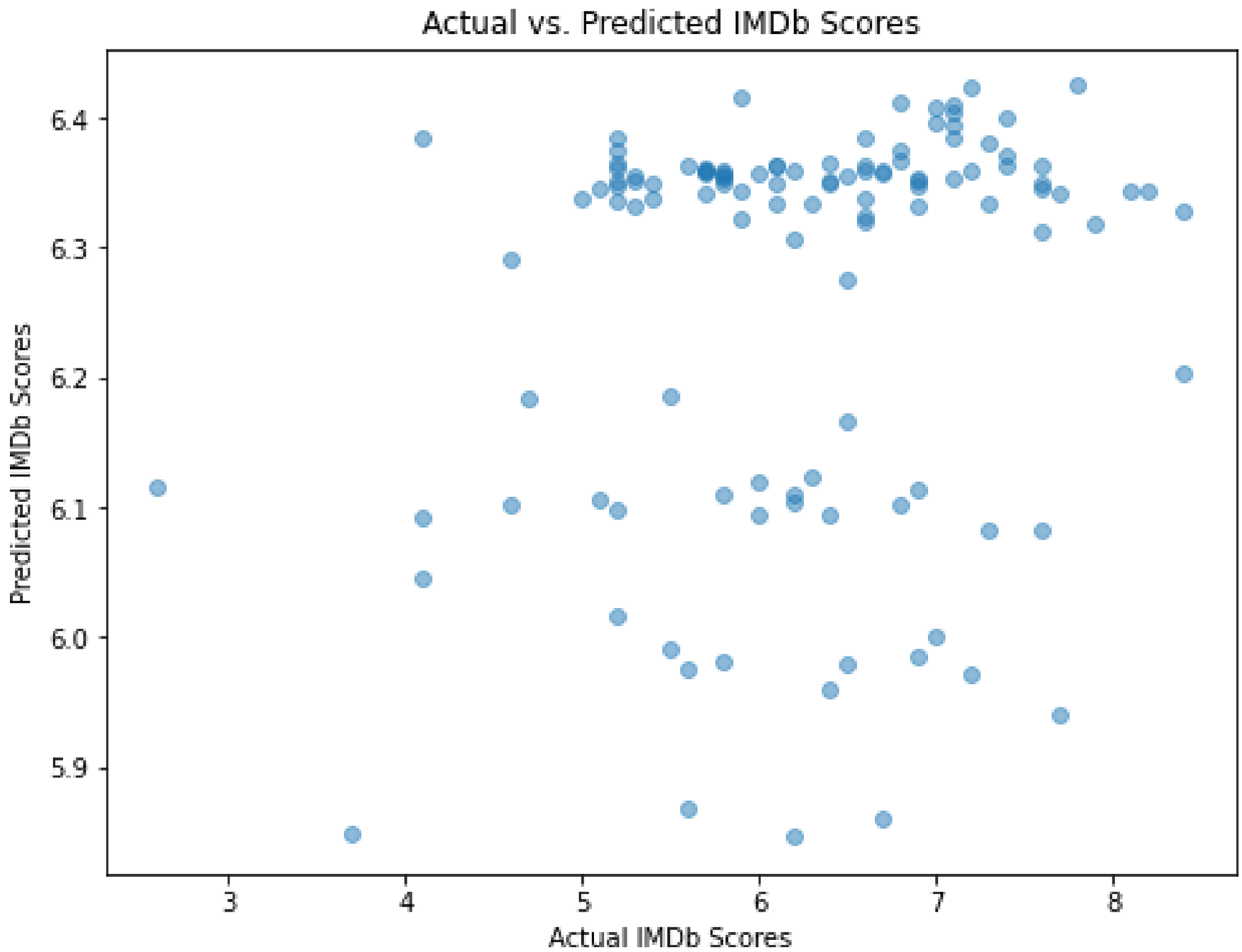
[21]:
```
# Initialize the Linear Regression
model model = LinearRegression()

# Train the model on the training
data model.fit(X_train, y_train)

# Make predictions on the test data
y_pred = model.predict(X_test)
```

[22]:
```
# Evaluate the model mae =
mean_absolute_error(y_test, y_pred) mse =
mean_squared_error(y_test, y_pred) rmse =
mean_squared_error(y_test, y_pred,
squared=False) r2 = r2_score(y_test, y_pred)

print(f"Mean Absolute Error (MAE): {mae}")
print(f"Mean Squared Error (MSE): {mse}")
print(f"Root Mean Squared Error (RMSE):
{rmse}") print(f"R-squared (R2): {r2}")
```

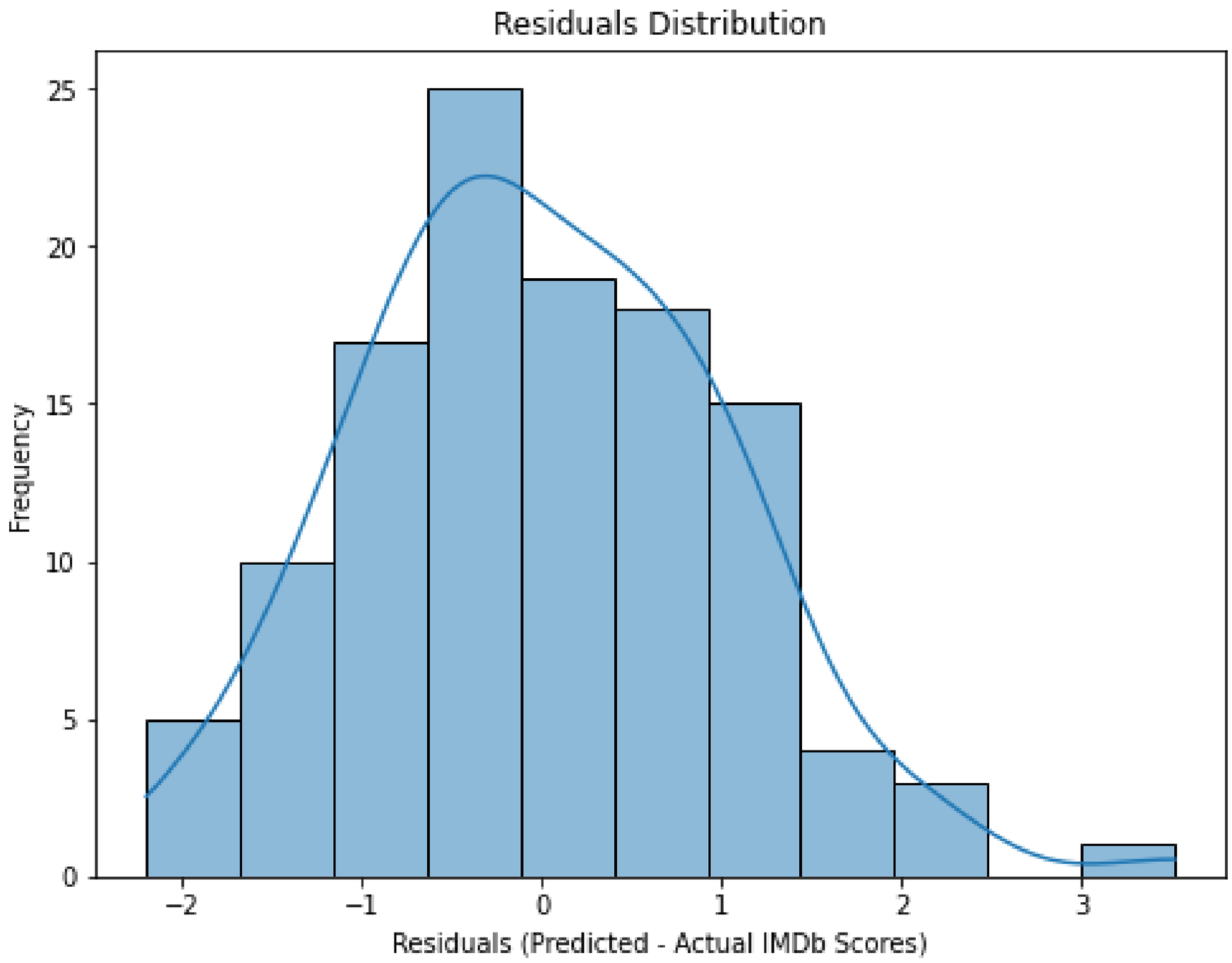
```
Mean Absolute Error (MAE): 0.8066643972186746
Mean Squared Error (MSE): 0.9998118486476895
Root Mean Squared Error (RMSE): 0.999905919898312
R-squared (R2): 0.036735757620628084
```

[23]:
```
impor  matplotlib pyplo  a  p
impor  seabor  a  s
```

[24]:
```
# Scatter plot of actual IMDb scores vs. predicted IMDb scores
p   figure(figsize      )
p   scatter(y_test, y_pred, alpha 0.
p   xlabel  Actual IMDb Scores
p   ylabel  Predicted IMDb Scores
p   title  Actual vs. Predicted IMDb Scores
p   show(
```



[25]:
```
# Distribution plot of the residuals (predicted - actual
IMDb scores) residuals = y_pred - y_test
plt.figure(figsize=(8, 6)) sns.histplot(residuals,
kde=True) plt.xlabel("Residuals (Predicted - Actual IMDb
Scores)")
plt.ylabel("Frequency")
plt.title("Residuals Distribution")
plt.show()
```



[26]:
```
from sklearn.ensemble import RandomForestRegressor from
sklearn.model_selection import train_test_split from
sklearn.metrics import mean_absolute_error, mean_squared_error,
r2_score import matplotlib.pyplot as plt import seaborn as sns
```

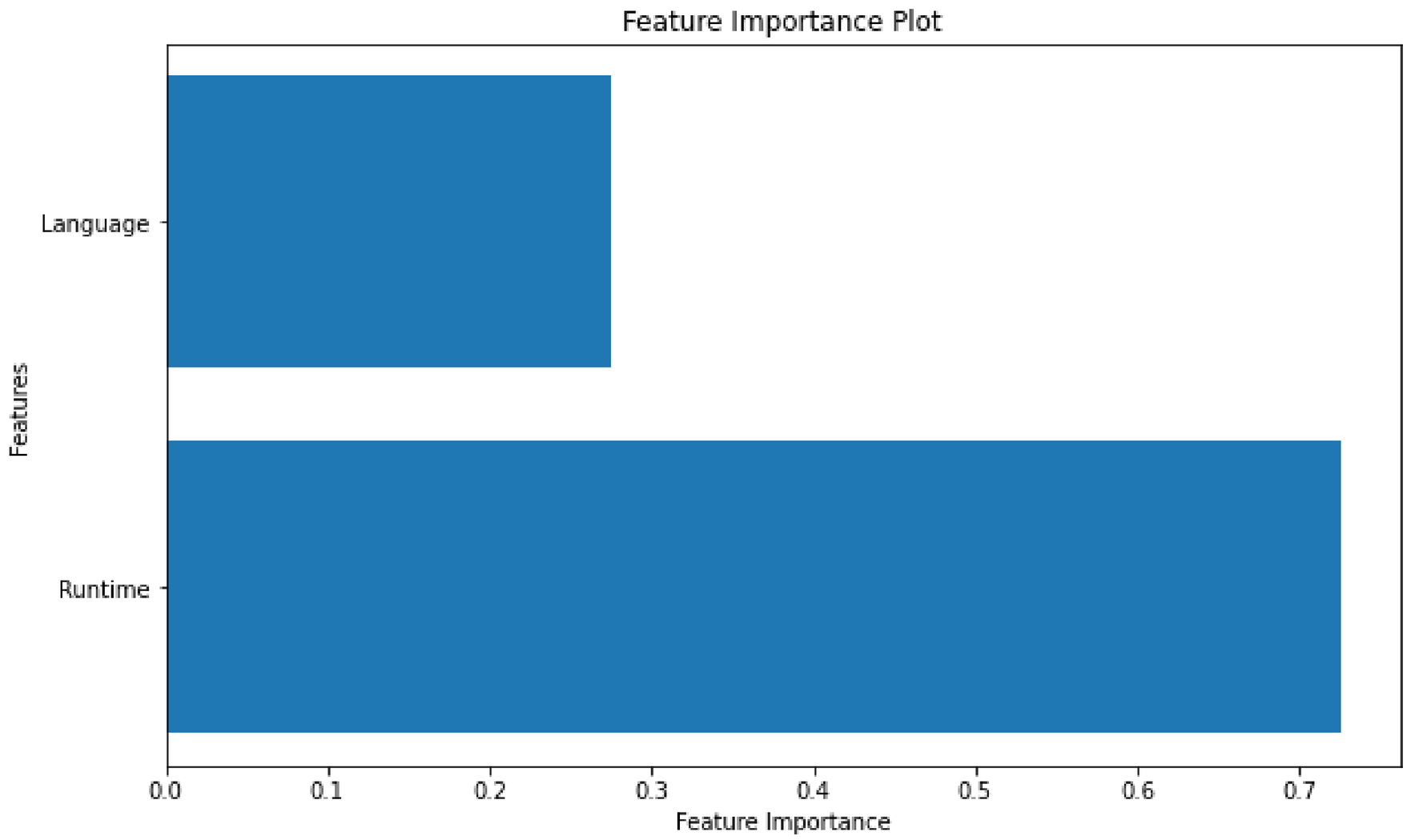
[27]:
```
X = df.drop(["IMDB Score", "Title", "Genre", "Premiere"],
 axis=1) y = df["IMDB Score"]

X_train, X_test, y_train, y_test = train_test_split(X, y,
 test_size=0.2,␣ ↪random_state=42)
```

[28]:
```
model = RandomForestRegressor(random_state=42)
model.fit(X_train, y_train)
```

[28]:
```
RandomForestRegressor(random_state=42)
```

[29]:
```
if isinstance(model, RandomForestRegressor):
    feature_importance = model.feature_importances_
    feature_names = X_train.columns
```

```
    p   figure(figsize  1    )
    p   barh(feature_names, feature_importance)
    p   xlabel  Feature Importance
    p   ylabel  Features
    p   title  Feature Importance Plot
    p   show(
```



[30]:
```
d   predict_imdb_score title, genre, premiere, runtime, language )
    # Create input data for prediction
    input_data   p  DataFrame({ Runtim  :  runtime],  Language :  label_encoder
  transform([language])]})

    # Make a prediction
    predicted_imdb_score   mode  predict(input_data)[

    retur  predicted_imdb_score
```

[34]:
```
# Example usage:
titl     2023-01-01
genr     Actio
premiere    2023-01-01   # You can format the date accordingly
runtim    4
language    Englis

predicted_score   predict_imdb_score(title, genre, premiere, runtime, language)
print(f"Predicted IMDb Score: {predicted_score:.2f}")
```

```
Predicted IMDb Score: 7.31
```

[ ]:
```
# User input title = input("Enter the movie title: ")
genre = input("Enter the movie genre: ") premiere =
input("Enter the premiere date (YYYY-MM-DD): ") runtime
= float(input("Enter the movie runtime (in minutes):
")) language = input("Enter the movie language: ")

predicted_score = predict_imdb_score(title, genre, premiere, runtime,
 language) print(f"Predicted IMDb Score: {predicted_score:.2f}")
```