Krittamate Cherdpongtagit 6310545884

Homework#4_2:Pre-process the adult dataset

1. Importing dataset

- Give reference link to your data come from?

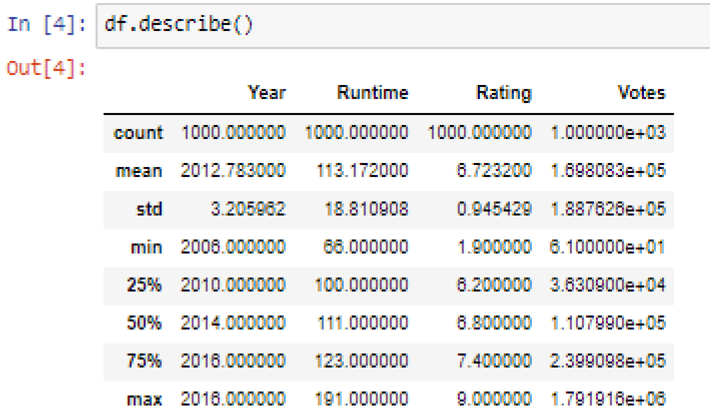
From Aj.Supaporn's homework#2

- Explain details of your importing steps of data collection (ex. selection, integration, sampling, de-duplicating, aggregation)

Selection: depends on the quality because I believe in quality of Aj.Supaporn data
Integration: There's no integration because I only come from one source
Sampling: The size of the data is already compact.
There's no de-duplicating, aggregation

2. Exploring dataset

- Give summary statistics of your dataset



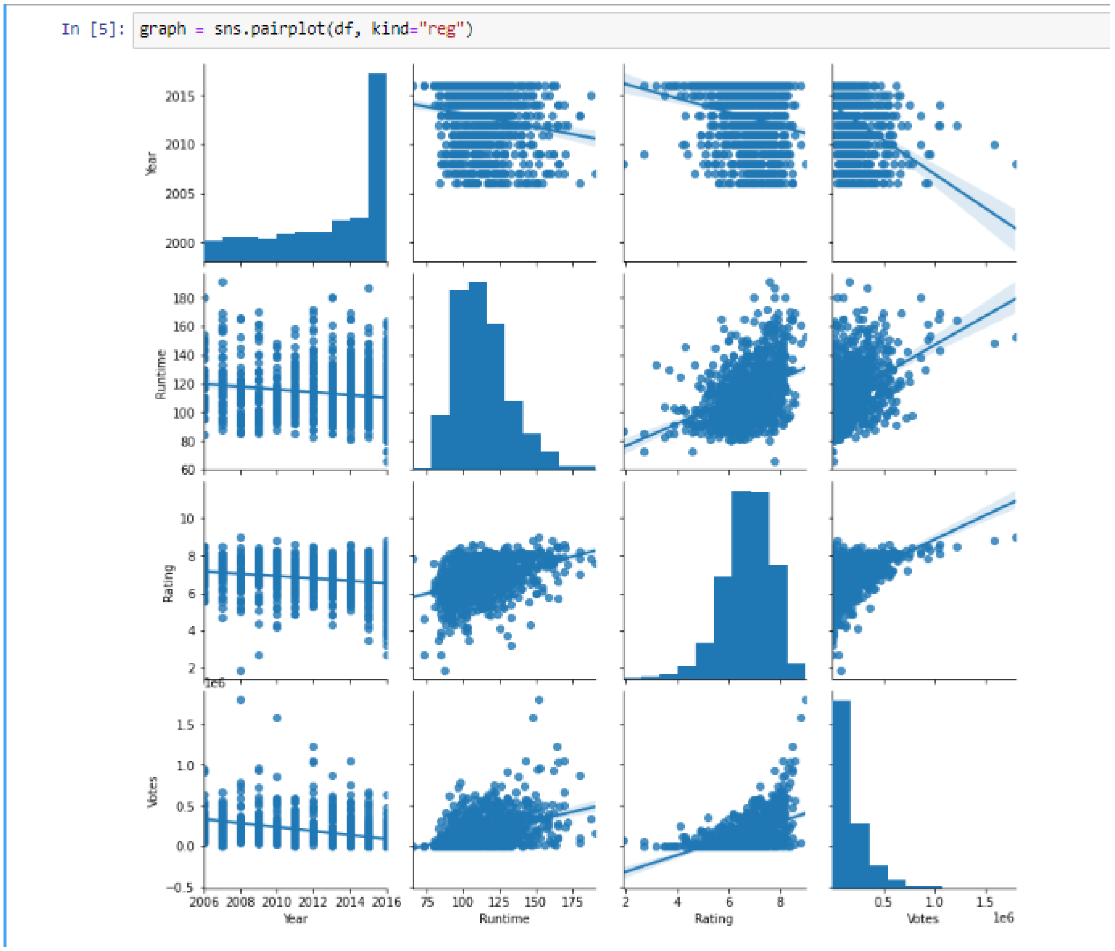
```
In [4]: df.describe()
Out[4]:
```

	Year	Runtime	Rating	Votes
count	1000.000000	1000.000000	1000.000000	1.000000e+03
mean	2012.783000	113.172000	6.723200	1.698083e+05
std	3.205962	18.810908	0.945429	1.887626e+05
min	2006.000000	66.000000	1.900000	6.100000e+01
25%	2010.000000	100.000000	6.200000	3.630900e+04
50%	2014.000000	111.000000	6.800000	1.107990e+05
75%	2016.000000	123.000000	7.400000	2.399098e+05
max	2016.000000	191.000000	9.000000	1.791916e+06

- Explain the meaning of each attribute?

Title: title of movies
Genre : genre of movies
Director: director of movies
Year: year of release of movies
Runtime : runtime of movies
Rating: score of movies from 0-10
Votes: number of votes of movies

- Use visualization tools to explore Adult Dataset

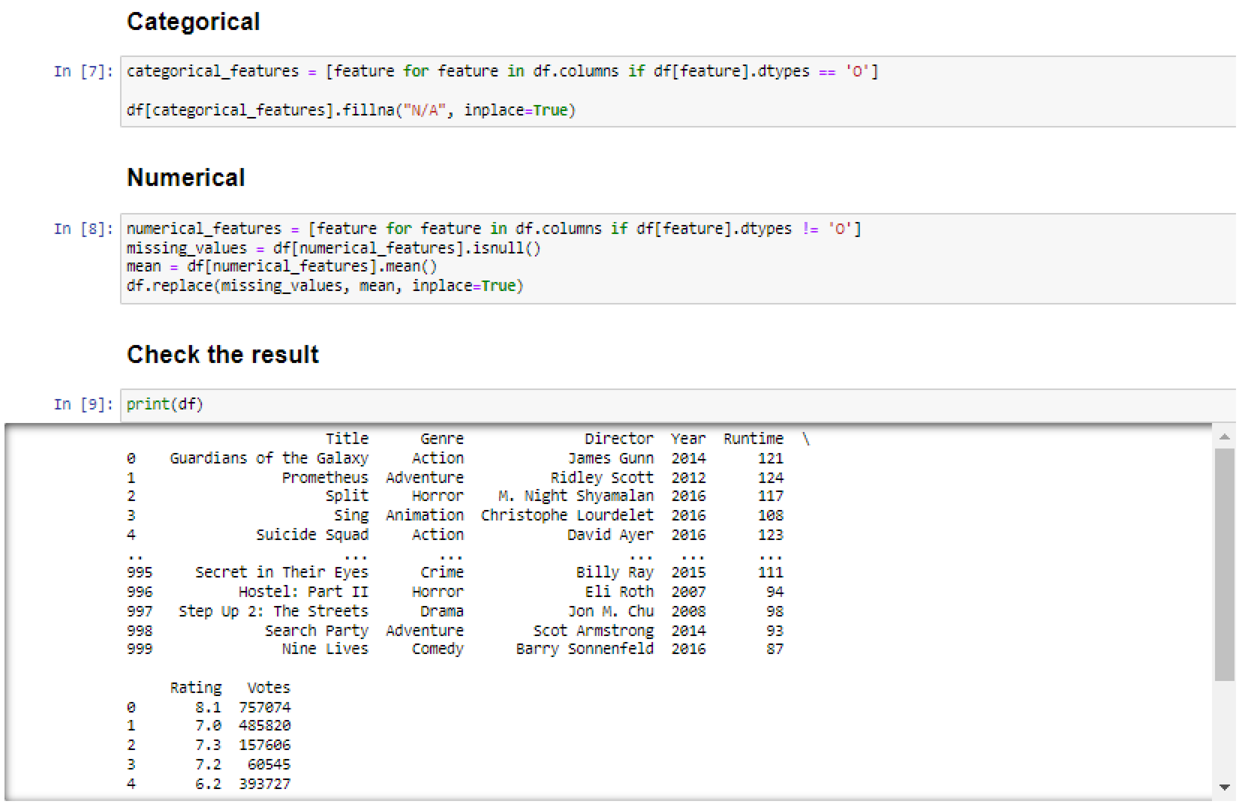


```
In [5]: graph = sns.pairplot(df, kind="reg")
```

3. Processing missing values and/or outliers

- Explain how you handle the missing of categorical or/and numerical variables?

Categorical: replace missing values with new category “N/A” in the dataset.
Numerical: replace missing values with the mean value of the non-missing values in the dataset.



Categorical

```
In [7]: categorical_features = [feature for feature in df.columns if df[feature].dtypes == 'O']

        df[categorical_features].fillna("N/A", inplace=True)
```

Numerical

```
In [8]: numerical_features = [feature for feature in df.columns if df[feature].dtypes != 'O']
        missing_values = df[numerical_features].isnull()
        mean = df[numerical_features].mean()
        df.replace(missing_values, mean, inplace=True)
```

Check the result

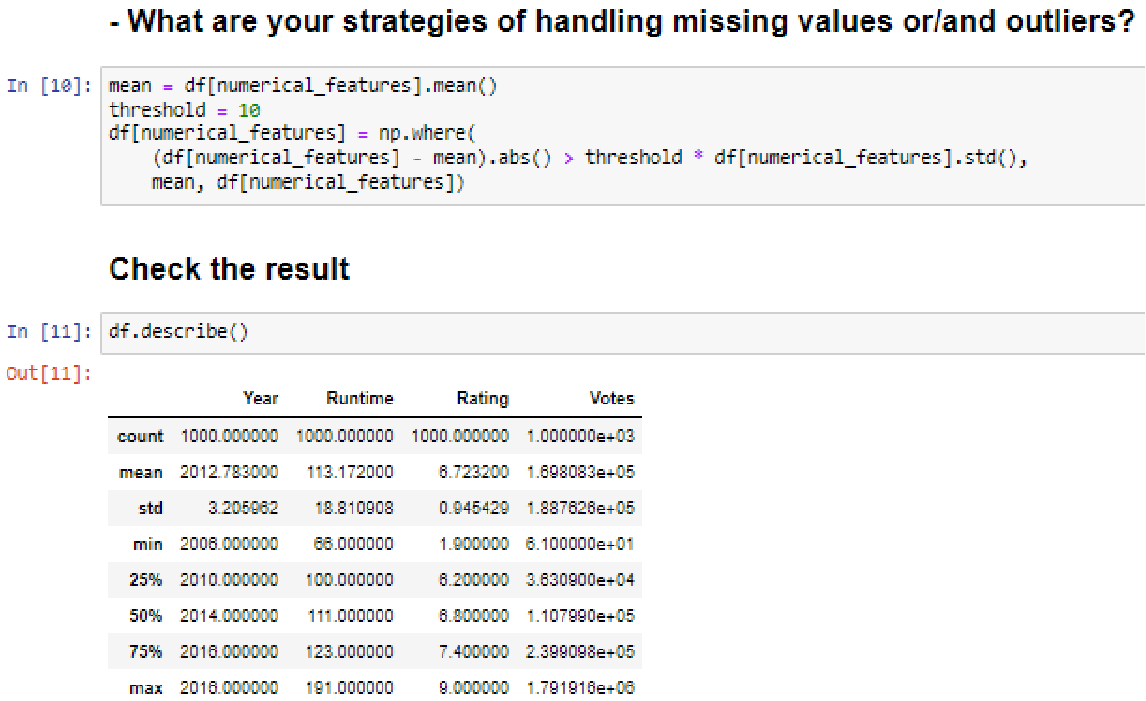
```
In [9]: print(df)
```

```
                          Title      Genre             Director  Year  Runtime  \
0       Guardians of the Galaxy     Action           James Gunn  2014      121
1                    Prometheus  Adventure         Ridley Scott  2012      124
2                         Split     Horror   M. Night Shyamalan  2016      117
3                          Sing  Animation  Christophe Lourdelet  2016      108
4                 Suicide Squad     Action           David Ayer  2016      123
..                          ...        ...                  ...   ...      ...
995        Secret in Their Eyes      Crime            Billy Ray  2015      111
996             Hostel: Part II     Horror             Eli Roth  2007       94
997     Step Up 2: The Streets      Drama           Jon M. Chu  2008       98
998                Search Party  Adventure        Scot Armstrong  2014       93
999                  Nine Lives     Comedy      Barry Sonnenfeld  2016       87

     Rating   Votes
0       8.1  757074
1       7.0  485820
2       7.3  157606
3       7.2   60545
4       6.2  393727
```

- What are your strategies of handling missing values or/and outliers?

Replace missing values. And replace outlier with mean



- What are your strategies of handling missing values or/and outliers?

```
In [10]: mean = df[numerical_features].mean()
         threshold = 10
         df[numerical_features] = np.where(
             (df[numerical_features] - mean).abs() > threshold * df[numerical_features].std(),
             mean, df[numerical_features])
```

Check the result

```
In [11]: df.describe()
```

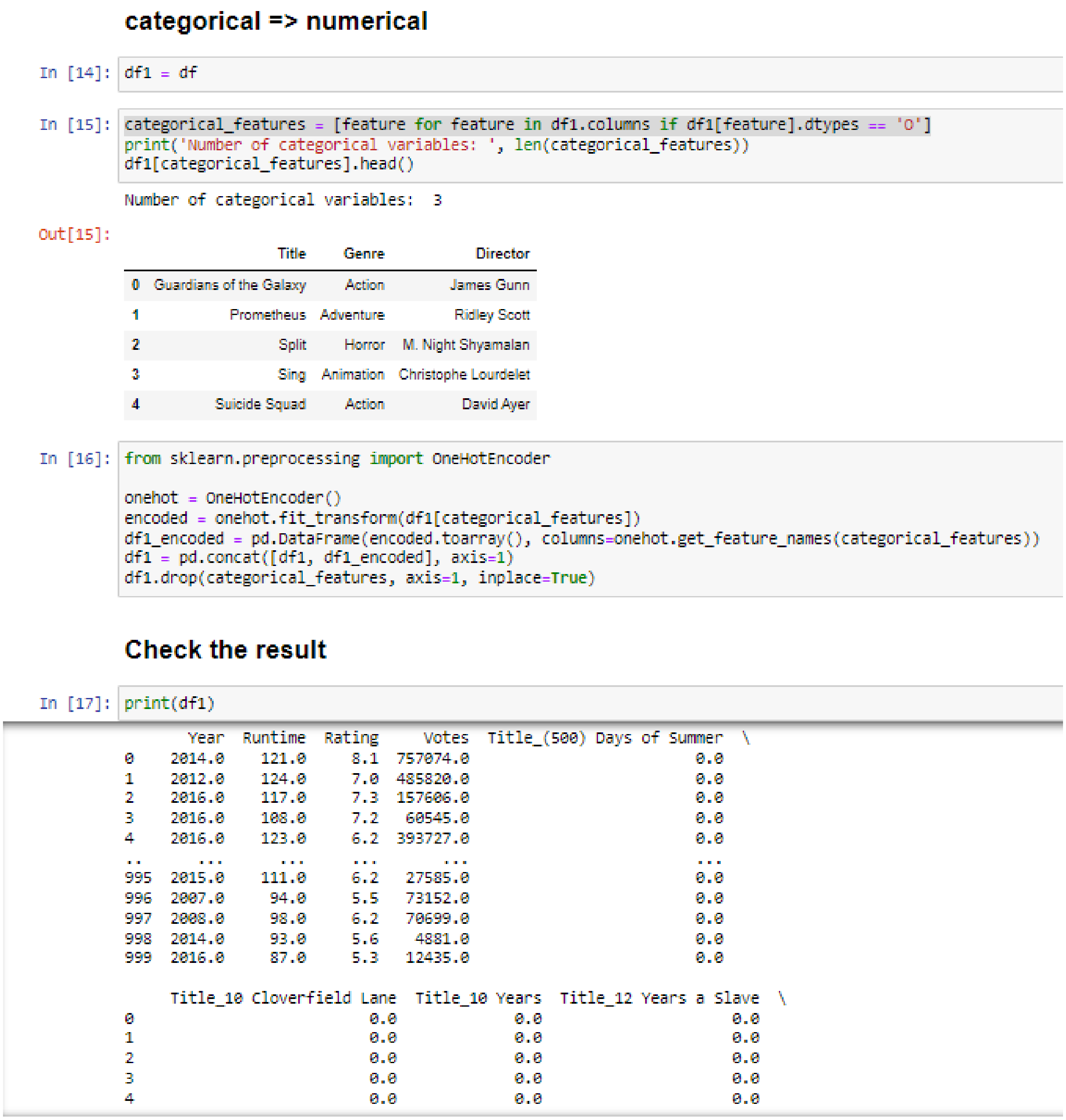
Out[11]:

	Year	Runtime	Rating	Votes
count	1000.000000	1000.000000	1000.000000	1.000000e+03
mean	2012.783000	113.172000	6.723200	1.698083e+05
std	3.205962	18.810908	0.945429	1.887626e+05
min	2006.000000	66.000000	1.900000	6.100000e+01
25%	2010.000000	100.000000	6.200000	3.630900e+04
50%	2014.000000	111.000000	6.800000	1.107990e+05
75%	2016.000000	123.000000	7.400000	2.399098e+05
max	2016.000000	191.000000	9.000000	1.791916e+06

4. Processing categorical and/or numerical data
- Explain how you do transformation (categorical => numerical, or numerical => categorical

categorical => numerical :

Using One-Hot Encoding, the technique that creates a new binary column for each unique category in the data.



categorical => numerical

```
In [14]: df1 = df
```

```
In [15]: categorical_features = [feature for feature in df1.columns if df1[feature].dtypes == 'O']
         print('Number of categorical variables: ', len(categorical_features))
         df1[categorical_features].head()
```

```
Number of categorical variables:  3
```

Out[15]:

	Title	Genre	Director
0	Guardians of the Galaxy	Action	James Gunn
1	Prometheus	Adventure	Ridley Scott
2	Split	Horror	M. Night Shyamalan
3	Sing	Animation	Christophe Lourdelet
4	Suicide Squad	Action	David Ayer

```
In [16]: from sklearn.preprocessing import OneHotEncoder

         onehot = OneHotEncoder()
         encoded = onehot.fit_transform(df1[categorical_features])
         df1_encoded = pd.DataFrame(encoded.toarray(), columns=onehot.get_feature_names(categorical_features))
         df1 = pd.concat([df1, df1_encoded], axis=1)
         df1.drop(categorical_features, axis=1, inplace=True)
```

Check the result

```
In [17]: print(df1)
```

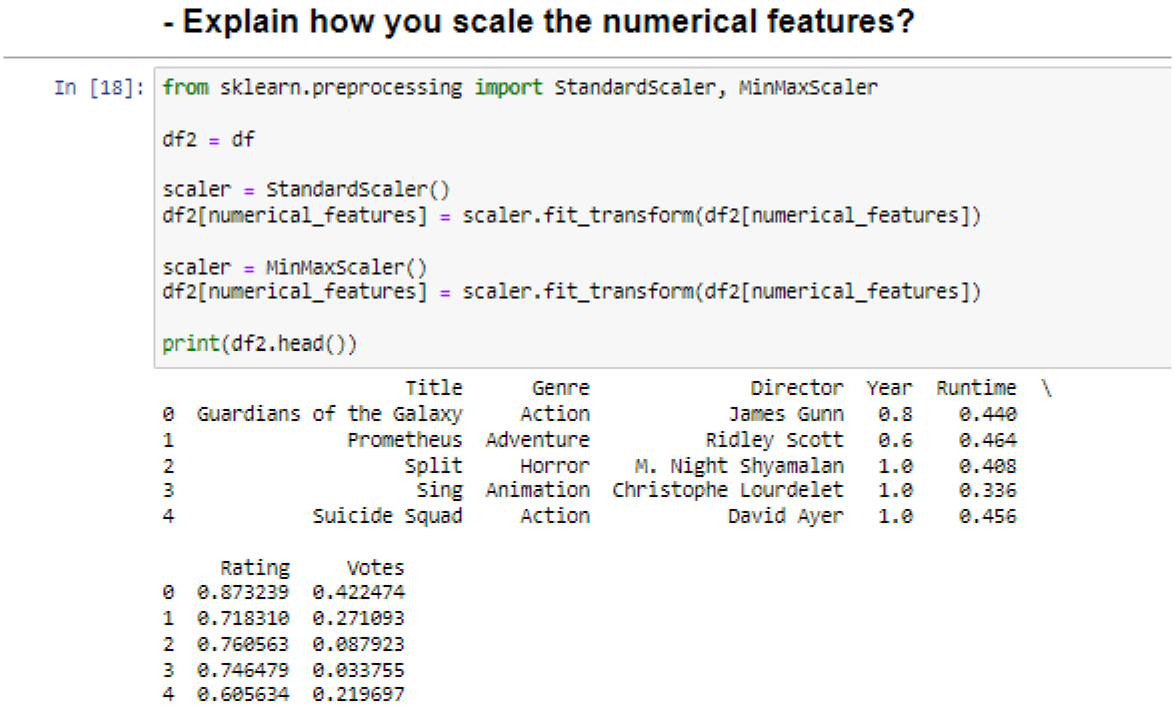
```
       Year  Runtime  Rating     Votes  Title_(500) Days of Summer  \
0    2014.0    121.0     8.1  757074.0                         0.0
1    2012.0    124.0     7.0  485820.0                         0.0
2    2016.0    117.0     7.3  157606.0                         0.0
3    2016.0    108.0     7.2   60545.0                         0.0
4    2016.0    123.0     6.2  393727.0                         0.0
..      ...      ...     ...       ...                         ...
995  2015.0    111.0     6.2   27585.0                         0.0
996  2007.0     94.0     5.5   73152.0                         0.0
997  2008.0     98.0     6.2   70699.0                         0.0
998  2014.0     93.0     5.6    4881.0                         0.0
999  2016.0     87.0     5.3   12435.0                         0.0

     Title_10 Cloverfield Lane  Title_10 Years  Title_12 Years a Slave  \
0                          0.0             0.0                     0.0
1                          0.0             0.0                     0.0
2                          0.0             0.0                     0.0
3                          0.0             0.0                     0.0
4                          0.0             0.0                     0.0
```

5. Feature scaling

- Explain how you scale the numerical features?

Using StandardScaler and MinMaxScaler. StandardScaler transforms the data such that it has a normal distribution with a mean of 0 and a standard deviation of 1. MinMaxScaler transforms the data to have a minimum value of 0 and a maximum value of 1



- Explain how you scale the numerical features?

In [18]:
```
from sklearn.preprocessing import StandardScaler, MinMaxScaler

df2 = df

scaler = StandardScaler()
df2[numerical_features] = scaler.fit_transform(df2[numerical_features])

scaler = MinMaxScaler()
df2[numerical_features] = scaler.fit_transform(df2[numerical_features])

print(df2.head())
```

```
                     Title      Genre             Director  Year  Runtime  \
0  Guardians of the Galaxy     Action           James Gunn   0.8    0.440
1               Prometheus  Adventure         Ridley Scott   0.6    0.464
2                    Split     Horror   M. Night Shyamalan   1.0    0.408
3                     Sing  Animation  Christophe Lourdelet   1.0    0.336
4            Suicide Squad     Action           David Ayer   1.0    0.456

     Rating     Votes
0  0.873239  0.422474
1  0.718310  0.271093
2  0.760563  0.087923
3  0.746479  0.033755
4  0.605634  0.219697
```

6. [Extra-Points] Feature Reduction

- Explain how you obtain the best features?

Univariate feature selection, selects the best features based on their individual relationship with the target variable. It uses statistical tests such as the chi-squared test or ANOVA to select the best features. The scikit-learn library provides the SelectKBest class that can be used for univariate feature selection.