MOVIE RATING PREDICTION WITH PYTHON

Importing Liabraries

In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:

```
df = pd.read_csv("IMDb Movies India.csv", encoding='ISO-8859-1')
df.head()
```

Out[2]:

	Name	Year	Duration	Genre	Rating	Votes	Director	Actor 1	Actor 2	Actor 3
0		NaN	NaN	Drama	NaN	NaN	J.S. Randhawa	Manmauji	Birbal	Rajendra Bhatia
1	#Gadhvi (He thought he was Gandhi)	(2019)	109 min	Drama	7.0	8	Gaurav Bakshi	Rasika Dugal	Vivek Ghamande	Arvind Jangid
2	#Homecoming	(2021)	90 min	Drama, Musical	NaN	NaN	Soumyajit Majumdar	Sayani Gupta	Plabita Borthakur	Roy Angana
3	#Yaaram	(2019)	110 min	Comedy, Romance	4.4	35	Ovais Khan	Prateik	Ishita Raj	Siddhant Kapoor
4	...And Once Again	(2010)	105 min	Drama	NaN	NaN	Amol Palekar	Rajat Kapoor	Rituparna Sengupta	Antara Mali

Data Preprocessing

In [3]:

```
#Number of Rows
df.shape[0]
```

Out[3]:

```
15509
```

In [4]:

```
#Number of Columns
df.shape[1]
```

Out[4]:

```
10
```

In [5]:

```
print(df.columns.tolist()) #Number of Columns in List
```

```
['Name', 'Year', 'Duration', 'Genre', 'Rating', 'Votes', 'Director', 'Actor 1', 'Actor 2', 'Actor
3']
```

In [6]:

```
#Missing values in Columns
df.isnull().sum()
```

Out[6]:

```
Name           0
Year         528
Duration    8269
Genre       1877
Rating      7590
Votes       7589
Director     525
Actor 1     1617
Actor 2     2384
Actor 3     3144
dtype: int64
```

In [7]:

```
#Total Number of Missing Values
df.isnull().sum().values.sum()
```

Out[7]:

```
33523
```

In [8]:
```
#Unique Values
df.nunique()
```

Out[8]:
```
Name        13838
Year          102
Duration      182
Genre         485
Rating         84
Votes        2034
Director     5938
Actor 1      4718
Actor 2      4891
Actor 3      4820
dtype: int64
```

In [9]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15509 entries, 0 to 15508
Data columns (total 10 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   Name      15509 non-null  object 
 1   Year      14981 non-null  object 
 2   Duration  7240 non-null   object 
 3   Genre     13632 non-null  object 
 4   Rating    7919 non-null   float64
 5   Votes     7920 non-null   object 
 6   Director  14984 non-null  object 
 7   Actor 1   13892 non-null  object 
 8   Actor 2   13125 non-null  object 
 9   Actor 3   12365 non-null  object 
dtypes: float64(1), object(9)
memory usage: 1.2+ MB
```

In [10]:
```
#actors value count
df['Actor 1'].value_counts()
```

Out[10]:
```
Ashok Kumar           158
Dharmendra            140
Jeetendra             140
Mithun Chakraborty    133
Amitabh Bachchan      129
                     ... 
Vatsal Sheth            1
Ujala Baboria           1
Dimple Sewak            1
Komal Leels             1
Sangeeta Tiwari         1
Name: Actor 1, Length: 4718, dtype: int64
```

In [11]:
```
# directors value count
df['Director'].value_counts()
```

Out[11]:
```
Jayant Desai        58
Kanti Shah          57
Babubhai Mistry     50
Mahesh Bhatt        48
Master Bhagwan      47
                    ..
Naeem Siddiqui       1
Shadaab Khan         1
Mystelle Brabbee     1
Kunal Shivdasani     1
Kiran Thej           1
Name: Director, Length: 5938, dtype: int64
```

In [12]:
```
#genre value count
df['Genre'].value_counts()
```

Out[12]:

```
Drama                          2780
Action                         1289
Thriller                        779
Romance                         708
Drama, Romance                  524
                               ... 
Action, Musical, War              1
Horror, Crime, Thriller           1
Animation, Comedy                 1
Romance, Action, Crime            1
Adventure, Fantasy, Sci-Fi        1
Name: Genre, Length: 485, dtype: int64
```

In [13]:

```
df.head(10)
```

Out[13]:

	Name	Year	Duration	Genre	Rating	Votes	Director	Actor 1	Actor 2	Actor 3
0		NaN	NaN	Drama	NaN	NaN	J.S. Randhawa	Manmauji	Birbal	Rajendra Bhatia
1	#Gadhvi (He thought he was Gandhi)	(2019)	109 min	Drama	7.0	8	Gaurav Bakshi	Rasika Dugal	Vivek Ghamande	Arvind Jangid
2	#Homecoming	(2021)	90 min	Drama, Musical	NaN	NaN	Soumyajit Majumdar	Sayani Gupta	Plabita Borthakur	Roy Angana
3	#Yaaram	(2019)	110 min	Comedy, Romance	4.4	35	Ovais Khan	Prateik	Ishita Raj	Siddhant Kapoor
4	...And Once Again	(2010)	105 min	Drama	NaN	NaN	Amol Palekar	Rajat Kapoor	Rituparna Sengupta	Antara Mali
5	...Aur Pyaar Ho Gaya	(1997)	147 min	Comedy, Drama, Musical	4.7	827	Rahul Rawail	Bobby Deol	Aishwarya Rai Bachchan	Shammi Kapoor
6	...Yahaan	(2005)	142 min	Drama, Romance, War	7.4	1,086	Shoojit Sircar	Jimmy Sheirgill	Minissha Lamba	Yashpal Sharma
7	.in for Motion	(2008)	59 min	Documentary	NaN	NaN	Anirban Datta	NaN	NaN	NaN
8	?: A Question Mark	(2012)	82 min	Horror, Mystery, Thriller	5.6	326	Allyson Patel	Yash Dave	Muntazir Ahmad	Kiran Bhatia
9	@Andheri	(2014)	116 min	Action, Crime, Thriller	4.0	11	Biju Bhaskar Nair	Augustine	Fathima Babu	Byon

In [14]:

```
# Predict movie ratings based on features, and remove null values from features
df.dropna(subset=['Name', 'Year', 'Duration', 'Rating', 'Votes'], inplace=True)
```

In [15]:

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

Out[15]:

```
Name          0
Year          0
Duration      0
Genre        31
Rating        0
Votes         0
Director      1
Actor 1      75
Actor 2     117
Actor 3     163
dtype: int64
```

In [16]:

```
df.head()
```

Out[16]:

	Name	Year	Duration	Genre	Rating	Votes	Director	Actor 1	Actor 2	Actor 3
1	#Gadhvi (He thought he was Gandhi)	(2019)	109 min	Drama	7.0	8	Gaurav Bakshi	Rasika Dugal	Vivek Ghamande	Arvind Jangid
3	#Yaaram	(2019)	110 min	Comedy, Romance	4.4	35	Ovais Khan	Prateik	Ishita Raj	Siddhant Kapoor
5	...Aur Pyaar Ho Gaya	(1997)	147 min	Comedy, Drama, Musical	4.7	827	Rahul Rawail	Bobby Deol	Aishwarya Rai Bachchan	Shammi Kapoor
6	...Yahaan	(2005)	142 min	Drama, Romance, War	7.4	1,086	Shoojit Sircar	Jimmy Sheirgill	Minissha Lamba	Yashpal Sharma
8	?: A Question Mark	(2012)	82 min	Horror, Mystery, Thriller	5.6	326	Allyson Patel	Yash Dave	Muntazir Ahmad	Kiran Bhatia

In [17]:

```
#Dataset Overview after clearning null values
```

In [18]:

```
df.shape[0] #Number of rows
```

Out[18]:

```
5851
```

In [19]:

```
df.shape[1] #Number of columns
```

Out[19]:

```
10
```

In [20]:

```
df.isna().sum().values.sum() #Total number of missing values
```

Out[20]:

```
387
```

In [21]:

```
df.nunique() #total number of unique values
```

Out[21]:

```
Name        5570
Year          91
Duration     178
Genre        393
Rating        83
Votes       2030
Director    2549
Actor 1     2046
Actor 2     2373
Actor 3     2572
dtype: int64
```

In [22]:

```
# Remove ("-2019") parentheses from YEAR column and we will convert to INT
df['Year'] = df['Year'].str.strip('()').astype(int)
```

In [23]:

```
# Remove ("1,086") commas from Votes column and we will convert to INT
df['Votes'] = df['Votes'].str.replace(',','').astype(int)
```

In [24]:

```
# Remove (109 min) min from Duration and we will convert to INT
df['Duration'] = df['Duration'].str.replace('min','').astype(int)
```

In [25]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 5851 entries, 1 to 15508
Data columns (total 10 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   Name      5851 non-null   object 
 1   Year      5851 non-null   int32  
 2   Duration  5851 non-null   int32  
 3   Genre     5820 non-null   object 
 4   Rating    5851 non-null   float64
 5   Votes     5851 non-null   int32  
 6   Director  5850 non-null   object 
 7   Actor 1   5776 non-null   object 
 8   Actor 2   5734 non-null   object 
 9   Actor 3   5688 non-null   object 
dtypes: float64(1), int32(3), object(6)
memory usage: 434.3+ KB
```

In [26]:

```
df.describe()
```

Out[26]:

	Year	Duration	Rating	Votes
count	5851.000000	5851.000000	5851.000000	5851.000000
mean	1996.416852	132.294480	5.931875	2611.273116
std	19.914640	26.555826	1.389942	13433.828528
min	1931.000000	21.000000	1.100000	5.000000
25%	1983.000000	117.000000	5.000000	28.000000
50%	2002.000000	134.000000	6.100000	119.000000
75%	2013.000000	150.000000	7.000000	862.500000
max	2021.000000	321.000000	10.000000	591417.000000

In [27]:

```
# Drop the Genre column
df.drop('Genre', axis=1, inplace=True)
```

In [34]:

```
df.head()
```

Out[34]:

	Name	Year	Duration	Rating	Votes	Director	Actor 1	Actor 2	Actor 3
1	#Gadhvi (He thought he was Gandhi)	2019	109	7.0	8	Gaurav Bakshi	Rasika Dugal	Vivek Ghamande	Arvind Jangid
3	#Yaaram	2019	110	4.4	35	Ovais Khan	Prateik	Ishita Raj	Siddhant Kapoor
5	...Aur Pyaar Ho Gaya	1997	147	4.7	827	Rahul Rawail	Bobby Deol	Aishwarya Rai Bachchan	Shammi Kapoor
6	...Yahaan	2005	142	7.4	1086	Shoojit Sircar	Jimmy Sheirgill	Minissha Lamba	Yashpal Sharma
8	?: A Question Mark	2012	82	5.6	326	Allyson Patel	Yash Dave	Muntazir Ahmad	Kiran Bhatia

In [35]:

```
import warnings
warnings.filterwarnings('ignore')
```

Exploratory Data Analysis (EDA)

In [43]:

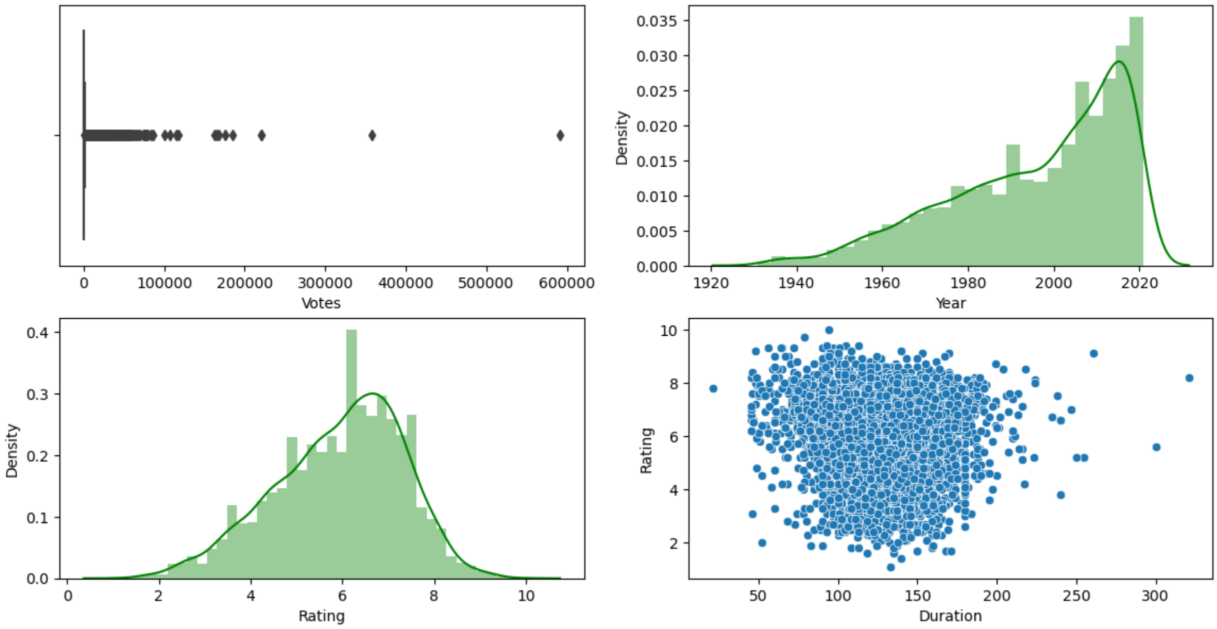
```
plt.figure(figsize=(14, 7))
plt.subplot(2, 2, 1)
sns.boxplot(x='Votes', data=df)

plt.subplot(2, 2, 2)
sns.distplot(df['Year'], color='g')

plt.subplot(2, 2, 3)
sns.distplot(df['Rating'], color='g')
```

```
plt.subplot(2, 2, 4)
sns.scatterplot(x=df['Duration'], y=df['Rating'], data=df)

plt.show()
```

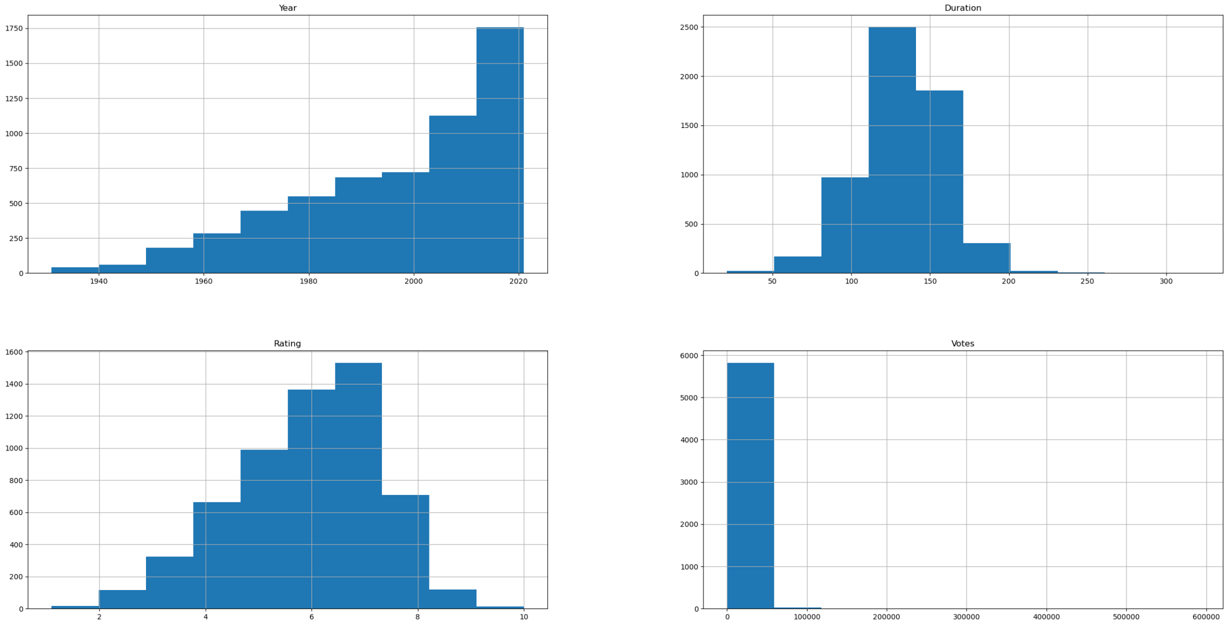


In [44]:

```
#Histogram
df.hist(figsize=(30, 15))
```

Out[44]:

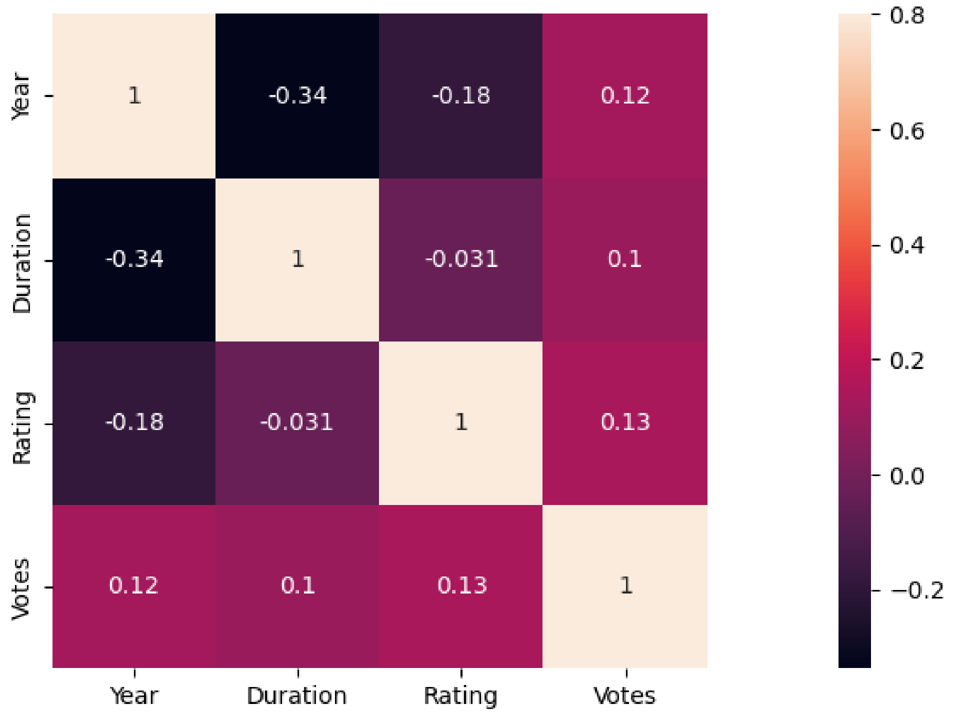
```
array([[<Axes: title={'center': 'Year'}>,
        <Axes: title={'center': 'Duration'}>],
       [<Axes: title={'center': 'Rating'}>,
        <Axes: title={'center': 'Votes'}>]], dtype=object)
```



In [46]:

```
# Heatmap for Correlation Matrix
corrmat = df.corr()
fig = plt.figure(figsize= (20, 5))

sns.heatmap(corrmat, vmax = .8, square = True, annot = True)
plt.show()
```



In [47]:

```
df.head()
```

Out[47]:

	Name	Year	Duration	Rating	Votes	Director	Actor 1	Actor 2	Actor 3
1	#Gadhvi (He thought he was Gandhi)	2019	109	7.0	8	Gaurav Bakshi	Rasika Dugal	Vivek Ghamande	Arvind Jangid
3	#Yaaram	2019	110	4.4	35	Ovais Khan	Prateik	Ishita Raj	Siddhant Kapoor
5	...Aur Pyaar Ho Gaya	1997	147	4.7	827	Rahul Rawail	Bobby Deol	Aishwarya Rai Bachchan	Shammi Kapoor
6	...Yahaan	2005	142	7.4	1086	Shoojit Sircar	Jimmy Sheirgill	Minissha Lamba	Yashpal Sharma
8	?: A Question Mark	2012	82	5.6	326	Allyson Patel	Yash Dave	Muntazir Ahmad	Kiran Bhatia

In [49]:

```
# Now we will drop another columns
df.drop(['Name', 'Director', 'Actor 1', 'Actor 2', 'Actor 3'], axis = 1, inplace=True)
df.head()
```

Out[49]:

	Year	Duration	Rating	Votes
1	2019	109	7.0	8
3	2019	110	4.4	35
5	1997	147	4.7	827
6	2005	142	7.4	1086
8	2012	82	5.6	326

In [51]:

```
X = df[['Year','Duration','Votes']]
y = df['Rating']
```

In [53]:

```
X.head()
```

Out[53]:

	Year	Duration	Votes
1	2019	109	8
3	2019	110	35
5	1997	147	827
6	2005	142	1086
8	2012	82	326

In [54]:

```
y.head()
```

Out[54]:

```
1    7.0
3    4.4
5    4.7
6    7.4
8    5.6
Name: Rating, dtype: float64
```

In [56]:

```
# Now we will split data into Training and Testing sets
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=1000)
```

Building a Model

In [58]:

```
# Create a pipeline with SGDRegressor and standard scalling
from sklearn.linear_model import SGDRegressor
from sklearn.preprocessing import StandardScaler
from sklearn.pipeline import Pipeline
```

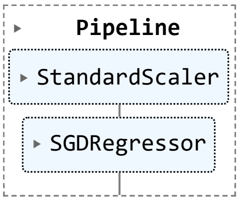
In [59]:

```
pipeline = Pipeline([('Scaler', StandardScaler()), ('sgd', SGDRegressor(max_iter=1000, random_state=
```

In [60]:

```
pipeline.fit(X_train, y_train)
```

Out[60]:



In [61]:

```
# Now Predict ratings on the test set
y_pred_pipeline = pipeline.predict(X_test)
```

In [64]:

```
y_pred_pipeline
```

Out[64]:

```
array([5.82466996, 6.57614536, 5.73319638, ..., 5.68570112, 5.81004424,
       5.87257446])
```

Model Evaluation

In [66]:

```
from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_score

# Evaluation Metrics for the Pipeline
mae_pipeline = mean_absolute_error(y_test, y_pred_pipeline)
mse_pipeline = mean_squared_error(y_test, y_pred_pipeline)
r2_pipeline = r2_score(y_test, y_pred_pipeline)
```

In [67]:

```
print("Pipeline Mean Absolute Error:", mae_pipeline)
print("Pipeline Mean Squared Error:", mse_pipeline)
print("Pipeline R-square:", r2_pipeline)
```

```
Pipeline Mean Absolute Error: 1.040142363499226
Pipeline Mean Squared Error: 1.75589466147756
Pipeline R-square: 0.037929023872087186
```

Model Deployment

In [70]:

```python
new_input = pd.DataFrame({'Year':[2022], 'Duration':[135], 'Votes':[10120]})

#Use trained pipeline to make predictons on the new_input
predicted_rating = pipeline.predict(new_input)
print("Predicted Rating:", predicted_rating)
```

```
Predicted Rating: [5.58974792]
```

You can find the Project on **GitHub.**