In [42]:
```
import numpy as np
import pandas as pd

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

In [43]:
```
import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
import plotly.express as px
%matplotlib inline
import seaborn as sns

import plotly.express as px
from plotly.offline import init_notebook_mode, iplot, plot

from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_sco
import warnings
warnings.filterwarnings('ignore')
```

In [44]:
```
df = pd.read_csv(r"C:\Users\jasja\Downloads\archive (2)\IMDb Movies India.c
```

In [45]:
```
df.head()
```

Out[45]:

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

In [47]:
```
df.shape
```

Out[47]:
```
(15509, 10)
```

In [48]:
```
df.columns
```

Out[48]:
```
Index(['Name', 'Year', 'Duration', 'Genre', 'Rating', 'Votes', 'Director',
       'Actor 1', 'Actor 2', 'Actor 3'],
      dtype='object')
```

In [49]:
```
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 [50]:
```
def missing_values_percent(dataframe):
    missing_values = dataframe.isna().sum()
    percentage_missing = (missing_values / len(dataframe) * 100).round(2)

    result_movie = pd.DataFrame({'Missing Values': missing_values, 'Percent
    result_movie['Percentage'] = result_movie['Percentage'].astype(str) + '

    return result_movie


result = missing_values_percent(df)
result
```

Out[50]:

	Missing Values	Percentage
Name	0	0.0%
Year	528	3.4%
Duration	8269	53.32%
Genre	1877	12.1%
Rating	7590	48.94%
Votes	7589	48.93%
Director	525	3.39%
Actor 1	1617	10.43%
Actor 2	2384	15.37%
Actor 3	3144	20.27%

In [51]:
```
df.drop(['Actor 2' , 'Actor 3'], axis=1, inplace=True)
```

In [52]:
```
df.dropna(subset=['Duration'], inplace = True)
df = df[df.isnull().sum(axis=1).sort_values(ascending=False) <=5]
missing_values_percent(df)
```

Out[52]:

	Missing Values	Percentage
Name	0	0.0%
Year	125	1.73%
Duration	0	0.0%
Genre	187	2.58%
Rating	1389	19.19%
Votes	1389	19.19%
Director	14	0.19%
Actor 1	264	3.65%

In [53]:
```
df.dropna(subset=['Rating', 'Votes'], inplace=True)
director_description = df['Director'].describe()

director_counts = df['Director'].value_counts().sort_values(ascending=False
df['Director'].fillna('rajmouli', inplace=True)

genre_counts = df['Genre'].value_counts().sort_values(ascending=False)
df['Genre'].fillna('Action', inplace=True)

actor1_description = df['Actor 1'].describe()
df['Actor 1'].fillna('mahesh babu', inplace=True)

missing_values_df = pd.DataFrame({
    'Missing Values': df.isnull().sum(),
    'Percentage': (df.isnull().sum() / len(df) * 100).round(2)
})

df.tail()
```

Out[53]:

	Name	Year	Duration	Genre	Rating	Votes	Director	Actor 1
15493	Zubaan	(2015)	115 min	Drama	6.1	408	Mozez Singh	Vicky Kaushal
15494	Zubeidaa	(2001)	153 min	Biography, Drama, History	6.2	1,496	Shyam Benegal	Karisma Kapoor
15503	Zulm Ki Zanjeer	(1989)	125 min	Action, Crime, Drama	5.8	44	S.P. Muthuraman	Chiranjeevi
15505	Zulmi	(1999)	129 min	Action, Drama	4.5	655	Kuku Kohli	Akshay Kumar
15508	Zulm-O-Sitam	(1998)	130 min	Action, Drama	6.2	20	K.C. Bokadia	Dharmendra

In [54]:
```
missing_values_percent(df)
```

Out[54]:

	Missing Values	Percentage
Name	0	0.0%
Year	0	0.0%
Duration	0	0.0%
Genre	0	0.0%
Rating	0	0.0%
Votes	0	0.0%
Director	0	0.0%
Actor 1	0	0.0%

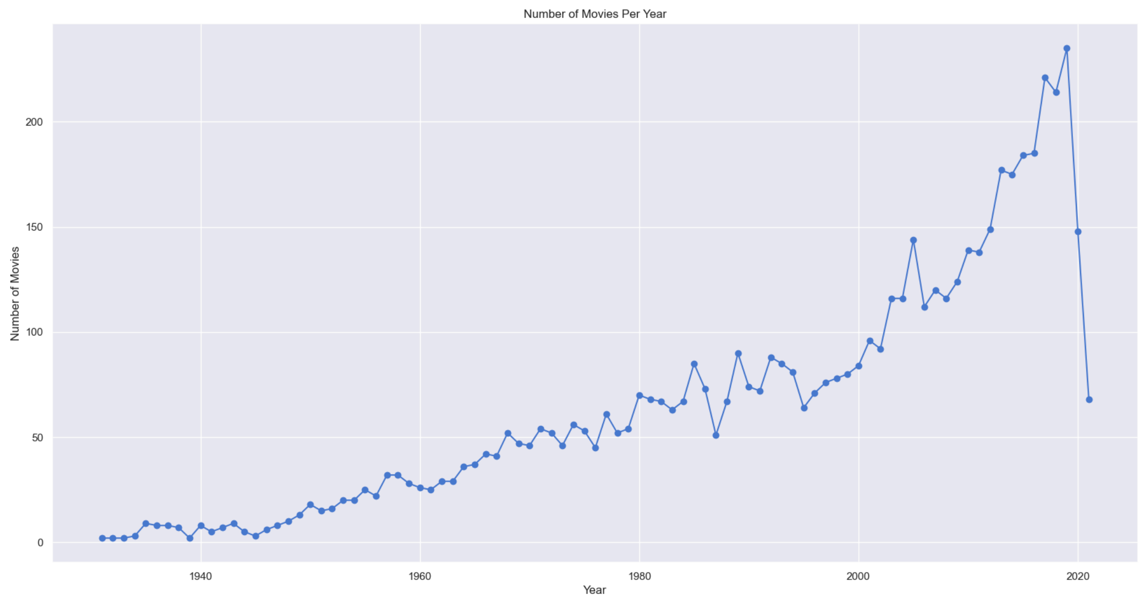
In [55]:
```
df['Year'] = df['Year'].str.replace(r'[()]', '', regex=True)
df['Duration'] = df['Duration'].str.replace(r' min', '', regex=True)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 5851 entries, 1 to 15508
Data columns (total 8 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   Name      5851 non-null   object 
 1   Year      5851 non-null   object 
 2   Duration  5851 non-null   object 
 3   Genre     5851 non-null   object 
 4   Rating    5851 non-null   float64
 5   Votes     5851 non-null   object 
 6   Director  5851 non-null   object 
 7   Actor 1   5851 non-null   object 
dtypes: float64(1), object(7)
memory usage: 411.4+ KB
```

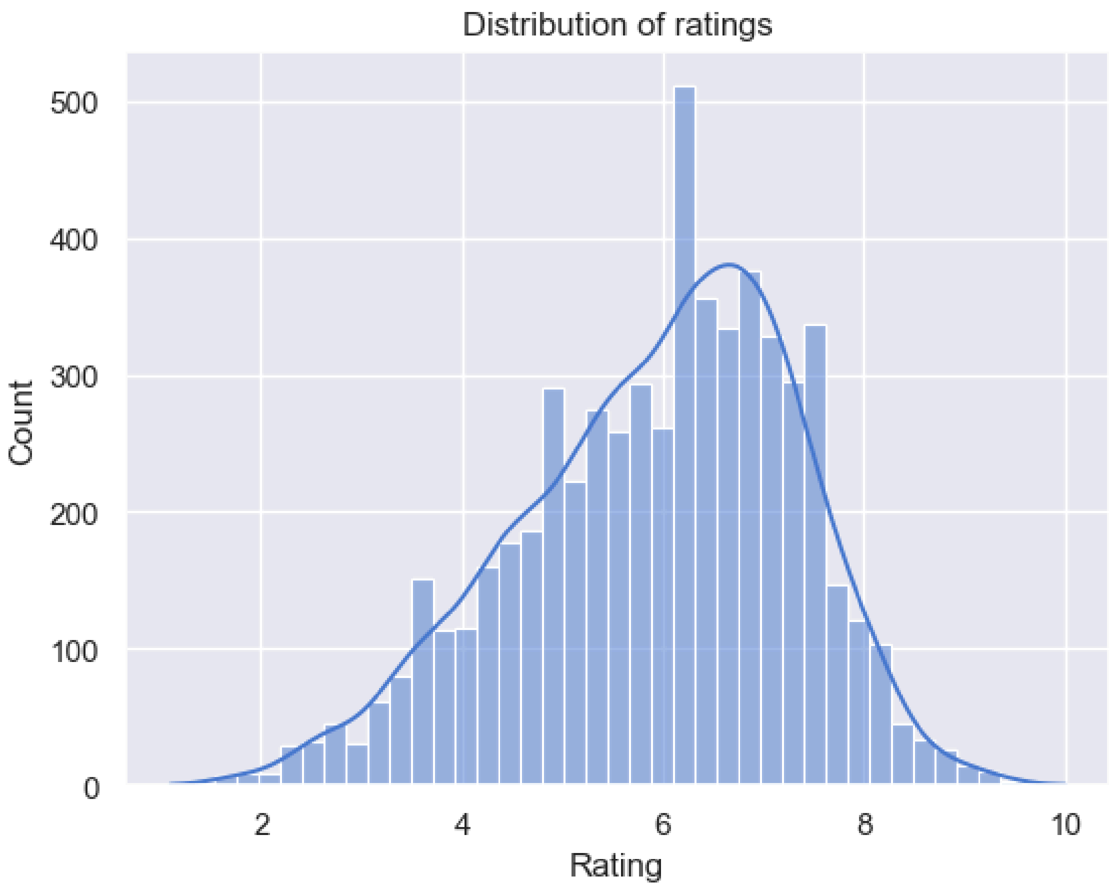
In [56]:
```
int_columns = ['Year', 'Duration']
df[int_columns] = df[int_columns].astype(int)
df['Votes'] = df['Votes'].str.replace(',', '').astype(int)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 5851 entries, 1 to 15508
Data columns (total 8 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     5851 non-null   object 
 4   Rating    5851 non-null   float64
 5   Votes     5851 non-null   int32  
 6   Director  5851 non-null   object 
 7   Actor 1   5851 non-null   object 
dtypes: float64(1), int32(3), object(4)
memory usage: 342.8+ KB
```

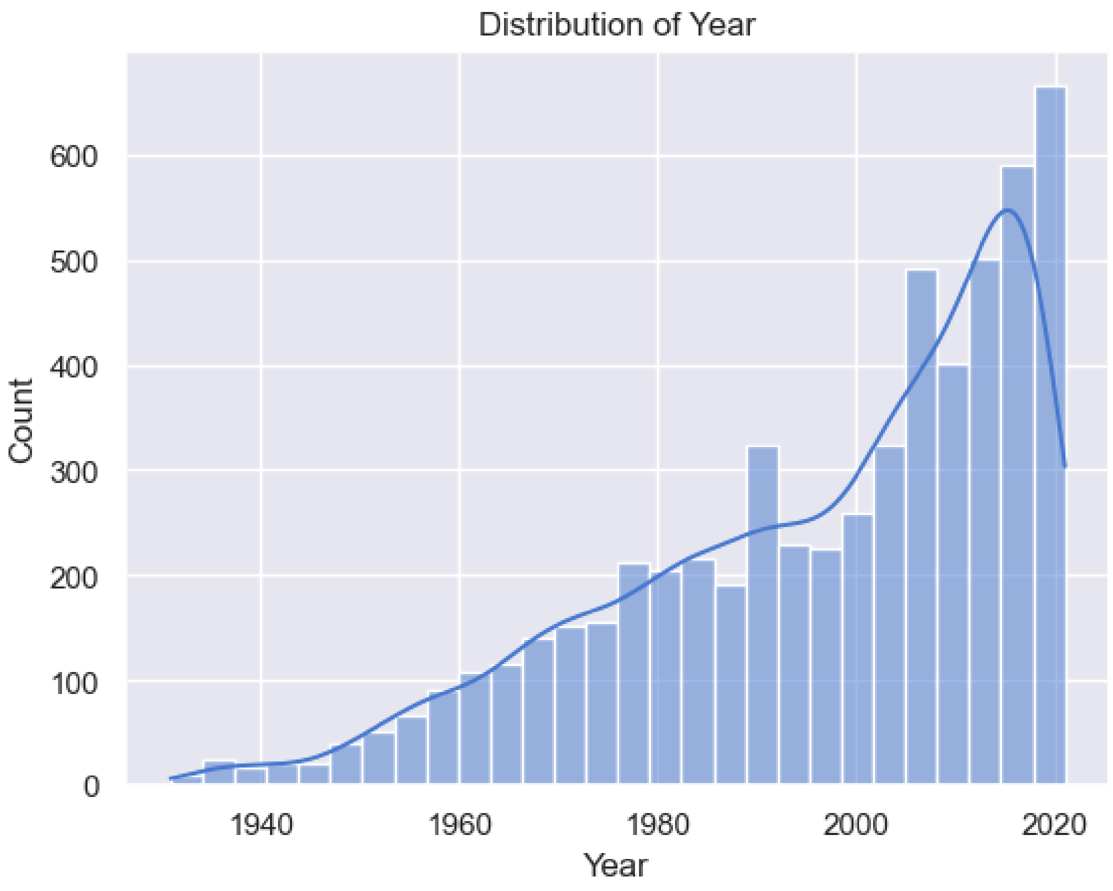
In [58]:
```
plt.figure(figsize=(20, 10))

year_counts = df['Year'].value_counts().sort_index()
years = year_counts.index

plt.plot(years, year_counts, marker='o' )

plt.title('Number of Movies Per Year')
plt.xlabel('Year')
plt.ylabel('Number of Movies')


plt.show()
```



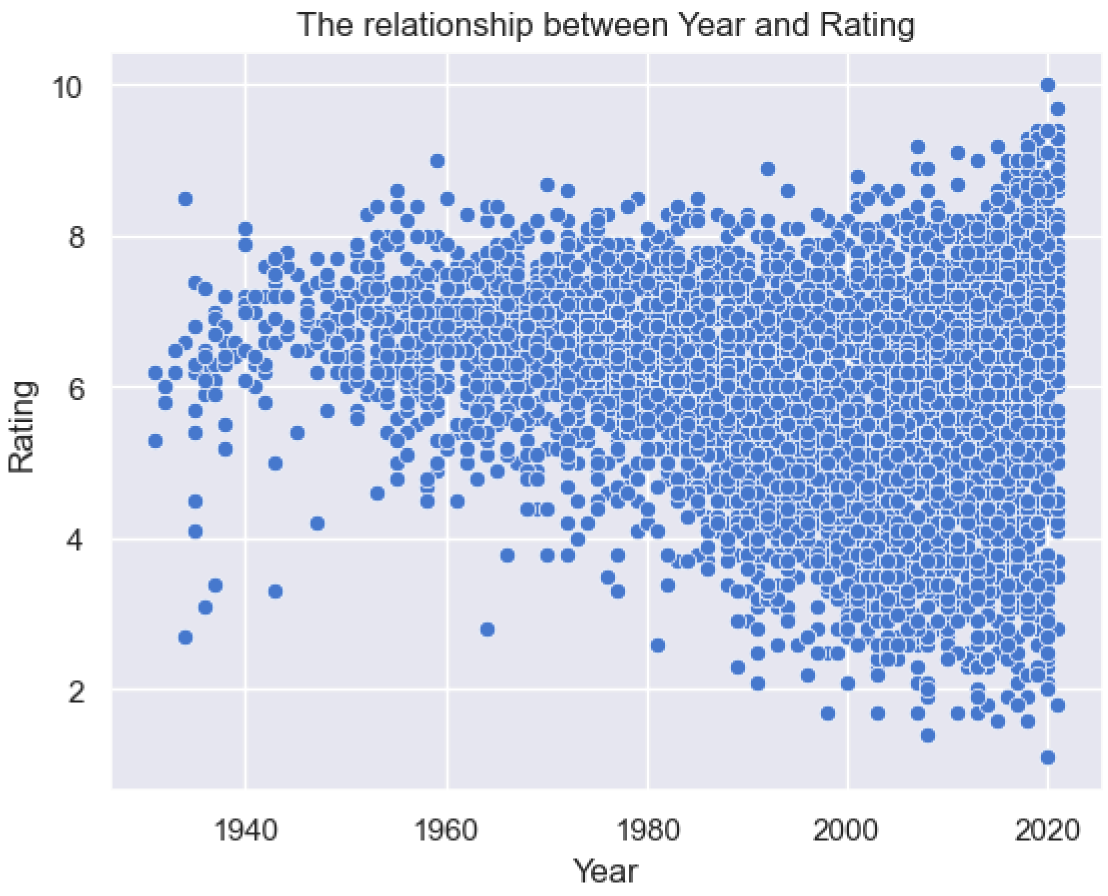
In [59]:
```
sns.histplot(data=df,x='Rating',kde=True)
plt.title('Distribution of ratings')
plt.show()
```



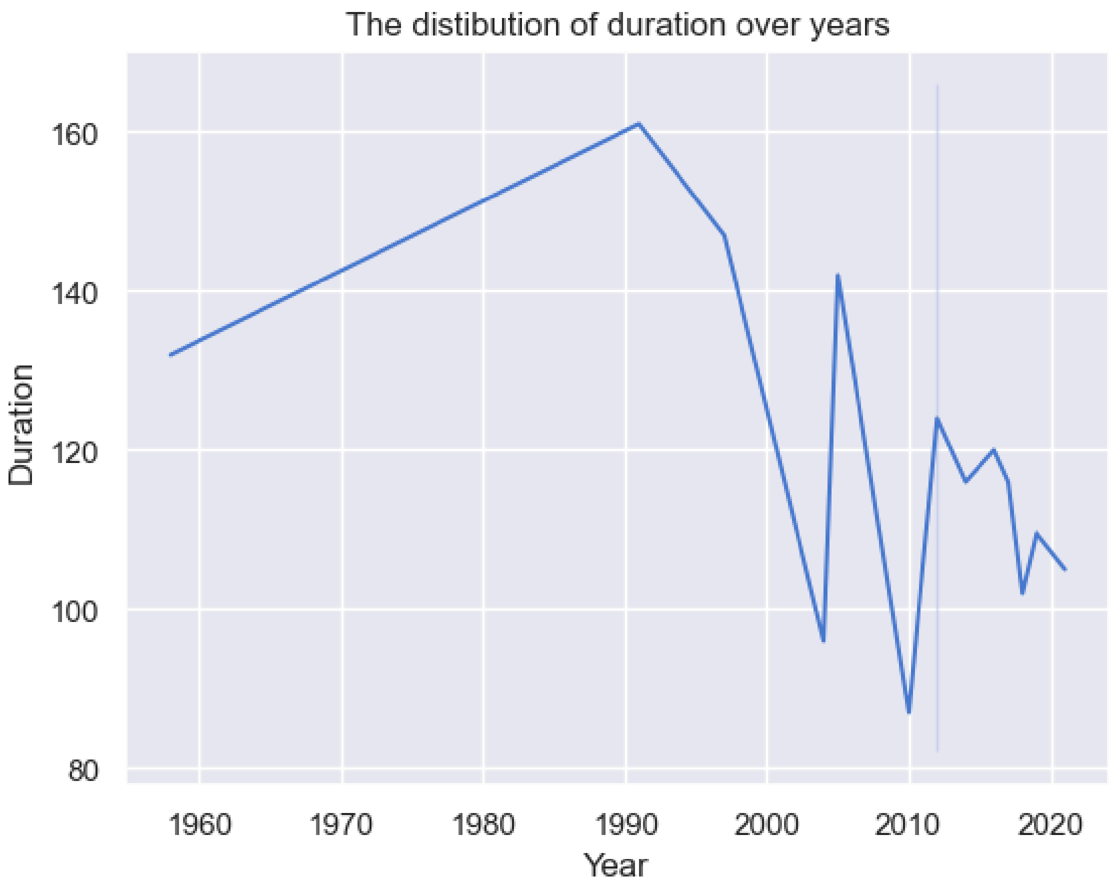
In [60]:
```
sns.histplot(data=df,x='Year',kde=True)
plt.title('Distribution of Year')
plt.show()
```



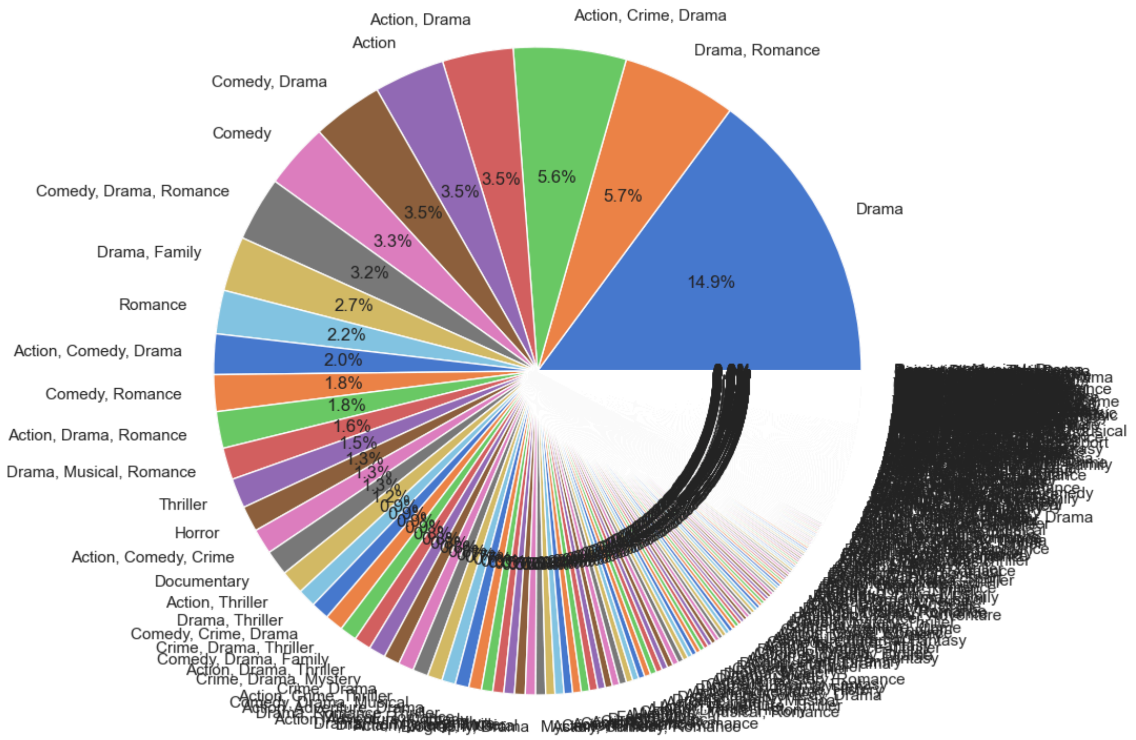
In [61]:
```
sns.scatterplot(data=df,x='Year',y='Rating')
plt.title("The relationship between Year and Rating")
plt.show()
```



In [62]:
```
sns.lineplot(data=df.head(15),x='Year',y='Duration')
plt.title('The distibution of duration over years')
plt.show()
```

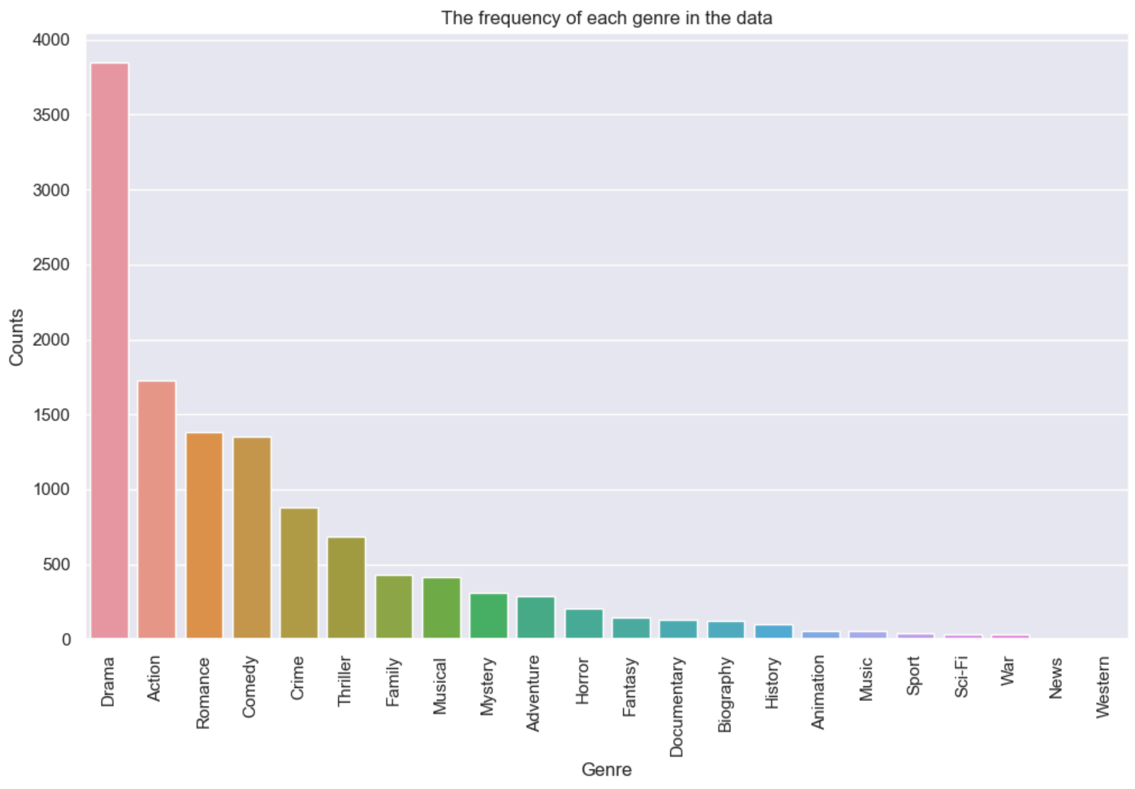


In [64]:
```
label = df["Genre"].value_counts().index
sizes = df["Genre"].value_counts()
plt.figure(figsize = (10,10))
plt.pie(sizes, labels= label, startangle = 0 , shadow = False , autopct='%1
plt.show()
```



In [65]:
```
movies_genre = df['Genre'].str.split(', ',expand=True).stack().value_counts
labels = movies_genre.keys()
count = movies_genre.values
print(movies_genre)
print(labels)
print(count)
plt.figure(figsize=(12,7))
sns.barplot(x=labels,y=count)
plt.xticks(rotation=90)
plt.title('The frequency of each genre in the data')
plt.xlabel('Genre')
plt.ylabel('Counts')
plt.show()
```

```
Drama          3847
Action         1730
Romance        1383
Comedy         1352
Crime           878
Thriller        684
Family          428
Musical         416
Mystery         308
Adventure       284
Horror          205
Fantasy         148
Documentary     130
Biography       126
History         103
Animation        56
Music            55
Sport            44
Sci-Fi           35
War              34
News              2
Western           2
Name: count, dtype: int64
Index(['Drama', 'Action', 'Romance', 'Comedy', 'Crime', 'Thriller', 'Famil
y',
       'Musical', 'Mystery', 'Adventure', 'Horror', 'Fantasy', 'Documentar
y',
       'Biography', 'History', 'Animation', 'Music', 'Sport', 'Sci-Fi', 'W
ar',
       'News', 'Western'],
      dtype='object')
[3847 1730 1383 1352  878  684  428  416  308  284  205  148  130  126
  103   56   55   44   35   34    2    2]
```



In [67]:
```
genre_mean_rating = df.groupby('Genre')['Rating'].transform('mean')
df['Genre_mean_rating'] = genre_mean_rating
df['Director_encoded'] = df.groupby('Director')['Rating'].transform('mean')
df['Actor_encoded'] = df.groupby('Actor 1')['Rating'].transform('mean')

# Define the features and target variable
features = ['Year', 'Votes', 'Duration', 'Genre_mean_rating', 'Director_enc
X = df[features]
y = df['Rating']


# Split the data into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, ra

# Initialize and train a Linear Regression model
lr = LinearRegression()
lr.fit(X_train, y_train)

# Make predictions on the test set
y_pred = lr.predict(X_test)


# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
mae = mean_absolute_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)
# Print the evaluation metrics
print(f"Mean Squared Error: {mse:.4f}")
print(f"Mean Absolute Error: {mae:.4f}")
print(f"R2 Score: {r2:.4f}")
```

```
Mean Squared Error: 0.5138
Mean Absolute Error: 0.5127
R2 Score: 0.7238
```

In [ ]:

```

```