Data Preprocessing and other operations

In [60]:
```
#importing important libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [61]:
```
#reading the csv file into a pandas dataframe
df = pd.read_csv('mymoviedb.csv', lineterminator = '\n')
```

In [62]:
```
#showing the top 5 movies in the dataset
df.head(5)
```

Out[62]:

	Release_Date	Title	Overview	Popularity	Vote_Count	Vote_Average	Original_Language	Genre	Poster_Url
0	2021-12-15	Spider-Man: No Way Home	Peter Parker is unmasked and no longer able to...	5083.954	8940	8.3	en	Action, Adventure, Science Fiction	https://image.tmdb.org/t/p/original/1g0dhYtq4i...
1	2022-03-01	The Batman	In his second year of fighting crime, Batman u...	3827.658	1151	8.1	en	Crime, Mystery, Thriller	https://image.tmdb.org/t/p/original/74xTEgt7R3...
2	2022-02-25	No Exit	Stranded at a rest stop in the mountains durin...	2618.087	122	6.3	en	Thriller	https://image.tmdb.org/t/p/original/vDHsLnOWKl...
3	2021-11-24	Encanto	The tale of an extraordinary family, the Madri...	2402.201	5076	7.7	en	Animation, Comedy, Family, Fantasy	https://image.tmdb.org/t/p/original/4j0PNHkMr5...
4	2021-12-22	The King's Man	As a collection of history's worst tyrants and...	1895.511	1793	7.0	en	Action, Adventure, Thriller, War	https://image.tmdb.org/t/p/original/aq4Pwv5Xeu...

In [63]:
```
#information about the dataset and its attibutes. we can see date is a string type we need to change it
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9827 entries, 0 to 9826
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   Release_Date       9827 non-null   object
 1   Title              9827 non-null   object
 2   Overview           9827 non-null   object
 3   Popularity         9827 non-null   float64
 4   Vote_Count         9827 non-null   int64
 5   Vote_Average       9827 non-null   float64
 6   Original_Language  9827 non-null   object
 7   Genre              9827 non-null   object
 8   Poster_Url         9827 non-null   object
dtypes: float64(2), int64(1), object(6)
memory usage: 691.1+ KB
```

In [64]:
```
#we can also see that for multiple genres we have ', ' after each one so we need to remove those also
df['Genre']
```

Out[64]:
```
0       Action, Adventure, Science Fiction
1                 Crime, Mystery, Thriller
2                                 Thriller
3       Animation, Comedy, Family, Fantasy
4         Action, Adventure, Thriller, War
                       ...
9822                          Drama, Crime
9823                                Horror
9824              Mystery, Thriller, Horror
9825                  Music, Drama, History
9826            War, Drama, Science Fiction
Name: Genre, Length: 9827, dtype: object
```

In [65]:
```
#checking to see if there are any duplicates in our dataset. it is zero
df.duplicated().sum()
```

Out[65]: `np.int64(0)`

In [66]:
```
#this function helps describe the dataset in terms of statistics like mean, median, mode, standard deviation etc
#it only does so for numeric values
df.describe()
```

Out[66]:

	Popularity	Vote_Count	Vote_Average
count	9827.000000	9827.000000	9827.000000
mean	40.326088	1392.805536	6.439534
std	108.873998	2611.206907	1.129759
min	13.354000	0.000000	0.000000
25%	16.128500	146.000000	5.900000
50%	21.199000	444.000000	6.500000
75%	35.191500	1376.000000	7.100000
max	5083.954000	31077.000000	10.000000

data preprocessing

1. removing useless columns like overview, original language and poster url
2. removing ', ' from genres
3. changing release date to date time format and extracting only the year from it

In [67]:
```
df.head(5)
```

Out[67]:

	Release_Date	Title	Overview	Popularity	Vote_Count	Vote_Average	Original_Language	Genre	Poster_Url
0	2021-12-15	Spider-Man: No Way Home	Peter Parker is unmasked and no longer able to...	5083.954	8940	8.3	en	Action, Adventure, Science Fiction	https://image.tmdb.org/t/p/original/1g0dhYtq4i...
1	2022-03-01	The Batman	In his second year of fighting crime, Batman u...	3827.658	1151	8.1	en	Crime, Mystery, Thriller	https://image.tmdb.org/t/p/original/74xTEgt7R3...
2	2022-02-25	No Exit	Stranded at a rest stop in the mountains durin...	2618.087	122	6.3	en	Thriller	https://image.tmdb.org/t/p/original/vDHsLnOWKl...
3	2021-11-24	Encanto	The tale of an extraordinary family, the Madri...	2402.201	5076	7.7	en	Animation, Comedy, Family, Fantasy	https://image.tmdb.org/t/p/original/4j0PNHkMr5...
4	2021-12-22	The King's Man	As a collection of history's worst tyrants and...	1895.511	1793	7.0	en	Action, Adventure, Thriller, War	https://image.tmdb.org/t/p/original/aq4Pwv5Xeu...

In [68]:
```
#changing release date to date time format
df['Release_Date'] = pd.to_datetime(df['Release_Date'])
print(df['Release_Date'].dtypes) #checking data type
df['Release_Date'] = df['Release_Date'].dt.year #changing to year only
df['Release_Date'].dtypes #checking data type again
```

```
datetime64[ns]
```

Out[68]: `dtype('int32')`

In [69]:
```
df.head(5)
```

Out[69]:

	Release_Date	Title	Overview	Popularity	Vote_Count	Vote_Average	Original_Language	Genre	Poster_Url
0	2021	Spider-Man: No Way Home	Peter Parker is unmasked and no longer able to...	5083.954	8940	8.3	en	Action, Adventure, Science Fiction	https://image.tmdb.org/t/p/original/1g0dhYtq4i...
1	2022	The Batman	In his second year of fighting crime, Batman u...	3827.658	1151	8.1	en	Crime, Mystery, Thriller	https://image.tmdb.org/t/p/original/74xTEgt7R3...
2	2022	No Exit	Stranded at a rest stop in the mountains durin...	2618.087	122	6.3	en	Thriller	https://image.tmdb.org/t/p/original/vDHsLnOWKl...
3	2021	Encanto	The tale of an extraordinary family, the Madri...	2402.201	5076	7.7	en	Animation, Comedy, Family, Fantasy	https://image.tmdb.org/t/p/original/4j0PNHkMr5...
4	2021	The King's Man	As a collection of history's worst tyrants and...	1895.511	1793	7.0	en	Action, Adventure, Thriller, War	https://image.tmdb.org/t/p/original/aq4Pwv5Xeu...

In [70]:
```
#removing unused columns like overview, original language and poster url
cols = ['Overview', 'Original_Language', 'Poster_Url']
df.drop(cols, axis = 1, inplace = True)
```

In [71]:
```
df.columns
```

Out[71]:
```
Index(['Release_Date', 'Title', 'Popularity', 'Vote_Count', 'Vote_Average',
       'Genre'],
      dtype='object')
```

In [72]:
```
df.head(5)
```

Out[72]:

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	8.3	Action, Adventure, Science Fiction
1	2022	The Batman	3827.658	1151	8.1	Crime, Mystery, Thriller
2	2022	No Exit	2618.087	122	6.3	Thriller
3	2021	Encanto	2402.201	5076	7.7	Animation, Comedy, Family, Fantasy
4	2021	The King's Man	1895.511	1793	7.0	Action, Adventure, Thriller, War

In [73]:
```
#categorizing movies as blockbuster, average, below_avg, anf flop

def categories(df, col, labels):
    brackets = [df[col].describe()['min'],
           df[col].describe()['25%'],
           df[col].describe()['50%'],
           df[col].describe()['75%'],
           df[col].describe()['max']]

    df[col] = pd.cut(df[col], brackets, labels = labels, duplicates = 'drop')
    return df
```

In [74]:
```
labels = ['flop', 'below_avg', 'average', 'blockbuster']
```

In [75]:
```
categories(df, 'Vote_Average', labels)
```

Out[75]:

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Action, Adventure, Science Fiction
1	2022	The Batman	3827.658	1151	blockbuster	Crime, Mystery, Thriller
2	2022	No Exit	2618.087	122	below_avg	Thriller
3	2021	Encanto	2402.201	5076	blockbuster	Animation, Comedy, Family, Fantasy
4	2021	The King's Man	1895.511	1793	average	Action, Adventure, Thriller, War
...	...	...	...	...	...	...
9822	1973	Badlands	13.357	896	blockbuster	Drama, Crime
9823	2020	Violent Delights	13.356	8	flop	Horror
9824	2016	The Offering	13.355	94	flop	Mystery, Thriller, Horror
9825	2021	The United States vs. Billie Holiday	13.354	152	average	Music, Drama, History
9826	1984	Threads	13.354	186	blockbuster	War, Drama, Science Fiction

9827 rows × 6 columns

In [76]:
```
df['Vote_Average'].unique()
```

Out[76]:
```
['blockbuster', 'below_avg', 'average', 'flop', NaN]
Categories (4, object): ['flop' < 'below_avg' < 'average' < 'blockbuster']
```

In [77]:
```
df.head(5)
```

Out[77]:

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Action, Adventure, Science Fiction
1	2022	The Batman	3827.658	1151	blockbuster	Crime, Mystery, Thriller
2	2022	No Exit	2618.087	122	below_avg	Thriller
3	2021	Encanto	2402.201	5076	blockbuster	Animation, Comedy, Family, Fantasy
4	2021	The King's Man	1895.511	1793	average	Action, Adventure, Thriller, War

In [78]:
```
df['Vote_Average'].value_counts()
```

Out[78]:
```
Vote_Average
flop           2467
blockbuster    2450
average        2412
below_avg      2398
Name: count, dtype: int64
```

In [79]:
```
df.dropna(inplace= True)
```

In [80]:
```
df.isna().sum()
```

Out[80]:
```
Release_Date    0
Title           0
Popularity      0
Vote_Count      0
Vote_Average    0
Genre           0
dtype: int64
```

In [81]:
```
df.head()
```

Out[81]:

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Action, Adventure, Science Fiction
1	2022	The Batman	3827.658	1151	blockbuster	Crime, Mystery, Thriller
2	2022	No Exit	2618.087	122	below_avg	Thriller
3	2021	Encanto	2402.201	5076	blockbuster	Animation, Comedy, Family, Fantasy
4	2021	The King's Man	1895.511	1793	average	Action, Adventure, Thriller, War

In [82]:
```
#separating multiple genres into multiple lines
df['Genre'] = df['Genre'].str.split(', ')
```

In [83]:
```
df = df.explode('Genre').reset_index(drop=True)
```

In [84]:
```
df.head()
```

Out[84]:

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Action
1	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Adventure
2	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Science Fiction
3	2022	The Batman	3827.658	1151	blockbuster	Crime
4	2022	The Batman	3827.658	1151	blockbuster	Mystery

In [85]:
```
#casting column into category
df['Genre'] = df['Genre'].astype('category')
df['Genre'].dtypes
```

Out[85]:
```
CategoricalDtype(categories=['Action', 'Adventure', 'Animation', 'Comedy', 'Crime',
                  'Documentary', 'Drama', 'Family', 'Fantasy', 'History',
                  'Horror', 'Music', 'Mystery', 'Romance', 'Science Fiction',
                  'TV Movie', 'Thriller', 'War', 'Western'],
, ordered=False, categories_dtype=object)
```

In [86]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25552 entries, 0 to 25551
Data columns (total 6 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Release_Date  25552 non-null  int32
 1   Title         25552 non-null  object
 2   Popularity    25552 non-null  float64
 3   Vote_Count    25552 non-null  int64
 4   Vote_Average  25552 non-null  category
 5   Genre         25552 non-null  category
dtypes: category(2), float64(1), int32(1), int64(1), object(1)
memory usage: 749.6+ KB
```

In [88]:
```
df.nunique()
```

Out[88]:
```
Release_Date     100
Title           9415
Popularity      8088
Vote_Count      3265
Vote_Average       4
Genre             19
dtype: int64
```

In [ ]:

Exploratory Data Analysis

1. What is the most frequent genre of movies released on Netflix?
2. What genres have the highest votes in vote_avg column?
3. Which movie has the highest popularity? What is its genres?
4. Which movie has the lowest popularity? What is its genres?
5. Which year has the most filmed movies?

In [89]:
```
sns.set_style('whitegrid')
```

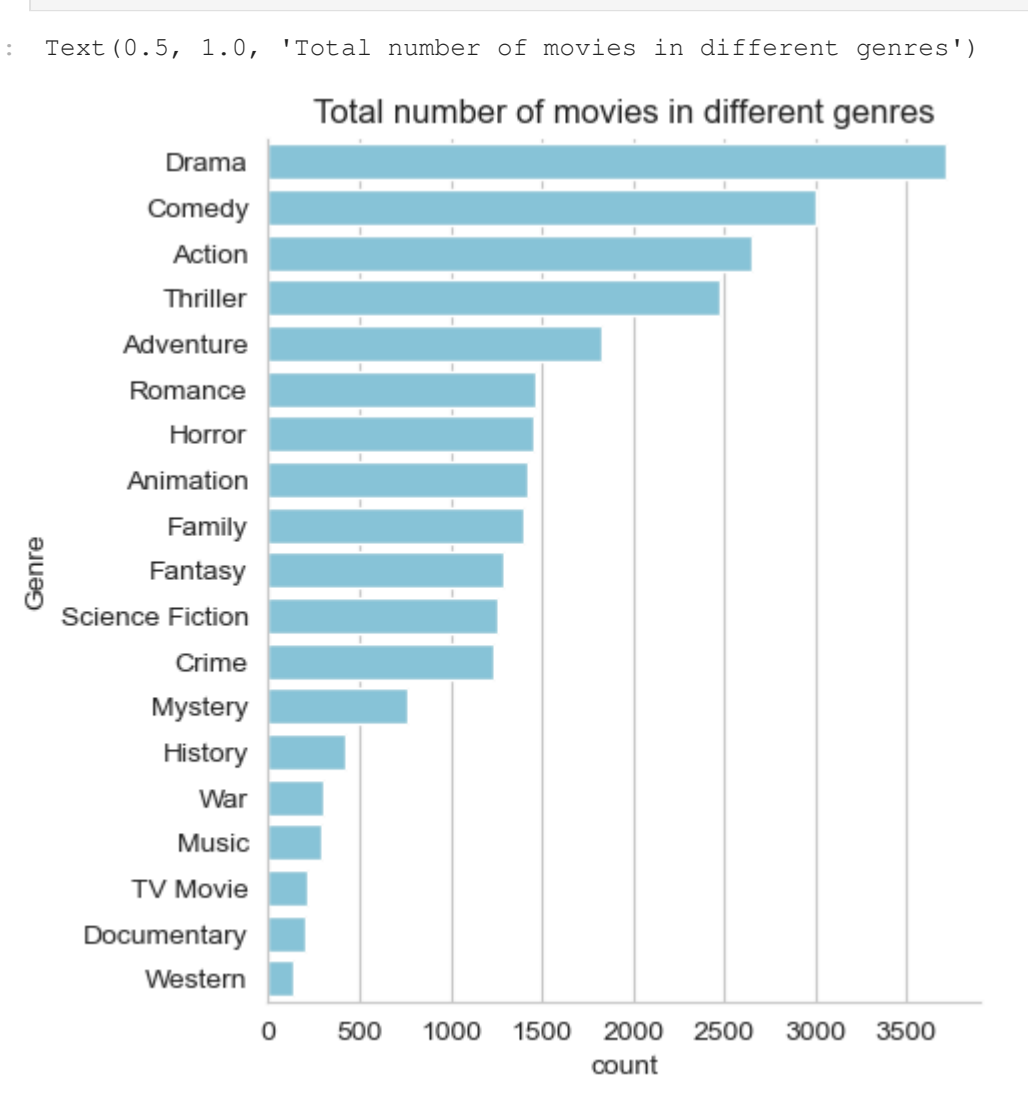
In [96]:
```
#1. What is the most frequent genre of movies released on Netflix?
df['Genre'].describe()
```

Out[96]:
```
count     25552
unique       19
top       Drama
freq       3715
Name: Genre, dtype: object
```

In [98]:
```
sns.catplot(y = 'Genre', data = df, kind  ='count',
            order = df['Genre'].value_counts().index,
           color = '#7ccbe5')

plt.title('Total number of movies in different genres')
```

Out[98]: `Text(0.5, 1.0, 'Total number of movies in different genres')`



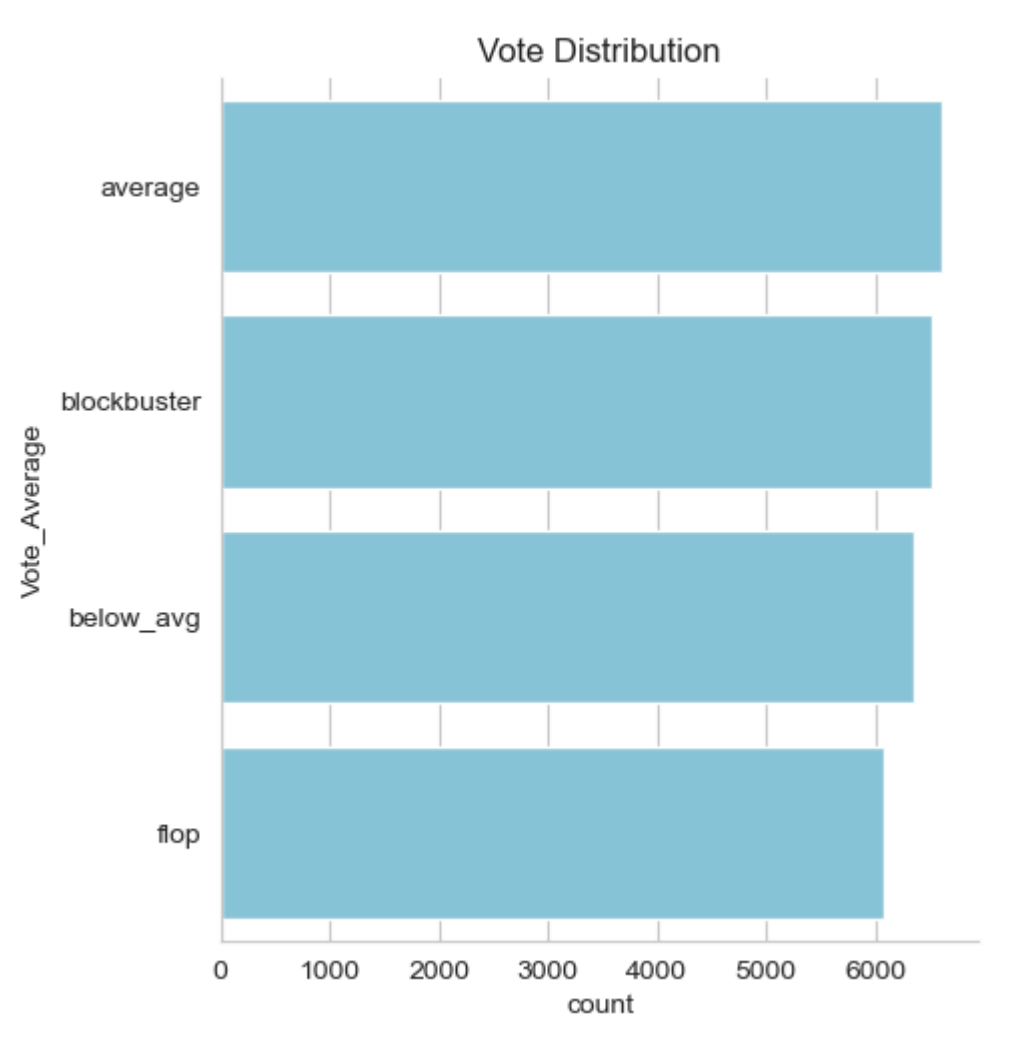
In [99]:
```
df.head(5)
```

Out[99]:

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Action
1	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Adventure
2	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Science Fiction
3	2022	The Batman	3827.658	1151	blockbuster	Crime
4	2022	The Batman	3827.658	1151	blockbuster	Mystery

In [108…
```
#2. What genres have the highest votes in vote_avg column?
sns.catplot(y = 'Vote_Average', data = df, kind = 'count',
           order = df['Vote_Average'].value_counts().index,
           color = '#7ccbe5')
plt.title('Vote Distribution')
```

Out[108… `Text(0.5, 1.0, 'Vote Distribution')`



In [110…
```
#3. Which movie has the highest popularity? What is its genres?
df[df['Popularity'] == df['Popularity'].max()]
```

Out[110…

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
0	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Action
1	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Adventure
2	2021	Spider-Man: No Way Home	5083.954	8940	blockbuster	Science Fiction

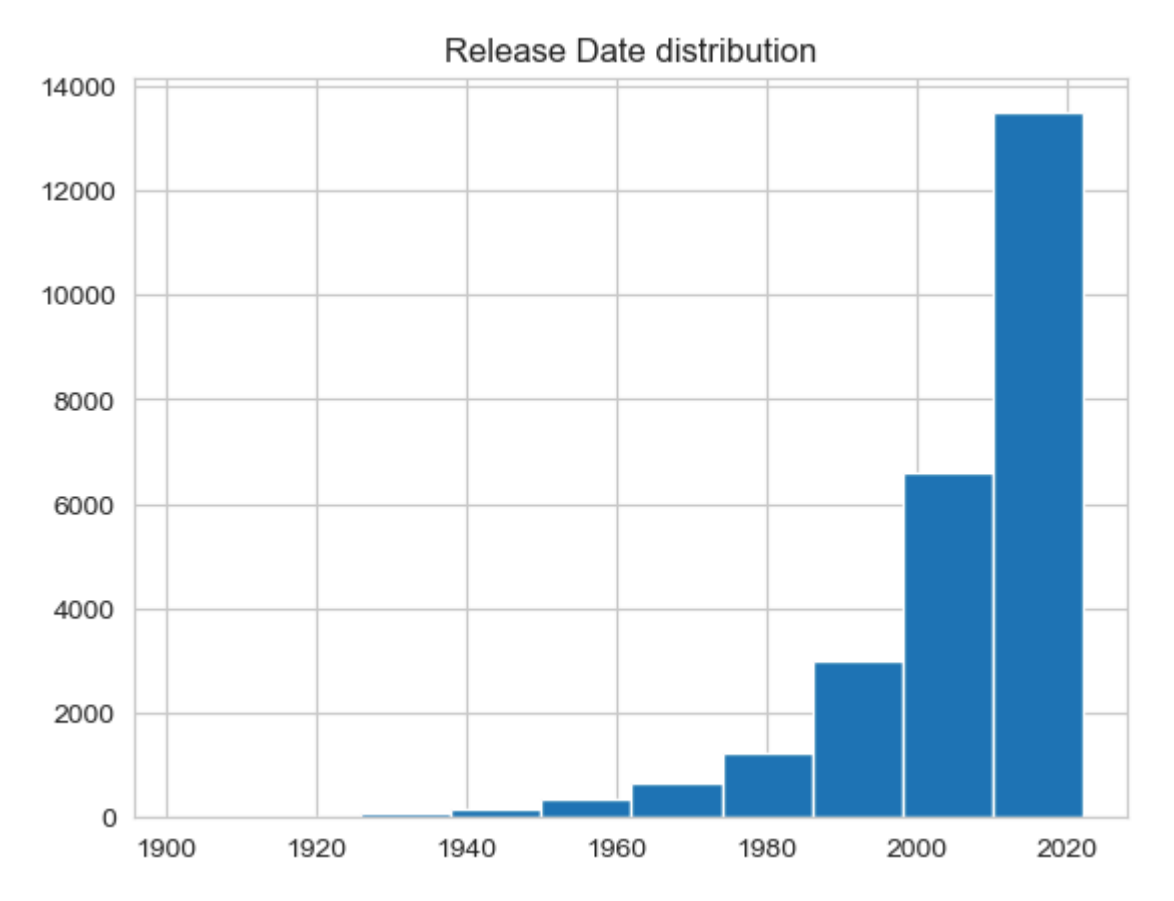
In [111…
```
#4. Which movie has the lowest popularity? What is its genres?
df[df['Popularity'] == df['Popularity'].min()]
```

Out[111…

	Release_Date	Title	Popularity	Vote_Count	Vote_Average	Genre
25546	2021	The United States vs. Billie Holiday	13.354	152	average	Music
25547	2021	The United States vs. Billie Holiday	13.354	152	average	Drama
25548	2021	The United States vs. Billie Holiday	13.354	152	average	History
25549	1984	Threads	13.354	186	blockbuster	War
25550	1984	Threads	13.354	186	blockbuster	Drama
25551	1984	Threads	13.354	186	blockbuster	Science Fiction

In [112…
```
#5. Which year has the most filmed movies?
df['Release_Date'].hist()
plt.title('Release Date distribution')
```

Out[112… `Text(0.5, 1.0, 'Release Date distribution')`



In [ ]:

Summary

Exploratory Data Analysis

1. What is the most frequent genre of movies released on Netflix? Ans. Drama
2. What genres have the highest votes in vote_avg column? Ans. Average
3. Which movie has the highest popularity? What is its genres? Ans. Spider Man: No Way Home - Action, Adventure, Science Fiction
4. Which movie has the lowest popularity? What is its genres? Ans. The United States vs. Billie Holiday - Music, Drama, History Threads - War, Drama, Science Fiction
5. Which year has the most filmed movies? Ans. 2020

In [ ]: