Introduction:

we are having three csv files.

1-Contains movie names and genres

2-Contains tags

3-Ratings of the movies

Now we are going to analyze the datasets and need the visualize the analysis results

```
# import the requried libraries

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

# loading the data form the files

ratings=pd.read_csv(r"D:\Temp\Data Science & Artificial Intelligence\
Completed\Week-3\Class-17 on 08-02-2024 on Thrusday\datasets\archive
(1)\rating.csv")
tags=pd.read_csv(r"D:\Temp\Data Science & Artificial Intelligence\
Completed\Week-3\Class-17 on 08-02-2024 on Thrusday\datasets\archive
(1)\tag.csv")
movies=pd.read_csv(r"D:\Temp\Data Science & Artificial Intelligence\
Completed\Week-3\Class-17 on 08-02-2024 on Thrusday\datasets\archive
(1)\movie.csv")

# preview individual dataframes

movies
```

```
       movieId                                     title  \
0            1                         Toy Story (1995)
1            2                           Jumanji (1995)
2            3                  Grumpier Old Men (1995)
3            4                 Waiting to Exhale (1995)
4            5       Father of the Bride Part II (1995)
...        ...                                       ...
27273   131254             Kein Bund für's Leben (2007)
27274   131256            Feuer, Eis & Dosenbier (2002)
27275   131258                       The Pirates (2014)
```

```
27276   131260                  Rentun Ruusu (2001)
27277   131262                     Innocence (2014)

                                              genres
0      Adventure|Animation|Children|Comedy|Fantasy
1                      Adventure|Children|Fantasy
2                                  Comedy|Romance
3                            Comedy|Drama|Romance
4                                           Comedy
...                                            ...
27273                                       Comedy
27274                                       Comedy
27275                                    Adventure
27276                        (no genres listed)
27277                  Adventure|Fantasy|Horror

[27278 rows x 3 columns]
```

tags

```
        userId  movieId            tag            timestamp
0           18     4141    Mark Waters  2009-04-24 18:19:40
1           65      208      dark hero  2013-05-10 01:41:18
2           65      353      dark hero  2013-05-10 01:41:19
3           65      521  noir thriller  2013-05-10 01:39:43
4           65      592      dark hero  2013-05-10 01:41:18
...        ...      ...            ...                  ...
465559  138446    55999        dragged  2013-01-23 23:29:32
465560  138446    55999  Jason Bateman  2013-01-23 23:29:38
465561  138446    55999         quirky  2013-01-23 23:29:38
465562  138446    55999            sad  2013-01-23 23:29:32
465563  138472      923  rise to power  2007-11-02 21:12:47

[465564 rows x 4 columns]
```

ratings

```
          userId  movieId  rating            timestamp
0              1        2     3.5  2005-04-02 23:53:47
1              1       29     3.5  2005-04-02 23:31:16
2              1       32     3.5  2005-04-02 23:33:39
3              1       47     3.5  2005-04-02 23:32:07
4              1       50     3.5  2005-04-02 23:29:40
...          ...      ...     ...                  ...
20000258  138493    68954     4.5  2009-11-13 15:42:00
20000259  138493    69526     4.5  2009-12-03 18:31:48
20000260  138493    69644     3.0  2009-12-07 18:10:57
20000261  138493    70286     5.0  2009-11-13 15:42:24
20000262  138493    71619     2.5  2009-10-17 20:25:36

[20000263 rows x 4 columns]
```

```
# viewing the shapes of the dataframes

print('shape of movies dataframe is ',movies.shape)
print('shape of tags dataframe is ',tags.shape)
print('shape of ratings dataframe is ',ratings.shape)
```

```
shape of movies dataframe is  (27278, 3)
shape of tags dataframe is  (465564, 4)
shape of ratings dataframe is  (20000263, 4)
```

```
# first we will go with setting movies dataframe

movies.shape
```

```
(27278, 3)
```

```
movies.info()# total informations
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27278 entries, 0 to 27277
Data columns (total 3 columns):
 #   Column   Non-Null Count  Dtype 
---  ------   --------------  ----- 
 0   movieId  27278 non-null  int64 
 1   title    27278 non-null  object
 2   genres   27278 non-null  object
dtypes: int64(1), object(2)
memory usage: 639.5+ KB
```

```
#checking null values
movies.isnull().sum()
# there is no null values
```

```
movieId    0
title      0
genres     0
dtype: int64
```

```
movies.columns# attributes
```

```
Index(['movieId', 'title', 'genres'], dtype='object')
```

```
movies.head()
```

```
   movieId                                title  \
0        1                    Toy Story (1995)   
1        2                      Jumanji (1995)   
2        3             Grumpier Old Men (1995)   
3        4            Waiting to Exhale (1995)   
4        5  Father of the Bride Part II (1995)   

                                        genres
```

```
0  Adventure|Animation|Children|Comedy|Fantasy
1                   Adventure|Children|Fantasy
2                               Comedy|Romance
3                         Comedy|Drama|Romance
4                                       Comedy
```

```
# we found that this dataframe contains 2-categorical
attributes[title, genres] and 1-numerical attribute[movieId]

# we found all the movie titles contains it's released year. So we
will extract the year from the tilte to form a new attribute as Year

movies['title'].str.extract(r'\((\d{4})\)')# it will extract the
digits from the text.
```

```
          0
0      1995
1      1995
2      1995
3      1995
4      1995
...     ...
27273  2007
27274  2002
27275  2014
27276  2001
27277  2014

[27278 rows x 1 columns]
```

```
movies['Year']=movies['title'].str.extract(r'\((\d{4})\)')# it will
extract the digits from the text and form a new attribute.

movies.columns

Index(['movieId', 'title', 'genres', 'Year'], dtype='object')

movies.head()
```

```
   movieId                                title  \
0        1                    Toy Story (1995)
1        2                      Jumanji (1995)
2        3             Grumpier Old Men (1995)
3        4            Waiting to Exhale (1995)
4        5  Father of the Bride Part II (1995)

                                       genres  Year
0  Adventure|Animation|Children|Comedy|Fantasy  1995
1                   Adventure|Children|Fantasy  1995
2                               Comedy|Romance  1995
```

```
3                          Comedy|Drama|Romance  1995
4                                        Comedy  1995
```

```
# now we created new attribute Year. So we need to remove the years in
the title.
```

```
movies.title.str.replace(r'[\(\d+\)]','',regex=True)
```

```
0                            Toy Story
1                              Jumanji
2                     Grumpier Old Men
3                    Waiting to Exhale
4          Father of the Bride Part II
                        ...
27273           Kein Bund für's Leben
27274          Feuer, Eis & Dosenbier
27275                      The Pirates
27276                    Rentun Ruusu
27277                       Innocence
Name: title, Length: 27278, dtype: object
```

```
movies.title=movies.title.str.replace(r'\(\d+\)','',regex=True)#
removed the year in the title
```

```
# now we will set the genres
```

```
movies.genres.unique()
```

```
array(['Adventure|Animation|Children|Comedy|Fantasy',
       'Adventure|Children|Fantasy', 'Comedy|Romance', ...,
       'Action|Adventure|Animation|Fantasy|Horror',
       'Animation|Children|Comedy|Fantasy|Sci-Fi',
       'Animation|Children|Comedy|Western'], dtype=object)
```

```
movies.genres.nunique()
```

```
1342
```

```
# now we will try get the count of genres.
```

```
movies.genres.str.split('|').tolist()# it will split the multiple
genres with | separator ant make them in the form of lists
```

```
[['Adventure', 'Animation', 'Children', 'Comedy', 'Fantasy'],
 ['Adventure', 'Children', 'Fantasy'],
 ['Comedy', 'Romance'],
 ['Comedy', 'Drama', 'Romance'],
 ['Comedy'],
 ['Action', 'Crime', 'Thriller'],
 ['Comedy', 'Romance'],
 ['Adventure', 'Children'],
 ['Action'],
```

```
 'Adventure',
 'Animation',
 'Children',
 'Comedy',
 'Crime',
 'Documentary',
 'Drama',
 'Fantasy',
 'Film-Noir',
 'Horror',
 'IMAX',
 'Musical',
 'Mystery',
 'Romance',
 'Sci-Fi',
 'Thriller',
 'War',
 'Western'}
```

```
len(set(sum(gernes_list,[])))# we are having 20 unique gerne values
```

```
20
```

```
movies.head()
```

```
   movieId                               title  \
0        1                    Toy Story
1        2                      Jumanji
2        3             Grumpier Old Men
3        4            Waiting to Exhale
4        5  Father of the Bride Part II
```

```
                                        genres  Year
0  Adventure|Animation|Children|Comedy|Fantasy  1995
1                   Adventure|Children|Fantasy  1995
2                              Comedy|Romance  1995
3                        Comedy|Drama|Romance  1995
4                                      Comedy  1995
```

```
# here for a single movies there are multiple gernes, so we can add
dummy variables.
```

```
gernes_dummies=movies.genres.str.get_dummies(sep='|')
gernes_dummies# created a dataframe of dummies
```

```
       (no genres listed)  Action  Adventure  Animation  Children
Comedy  \
0                       0       0          1          1         1
1
1                       0       0          1          0         1
0
```

```
2                       0       0          0          0         0
1
3                       0       0          0          0         0
1
4                       0       0          0          0         0
1
...                   ...     ...        ...        ...       ...
...
27273                   0       0          0          0         0
1
27274                   0       0          0          0         0
1
27275                   0       0          1          0         0
0
27276                   1       0          0          0         0
0
27277                   0       0          1          0         0
0

       Crime  Documentary  Drama  Fantasy  Film-Noir  Horror  IMAX
Musical  \
0          0            0      0        1          0       0     0
0
1          0            0      0        1          0       0     0
0
2          0            0      0        0          0       0     0
0
3          0            0      1        0          0       0     0
0
4          0            0      0        0          0       0     0
0
...      ...          ...    ...      ...        ...     ...   ...
...
27273      0            0      0        0          0       0     0
0
27274      0            0      0        0          0       0     0
0
27275      0            0      0        0          0       0     0
0
27276      0            0      0        0          0       0     0
0
27277      0            0      0        1          0       1     0
0

       Mystery  Romance  Sci-Fi  Thriller  War  Western
0            0        0       0         0    0        0
1            0        0       0         0    0        0
2            0        1       0         0    0        0
3            0        1       0         0    0        0
```

```
4            0        0       0         0    0        0
...        ...      ...     ...       ...  ...      ...
27273        0        0       0         0    0        0
27274        0        0       0         0    0        0
27275        0        0       0         0    0        0
27276        0        0       0         0    0        0
27277        0        0       0         0    0        0

[27278 rows x 20 columns]
```

```
movies=pd.concat([movies,gernes_dummies],axis=1)# merged two
dataframes
movies
```

```
       movieId                            title  \
0            1                      Toy Story
1            2                        Jumanji
2            3               Grumpier Old Men
3            4              Waiting to Exhale
4            5  Father of the Bride Part II
...        ...                              ...
27273   131254          Kein Bund für's Leben
27274   131256         Feuer, Eis & Dosenbier
27275   131258                    The Pirates
27276   131260                  Rentun Ruusu
27277   131262                     Innocence

                                          genres  Year  (no genres
listed)  \
0      Adventure|Animation|Children|Comedy|Fantasy  1995
0
1                       Adventure|Children|Fantasy  1995
0
2                                   Comedy|Romance  1995
0
3                             Comedy|Drama|Romance  1995
0
4                                           Comedy  1995
0
...                                            ...   ...
...
27273                                       Comedy  2007
0
27274                                       Comedy  2002
0
27275                                    Adventure  2014
0
27276                           (no genres listed)  2001
1
27277                       Adventure|Fantasy|Horror  2014
```

```
       Action  Adventure  Animation  Children  Comedy  ...  Film-Noir
Horror  \
0           0          1          1         1       1  ...          0
0
1           0          1          0         1       0  ...          0
0
2           0          0          0         0       1  ...          0
0
3           0          0          0         0       1  ...          0
0
4           0          0          0         0       1  ...          0
0
...       ...        ...        ...       ...     ...  ...        ...
...
27273       0          0          0         0       1  ...          0
0
27274       0          0          0         0       1  ...          0
0
27275       0          1          0         0       0  ...          0
0
27276       0          0          0         0       0  ...          0
0
27277       0          1          0         0       0  ...          0
1

       IMAX  Musical  Mystery  Romance  Sci-Fi  Thriller  War  Western

0         0        0        0        0       0         0    0        0

1         0        0        0        0       0         0    0        0

2         0        0        0        1       0         0    0        0

3         0        0        0        1       0         0    0        0

4         0        0        0        0       0         0    0        0

...     ...      ...      ...      ...     ...       ...  ...      ...

27273     0        0        0        0       0         0    0        0

27274     0        0        0        0       0         0    0        0

27275     0        0        0        0       0         0    0        0

27276     0        0        0        0       0         0    0        0

27277     0        0        0        0       0         0    0        0
```

```
[27278 rows x 24 columns]
```

```
# now we made our movies dataframe somemore better for future
analysis.

# let's set the ratings dataframe now

ratings.head()
```

```
   userId  movieId  rating            timestamp
0       1        2     3.5  2005-04-02 23:53:47
1       1       29     3.5  2005-04-02 23:31:16
2       1       32     3.5  2005-04-02 23:33:39
3       1       47     3.5  2005-04-02 23:32:07
4       1       50     3.5  2005-04-02 23:29:40
```

```
ratings[ratings.movieId==1]['rating'].mean()# getting the average
rating of a movie
```

```
3.921239561324077
```

we are getting the rating of the individual movies as rating=(sum of the ratings of a movie/no of rows of a movie) and rounding it.

```
ratings_frame=ratings[['movieId','rating']].groupby('movieId',as_index
=False).mean().round(1)
ratings_frame
```

```
       movieId  rating
0            1     3.9
1            2     3.2
2            3     3.2
3            4     2.9
4            5     3.1
...        ...     ...
26739   131254     4.0
26740   131256     4.0
26741   131258     2.5
26742   131260     3.0
26743   131262     4.0
```

```
[26744 rows x 2 columns]
```

```
# now we will add this ratings to the movies dataframe by using
merge()

movies=movies.merge(ratings_frame,on='movieId',how='left') # merging
the two dataframes

movies.head()
```

```
   movieId                               title  \
0        1                    Toy Story
1        2                      Jumanji
2        3             Grumpier Old Men
3        4            Waiting to Exhale
4        5  Father of the Bride Part II

                                        genres  Year  (no genres
listed)  \
0  Adventure|Animation|Children|Comedy|Fantasy  1995
0
1                   Adventure|Children|Fantasy  1995
0
2                              Comedy|Romance  1995
0
3                        Comedy|Drama|Romance  1995
0
4                                      Comedy  1995
0

   Action  Adventure  Animation  Children  Comedy  ...  Horror  IMAX
Musical  \
0       0          1          1         1       1  ...       0     0
0
1       0          1          0         1       0  ...       0     0
0
2       0          0          0         0       1  ...       0     0
0
3       0          0          0         0       1  ...       0     0
0
4       0          0          0         0       1  ...       0     0
0

   Mystery  Romance  Sci-Fi  Thriller  War  Western  rating
0        0        0       0         0    0        0     3.9
1        0        0       0         0    0        0     3.2
2        0        1       0         0    0        0     3.2
3        0        1       0         0    0        0     2.9
4        0        0       0         0    0        0     3.1

[5 rows x 25 columns]
```

```
# now we added the all the ratings of their respective movies.

ratings.head()
```

```
   userId  movieId  rating            timestamp
0       1        2     3.5  2005-04-02 23:53:47
1       1       29     3.5  2005-04-02 23:31:16
2       1       32     3.5  2005-04-02 23:33:39
```

```
3       1       47     3.5  2005-04-02 23:32:07
4       1       50     3.5  2005-04-02 23:29:40
```

```
# we cleared ratings.

# Now we will go with tags dataframe

tags.head()
```

```
   userId  movieId            tag            timestamp
0      18     4141    Mark Waters  2009-04-24 18:19:40
1      65      208      dark hero  2013-05-10 01:41:18
2      65      353      dark hero  2013-05-10 01:41:19
3      65      521  noir thriller  2013-05-10 01:39:43
4      65      592      dark hero  2013-05-10 01:41:18
```

```
# we found for a single movie there are multiple tags.

# we will make the list of tags of individual movies now

moive_tags=tags.groupby('movieId')['tag'].apply(list).reset_index()
moive_tags
```

```
       movieId                                                tag
0            1  [Watched, computer animation, Disney animated ...
1            2  [time travel, adapted from:book, board game, c...
2            3  [old people that is actually funny, sequel fev...
3            4  [chick flick, revenge, characters, chick flick...
4            5  [Diane Keaton, family, sequel, Steve Martin, w...
...        ...                                                ...
19540   131054                                          [dinosaurs]
19541   131082                       [documentary, Yoshitomo Nara]
19542   131164                                       [Vietnam War]
19543   131170                                [alternate reality]
19544   131258           [bandits, Korea, mutiny, pirates, whale]

[19545 rows x 2 columns]
```

```
# we add the tags to the movies dataframe.

movies=movies.merge(moive_tags,on='movieId',how='left')

movies.head()
```

```
   movieId                         title  \
0        1                   Toy Story
1        2                     Jumanji
2        3            Grumpier Old Men
3        4           Waiting to Exhale
4        5  Father of the Bride Part II

                                      genres  Year  (no genres
```

```
listed)  \
0  Adventure|Animation|Children|Comedy|Fantasy  1995
0
1                   Adventure|Children|Fantasy  1995
0
2                              Comedy|Romance  1995
0
3                        Comedy|Drama|Romance  1995
0
4                                     Comedy  1995
0

   Action  Adventure  Animation  Children  Comedy  ...  IMAX  Musical
\
0       0          1          1         1       1  ...     0        0

1       0          1          0         1       0  ...     0        0

2       0          0          0         0       1  ...     0        0

3       0          0          0         0       1  ...     0        0

4       0          0          0         0       1  ...     0        0


   Mystery  Romance  Sci-Fi  Thriller  War  Western  rating  \
0        0        0       0         0    0        0     3.9
1        0        0       0         0    0        0     3.2
2        0        1       0         0    0        0     3.2
3        0        1       0         0    0        0     2.9
4        0        0       0         0    0        0     3.1

                                                 tag
0  [Watched, computer animation, Disney animated ...
1  [time travel, adapted from:book, board game, c...
2  [old people that is actually funny, sequel fev...
3  [chick flick, revenge, characters, chick flick...
4  [Diane Keaton, family, sequel, Steve Martin, w...

[5 rows x 26 columns]
```

```
# we successfully added the tags in the movies dataframe

movies.rename(columns={'tag':'tags'},inplace=True)# renaming the
column name

# i want to re-arange the coumns

movies.columns
```

```
Index(['movieId', 'title', 'genres', 'Year', '(no genres listed)',
'Action',
       'Adventure', 'Animation', 'Children', 'Comedy', 'Crime',
'Documentary',
       'Drama', 'Fantasy', 'Film-Noir', 'Horror', 'IMAX', 'Musical',
'Mystery',
       'Romance', 'Sci-Fi', 'Thriller', 'War', 'Western', 'rating',
'tags'],
      dtype='object')
```

```
movies=movies[['movieId', 'title', 'Year', 'rating', 'genres', '(no
genres listed)', 'Action','Adventure', 'Animation', 'Children',
'Comedy', 'Crime', 'Documentary','Drama', 'Fantasy', 'Film-Noir',
'Horror', 'IMAX', 'Musical', 'Mystery','Romance', 'Sci-Fi',
'Thriller', 'War', 'Western', 'tags']]
```

```
movies.head()
```

```
   movieId                            title  Year  rating  \
0        1                Toy Story   1995     3.9
1        2                  Jumanji   1995     3.2
2        3         Grumpier Old Men   1995     3.2
3        4        Waiting to Exhale   1995     2.9
4        5  Father of the Bride Part II   1995     3.1

                                        genres  (no genres listed)
Action  \
0  Adventure|Animation|Children|Comedy|Fantasy                   0
0
1                   Adventure|Children|Fantasy                   0
0
2                              Comedy|Romance                   0
0
3                        Comedy|Drama|Romance                   0
0
4                                      Comedy                   0
0

   Adventure  Animation  Children  ...  Horror  IMAX  Musical  Mystery
\
0          1          1         1  ...       0     0        0        0

1          1          0         1  ...       0     0        0        0

2          0          0         0  ...       0     0        0        0

3          0          0         0  ...       0     0        0        0

4          0          0         0  ...       0     0        0        0
```

```
   Romance  Sci-Fi  Thriller  War  Western  \
0        0       0         0    0        0
1        0       0         0    0        0
2        1       0         0    0        0
3        1       0         0    0        0
4        0       0         0    0        0

                                                tags
0  [Watched, computer animation, Disney animated ...
1  [time travel, adapted from:book, board game, c...
2  [old people that is actually funny, sequel fev...
3  [chick flick, revenge, characters, chick flick...
4  [Diane Keaton, family, sequel, Steve Martin, w...

[5 rows x 26 columns]
```

```
# we successfully re-aranged the columns
```

```
movies.shape
```

```
(27278, 26)
```

```
movies.info()# total information
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27278 entries, 0 to 27277
Data columns (total 26 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   movieId             27278 non-null  int64  
 1   title               27278 non-null  object 
 2   Year                27256 non-null  object 
 3   rating              26744 non-null  float64
 4   genres              27278 non-null  object 
 5   (no genres listed)  27278 non-null  int64  
 6   Action              27278 non-null  int64  
 7   Adventure           27278 non-null  int64  
 8   Animation           27278 non-null  int64  
 9   Children            27278 non-null  int64  
 10  Comedy              27278 non-null  int64  
 11  Crime               27278 non-null  int64  
 12  Documentary         27278 non-null  int64  
 13  Drama               27278 non-null  int64  
 14  Fantasy             27278 non-null  int64  
 15  Film-Noir           27278 non-null  int64  
 16  Horror              27278 non-null  int64  
 17  IMAX                27278 non-null  int64  
 18  Musical             27278 non-null  int64  
 19  Mystery             27278 non-null  int64  
 20  Romance             27278 non-null  int64  
 21  Sci-Fi              27278 non-null  int64
```

```
 22  Thriller            27278 non-null  int64
 23  War                 27278 non-null  int64
 24  Western             27278 non-null  int64
 25  tags                19545 non-null  object
dtypes: float64(1), int64(21), object(4)
memory usage: 5.4+ MB
```

```
movies.dtypes# data types
```

```
movieId                  int64
title                   object
Year                    object
rating                 float64
genres                  object
(no genres listed)       int64
Action                   int64
Adventure                int64
Animation                int64
Children                 int64
Comedy                   int64
Crime                    int64
Documentary              int64
Drama                    int64
Fantasy                  int64
Film-Noir                int64
Horror                   int64
IMAX                     int64
Musical                  int64
Mystery                  int64
Romance                  int64
Sci-Fi                   int64
Thriller                 int64
War                      int64
Western                  int64
tags                    object
dtype: object
```

```
movies.isnull().sum()
```

```
movieId                   0
title                     0
Year                     22
rating                  534
genres                    0
(no genres listed)        0
Action                    0
Adventure                 0
Animation                 0
Children                  0
Comedy                    0
```

```
Crime                    0
Documentary              0
Drama                    0
Fantasy                  0
Film-Noir                0
Horror                   0
IMAX                     0
Musical                  0
Mystery                  0
Romance                  0
Sci-Fi                   0
Thriller                 0
War                      0
Western                  0
tags                  7733
dtype: int64
```

```
# we have missing values in the year attribute.
# so we will fill the years with the year of the first review of that
respwctie movie.
```

```
movies[movies.Year.isna()]['movieId'].tolist() # this the list of
movies with missing years
```

```
[40697,
 79607,
 87442,
 107434,
 108548,
 108583,
 112406,
 113190,
 115133,
 115685,
 125571,
 125632,
 125958,
 126438,
 126929,
 127005,
 128612,
 128734,
 129651,
 129705,
 129887,
 130454]
```

```
missing_year_movies=movies[movies.Year.isna()]['movieId'].tolist()
```

```
# now i'm filling them with their first rating years
```

```
for i in missing_year_movies:

temp=ratings.loc[ratings.movieId==i,'timestamp'].sort_values().head(1)
    temp=pd.to_datetime(temp.iloc[0]).year
    movies.loc[movies.movieId==i,'Year']=temp

movies.isnull().sum()
```

```
movieId                  0
title                    0
Year                     0
rating                 534
genres                   0
(no genres listed)       0
Action                   0
Adventure                0
Animation                0
Children                 0
Comedy                   0
Crime                    0
Documentary              0
Drama                    0
Fantasy                  0
Film-Noir                0
Horror                   0
IMAX                     0
Musical                  0
Mystery                  0
Romance                  0
Sci-Fi                   0
Thriller                 0
War                      0
Western                  0
tags                  7733
dtype: int64
```

```
# we fill the missing values of year attribute.

# now to try to fill the missing values in rating in movies dataframe

movies[movies.rating.isna()][['movieId','rating','genres']]# these are
the details of missed rating movies
```

	movieId	rating	genres
8555	26018	NaN	Crime|Film-Noir|Mystery|Thriller
8933	26580	NaN	Action|Drama|Thriller
9249	27249	NaN	Animation|Drama|Musical
9315	27396	NaN	Drama
9770	31797	NaN	Drama
...	...	...	...
26818	128886	NaN	Comedy|Drama

```
26872   129201     NaN                          Mystery
26933   129443     NaN                            Drama
27004   129820     NaN                  Children|Drama
27056   130040     NaN                           Horror

[534 rows x 3 columns]
```

```
missing_rating_movies=movies[movies.rating.isna()]
[['movieId','rating','genres']]
```

```
# we fill these missing values with the average rating of the similar
gerne movies.
```

```
for i in range(len(missing_rating_movies)):
    id=missing_rating_movies[['movieId','genres']].iloc[i].movieId

ger=missing_rating_movies[['movieId','genres']].iloc[i].genres.split(s
ep='|')[0]

missing_rating_movies.loc[missing_rating_movies.movieId==id,'rating']=
movies[movies.genres.str.split('|').str[0]==ger]['rating'].mean()

missing_rating_movies.rating=missing_rating_movies.rating.round(1)

movies=movies.merge(missing_rating_movies[['movieId','rating']],on='mo
vieId',how='outer')
movies
```

```
       movieId                           title  Year  rating_x  \
0            1                     Toy Story   1995       3.9
1            2                       Jumanji   1995       3.2
2            3              Grumpier Old Men   1995       3.2
3            4             Waiting to Exhale   1995       2.9
4            5  Father of the Bride Part II   1995       3.1
...        ...                           ...   ...       ...
27273   131254       Kein Bund für's Leben   2007       4.0
27274   131256      Feuer, Eis & Dosenbier   2002       4.0
27275   131258                  The Pirates   2014       2.5
27276   131260                Rentun Ruusu   2001       3.0
27277   131262                   Innocence   2014       4.0

                                       genres  (no genres listed)
\
0      Adventure|Animation|Children|Comedy|Fantasy                   0

1                      Adventure|Children|Fantasy                   0

2                                Comedy|Romance                     0

3                           Comedy|Drama|Romance                    0
```

```
4                                          Comedy                    0

...                                           ...                  ...

27273                                      Comedy                    0

27274                                      Comedy                    0

27275                                   Adventure                    0

27276                          (no genres listed)                    1

27277                    Adventure|Fantasy|Horror                    0


       Action  Adventure  Animation  Children  ...  IMAX  Musical
Mystery  \
0           0          1          1         1  ...     0        0
0
1           0          1          0         1  ...     0        0
0
2           0          0          0         0  ...     0        0
0
3           0          0          0         0  ...     0        0
0
4           0          0          0         0  ...     0        0
0
...       ...        ...        ...       ...  ...   ...      ...
...
27273       0          0          0         0  ...     0        0
0
27274       0          0          0         0  ...     0        0
0
27275       0          1          0         0  ...     0        0
0
27276       0          0          0         0  ...     0        0
0
27277       0          1          0         0  ...     0        0
0


       Romance  Sci-Fi  Thriller  War  Western  \
0            0       0         0    0        0
1            0       0         0    0        0
2            1       0         0    0        0
3            1       0         0    0        0
4            0       0         0    0        0
...        ...     ...       ...  ...      ...
27273        0       0         0    0        0
27274        0       0         0    0        0
27275        0       0         0    0        0
```

```
27276        0       0         0    0        0
27277        0       0         0    0        0

                                                    tags  rating_y
0      [Watched, computer animation, Disney animated ...       NaN
1      [time travel, adapted from:book, board game, c...       NaN
2      [old people that is actually funny, sequel fev...       NaN
3      [chick flick, revenge, characters, chick flick...       NaN
4      [Diane Keaton, family, sequel, Steve Martin, w...       NaN
...                                                  ...       ...
27273                                              NaN       NaN
27274                                              NaN       NaN
27275           [bandits, Korea, mutiny, pirates, whale]       NaN
27276                                              NaN       NaN
27277                                              NaN       NaN

[27278 rows x 27 columns]
```

```
movies['rating_x'].fillna(movies[movies.rating_x.isna()].rating_y,inpl
ace=True)
```

```
C:\Users\laasa\AppData\Local\Temp\ipykernel_7520\2000720275.py:1:
FutureWarning: A value is trying to be set on a copy of a DataFrame or
Series through chained assignment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never
work because the intermediate object on which we are setting values
always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try
using 'df.method({col: value}, inplace=True)' or df[col] =
df[col].method(value) instead, to perform the operation inplace on the
original object.
```

```
movies['rating_x'].fillna(movies[movies.rating_x.isna()].rating_y,inpl
ace=True)

movies.drop('rating_y',axis=1,inplace=True)

movies.rename(columns={'rating_x':'rating'},inplace=True)

movies.isnull().sum()
```

```
movieId                 0
title                   0
Year                    0
rating                  0
genres                  0
(no genres listed)      0
Action                  0
```

```
Adventure                 0
Animation                 0
Children                  0
Comedy                    0
Crime                     0
Documentary               0
Drama                     0
Fantasy                   0
Film-Noir                 0
Horror                    0
IMAX                      0
Musical                   0
Mystery                   0
Romance                   0
Sci-Fi                    0
Thriller                  0
War                       0
Western                   0
tags                   7733
dtype: int64
```

```
# now our dataframe is free of missing values.
# tags attribute has no preference, so leave it.

# this is our perfect movies dataframe.
movies
```

```
       movieId                            title  Year  rating  \
0            1                        Toy Story   1995     3.9
1            2                          Jumanji   1995     3.2
2            3              Grumpier Old Men   1995     3.2
3            4             Waiting to Exhale   1995     2.9
4            5  Father of the Bride Part II   1995     3.1
...        ...                              ...   ...     ...
27273   131254        Kein Bund für's Leben   2007     4.0
27274   131256       Feuer, Eis & Dosenbier   2002     4.0
27275   131258                   The Pirates   2014     2.5
27276   131260                 Rentun Ruusu   2001     3.0
27277   131262                    Innocence   2014     4.0

                                       genres  (no genres listed)
\
0      Adventure|Animation|Children|Comedy|Fantasy                    0

1                        Adventure|Children|Fantasy                    0

2                                   Comedy|Romance                     0

3                             Comedy|Drama|Romance                     0
```

```
4                                          Comedy                    0

...                                           ...                  ...

27273                                      Comedy                    0

27274                                      Comedy                    0

27275                                   Adventure                    0

27276                          (no genres listed)                    1

27277                    Adventure|Fantasy|Horror                    0


       Action  Adventure  Animation  Children  ...  Horror  IMAX
Musical  \
0           0          1          1         1  ...       0     0
0
1           0          1          0         1  ...       0     0
0
2           0          0          0         0  ...       0     0
0
3           0          0          0         0  ...       0     0
0
4           0          0          0         0  ...       0     0
0
...       ...        ...        ...       ...  ...     ...   ...
...
27273       0          0          0         0  ...       0     0
0
27274       0          0          0         0  ...       0     0
0
27275       0          1          0         0  ...       0     0
0
27276       0          0          0         0  ...       0     0
0
27277       0          1          0         0  ...       1     0
0

       Mystery  Romance  Sci-Fi  Thriller  War  Western  \
0            0        0       0         0    0        0
1            0        0       0         0    0        0
2            0        1       0         0    0        0
3            0        1       0         0    0        0
4            0        0       0         0    0        0
...        ...      ...     ...       ...  ...      ...
27273        0        0       0         0    0        0
27274        0        0       0         0    0        0
27275        0        0       0         0    0        0
```

```
27276        0        0       0         0    0        0
27277        0        0       0         0    0        0

                                                    tags
0      [Watched, computer animation, Disney animated ...
1      [time travel, adapted from:book, board game, c...
2      [old people that is actually funny, sequel fev...
3      [chick flick, revenge, characters, chick flick...
4      [Diane Keaton, family, sequel, Steve Martin, w...
...                                                  ...
27273                                                NaN
27274                                                NaN
27275           [bandits, Korea, mutiny, pirates, whale]
27276                                                NaN
27277                                                NaN

[27278 rows x 26 columns]

movies.describe()

             movieId        rating  (no genres listed)
Action  \
count   27278.000000  27278.000000        27278.000000  27278.000000

mean    59855.480570      3.134009            0.009018      0.129042

std     44429.314697      0.658372            0.094537      0.335252

min         1.000000      0.500000            0.000000      0.000000

25%      6931.250000      2.800000            0.000000      0.000000

50%     68068.000000      3.200000            0.000000      0.000000

75%    100293.250000      3.600000            0.000000      0.000000

max    131262.000000      5.000000            1.000000      1.000000


          Adventure     Animation      Children        Comedy
Crime  \
count  27278.000000  27278.000000  27278.000000  27278.000000
27278.000000
mean       0.085380      0.037649      0.041755      0.306987
0.107743
std        0.279452      0.190350      0.200033      0.461253
0.310061
min        0.000000      0.000000      0.000000      0.000000
0.000000
25%        0.000000      0.000000      0.000000      0.000000
0.000000
```

```
50%         0.000000      0.000000      0.000000      0.000000
0.000000
75%         0.000000      0.000000      0.000000      1.000000
0.000000
max         1.000000      1.000000      1.000000      1.000000
1.000000

        Documentary  ...     Film-Noir        Horror          IMAX  \
count  27278.000000  ...  27278.000000  27278.000000  27278.000000
mean       0.090586  ...      0.012098      0.095718      0.007185
std        0.287024  ...      0.109324      0.294210      0.084462
min        0.000000  ...      0.000000      0.000000      0.000000
25%        0.000000  ...      0.000000      0.000000      0.000000
50%        0.000000  ...      0.000000      0.000000      0.000000
75%        0.000000  ...      0.000000      0.000000      0.000000
max        1.000000  ...      1.000000      1.000000      1.000000

            Musical       Mystery       Romance        Sci-Fi
Thriller  \
count  27278.000000  27278.000000  27278.000000  27278.000000
27278.000000
mean       0.037979      0.055503      0.151294      0.063898
0.153164
std        0.191150      0.228963      0.358342      0.244575
0.360152
min        0.000000      0.000000      0.000000      0.000000
0.000000
25%        0.000000      0.000000      0.000000      0.000000
0.000000
50%        0.000000      0.000000      0.000000      0.000000
0.000000
75%        0.000000      0.000000      0.000000      0.000000
0.000000
max        1.000000      1.000000      1.000000      1.000000
1.000000

                War       Western
count  27278.000000  27278.000000
mean       0.043772      0.024782
std        0.204590      0.155463
min        0.000000      0.000000
25%        0.000000      0.000000
50%        0.000000      0.000000
75%        0.000000      0.000000
max        1.000000      1.000000

[8 rows x 22 columns]
```

```
# univariate analysis
```

```
movies.Year.unique()# these are the unique years
```

```
array(['1995', '1994', '1996', '1976', '1992', '1988', '1967', '1993',
       '1964', '1977', '1965', '1982', '1985', '1990', '1991', '1989',
       '1937', '1940', '1969', '1981', '1973', '1970', '1960', '1955',
       '1959', '1968', '1980', '1975', '1986', '1948', '1943', '1950',
       '1946', '1987', '1997', '1974', '1956', '1958', '1949', '1972',
       '1998', '1933', '1952', '1951', '1957', '1961', '1954', '1934',
       '1944', '1963', '1942', '1941', '1953', '1939', '1947', '1945',
       '1938', '1935', '1936', '1926', '1932', '1979', '1971', '1978',
       '1966', '1962', '1983', '1984', '1931', '1922', '1999', '1927',
       '1929', '1930', '1928', '1925', '1914', '2000', '1919', '1923',
       '1920', '1918', '1921', '2001', '1924', '2002', '2003', '1915',
       '2004', '1916', '1917', '2005', '2006', '1902', 2013, '1903',
       '2007', '2008', '2009', '1912', '2010', 2010, '1913', '2011',
       '1898', '1899', 2011, '1894', '2012', '1909', '1910', '1901',
       '1893', '2013', '1896', '2014', 2014, '1895', '2015', '1900',
2015,
       '1905', '1891'], dtype=object)
```

```
# we found there are some duplicates, it's beacause of some factors
like datatypes, spaces...etc
```

```
movies.Year=movies[['Year']].astype(str)
```

```
movies.Year.sort_values().unique()
```

```
array(['1891', '1893', '1894', '1895', '1896', '1898', '1899', '1900',
       '1901', '1902', '1903', '1905', '1909', '1910', '1912', '1913',
       '1914', '1915', '1916', '1917', '1918', '1919', '1920', '1921',
       '1922', '1923', '1924', '1925', '1926', '1927', '1928', '1929',
       '1930', '1931', '1932', '1933', '1934', '1935', '1936', '1937',
       '1938', '1939', '1940', '1941', '1942', '1943', '1944', '1945',
       '1946', '1947', '1948', '1949', '1950', '1951', '1952', '1953',
       '1954', '1955', '1956', '1957', '1958', '1959', '1960', '1961',
       '1962', '1963', '1964', '1965', '1966', '1967', '1968', '1969',
       '1970', '1971', '1972', '1973', '1974', '1975', '1976', '1977',
       '1978', '1979', '1980', '1981', '1982', '1983', '1984', '1985',
       '1986', '1987', '1988', '1989', '1990', '1991', '1992', '1993',
       '1994', '1995', '1996', '1997', '1998', '1999', '2000', '2001',
       '2002', '2003', '2004', '2005', '2006', '2007', '2008', '2009',
       '2010', '2011', '2012', '2013', '2014', '2015'], dtype=object)
```

```
movies.Year.nunique() # we are having 118 years movies data in our
movies dataframe
```

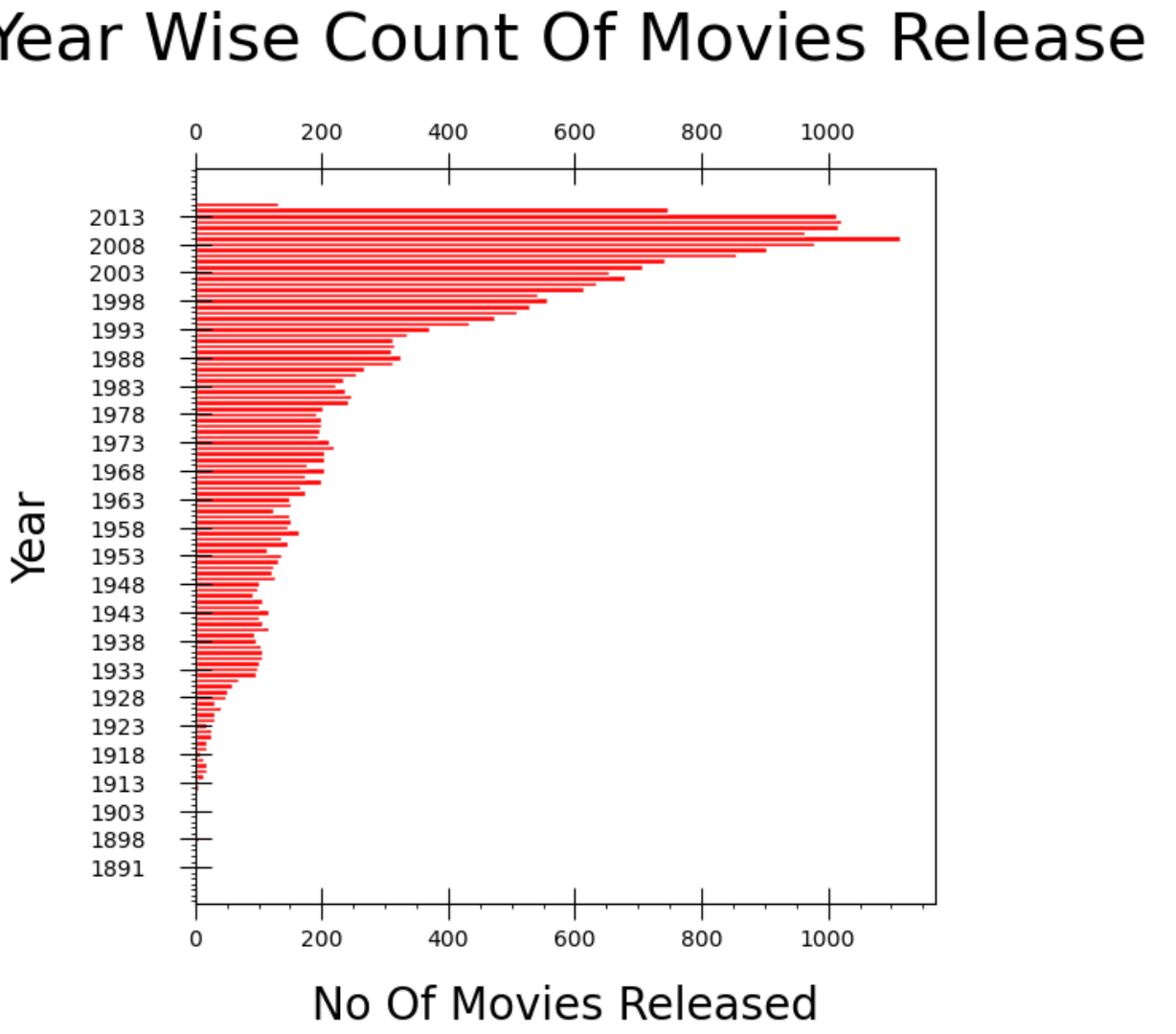
```
118
```

```
year_counts=movies[['Year']].groupby('Year',as_index=False).size()
```

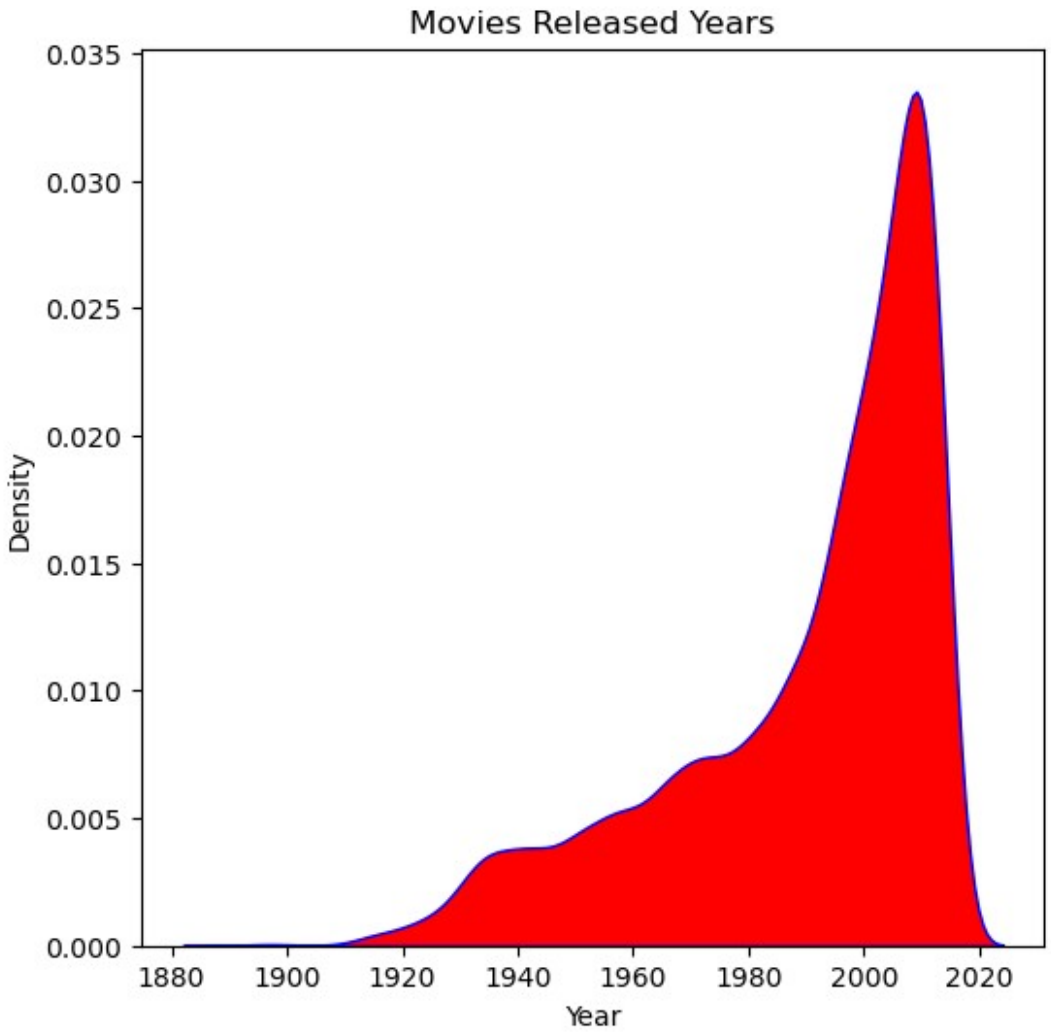
```
year_counts
```

```
     Year  size
0    1891     1
1    1893     1
2    1894     2
3    1895     2
4    1896     2
..    ...   ...
113  2011  1017
114  2012  1022
115  2013  1013
116  2014   746
117  2015   132

[118 rows x 2 columns]
```

```
plt.rcParams['figure.figsize']=(6,6)

plt.barh(data=year_counts,y='Year',width='size',height=1,ec='white',fc
='red')
plt.yticks(rotation=0,ticks=range(0,118,5))
plt.tick_params(top=True,direction='inout',length=15,pad=15,labeltop=T
rue,axis='y')
plt.tick_params(top=True,direction='inout',length=15,labeltop=True,axi
s='x')
plt.grid(which='minor',axis='y',alpha=0)
plt.minorticks_on()
plt.title('Year Wise Count Of Movies Release',pad=50,size=30)
plt.xlabel('No Of Movies Released',size=20,labelpad=15)
plt.ylabel('Year',size=20,labelpad=15)
plt.show()
```




```
sns.kdeplot(movies.Year.astype(int),alpha=1,fill=True,fc='red',ec='blu
e')
plt.title('Movies Released Years')
plt.show()
```




```
# according to the above figures, more movies are released in 2009.
# From 1995, no of movies released increased due to many factors like
technology grow, movies awearness in people...etc

movies.head()
```

```
   movieId                           title  Year  rating  \
0        1                     Toy Story   1995     3.9
1        2                       Jumanji   1995     3.2
2        3              Grumpier Old Men   1995     3.2
3        4             Waiting to Exhale   1995     2.9
4        5  Father of the Bride Part II   1995     3.1

                                        genres  (no genres listed)
Action  \
0  Adventure|Animation|Children|Comedy|Fantasy                    0
0
1                   Adventure|Children|Fantasy                    0
```

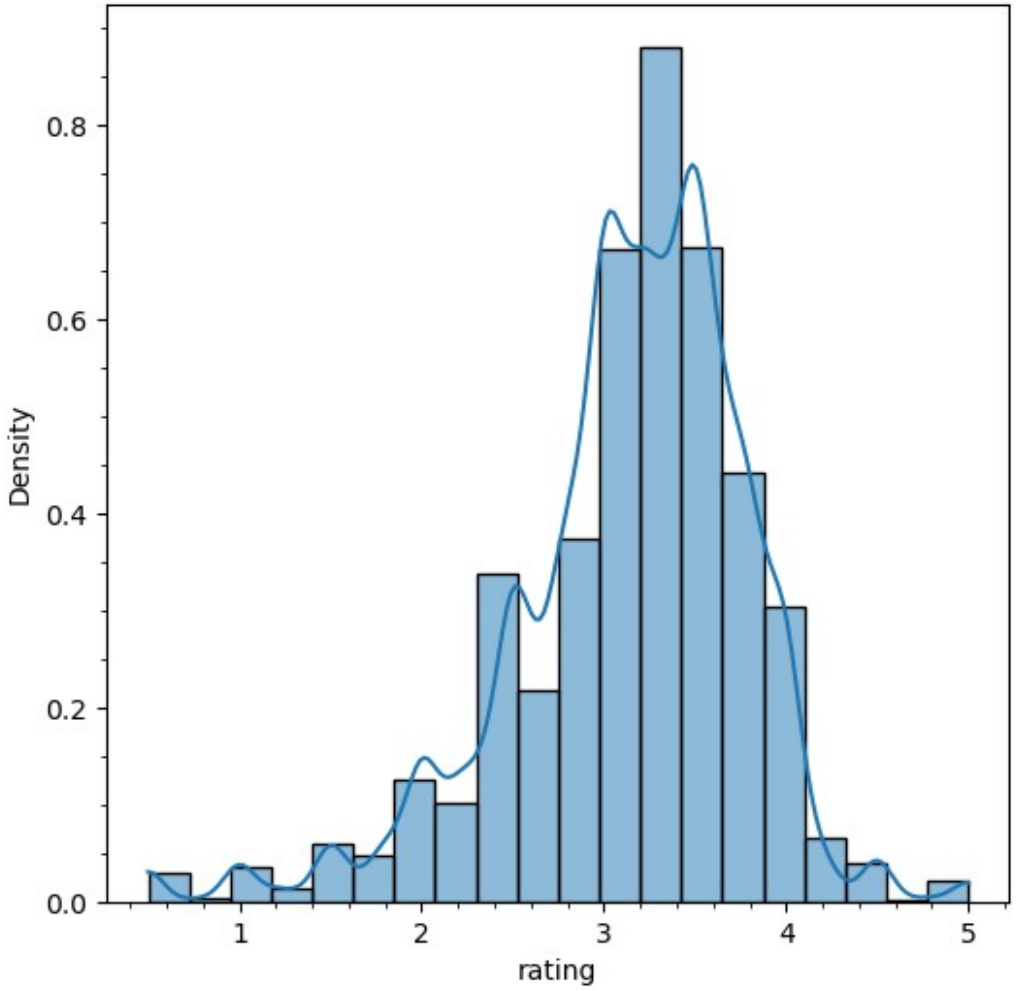
```
0
2                                Comedy|Romance                    0
0
3                           Comedy|Drama|Romance                   0
0
4                                        Comedy                    0
0

   Adventure  Animation  Children  ...  Horror  IMAX  Musical  Mystery
\
0          1          1         1  ...       0     0        0        0

1          1          0         1  ...       0     0        0        0

2          0          0         0  ...       0     0        0        0

3          0          0         0  ...       0     0        0        0

4          0          0         0  ...       0     0        0        0


   Romance  Sci-Fi  Thriller  War  Western  \
0        0       0         0    0        0
1        0       0         0    0        0
2        1       0         0    0        0
3        1       0         0    0        0
4        0       0         0    0        0

                                                 tags
0  [Watched, computer animation, Disney animated ...
1  [time travel, adapted from:book, board game, c...
2  [old people that is actually funny, sequel fev...
3  [chick flick, revenge, characters, chick flick...
4  [Diane Keaton, family, sequel, Steve Martin, w...

[5 rows x 26 columns]
```

```
#rating

movies.rating
```

```
0        3.9
1        3.2
2        3.2
3        2.9
4        3.1
        ...
27273    4.0
27274    4.0
27275    2.5
27276    3.0
```

```
27277    4.0
Name: rating, Length: 27278, dtype: float64
```

```
sns.histplot(movies.rating,bins=20,stat='density',kde=True)
plt.minorticks_on()
plt.show()
```




```
# According to the above figure, amoung the movies more movies got 3.6
to 3.8 ratings.
# only few got 4.8 to 5 ratings.
```

```
movies.head()
```

```
   movieId                               title  Year  rating  \
0        1                    Toy Story   1995     3.9
1        2                      Jumanji   1995     3.2
2        3             Grumpier Old Men   1995     3.2
3        4            Waiting to Exhale   1995     2.9
4        5  Father of the Bride Part II   1995     3.1
```

```
                                        genres  (no genres listed)
Action  \
0  Adventure|Animation|Children|Comedy|Fantasy                    0
0
1                   Adventure|Children|Fantasy                    0
0
2                              Comedy|Romance                    0
0
3                        Comedy|Drama|Romance                    0
0
4                                     Comedy                    0
0

   Adventure  Animation  Children  ...  Horror  IMAX  Musical  Mystery
\
0          1          1         1  ...       0     0        0        0

1          1          0         1  ...       0     0        0        0

2          0          0         0  ...       0     0        0        0

3          0          0         0  ...       0     0        0        0

4          0          0         0  ...       0     0        0        0


   Romance  Sci-Fi  Thriller  War  Western  \
0        0       0         0    0        0
1        0       0         0    0        0
2        1       0         0    0        0
3        1       0         0    0        0
4        0       0         0    0        0

                                                tags
0  [Watched, computer animation, Disney animated ...
1  [time travel, adapted from:book, board game, c...
2  [old people that is actually funny, sequel fev...
3  [chick flick, revenge, characters, chick flick...
4  [Diane Keaton, family, sequel, Steve Martin, w...

[5 rows x 26 columns]
```

```
# Genres

genres_list=list(set(sum(movies.genres.str.split('|'),[]))) # we have
these genres
genres_list
```

```
['Thriller',
 'Musical',
```

```
 'IMAX',
 'Crime',
 'Children',
 'Horror',
 '(no genres listed)',
 'Sci-Fi',
 'Film-Noir',
 'Comedy',
 'War',
 'Romance',
 'Fantasy',
 'Drama',
 'Adventure',
 'Mystery',
 'Animation',
 'Western',
 'Action',
 'Documentary']
```

```
len(genres_list)-1 #no genres listed excluded
```

```
19
```

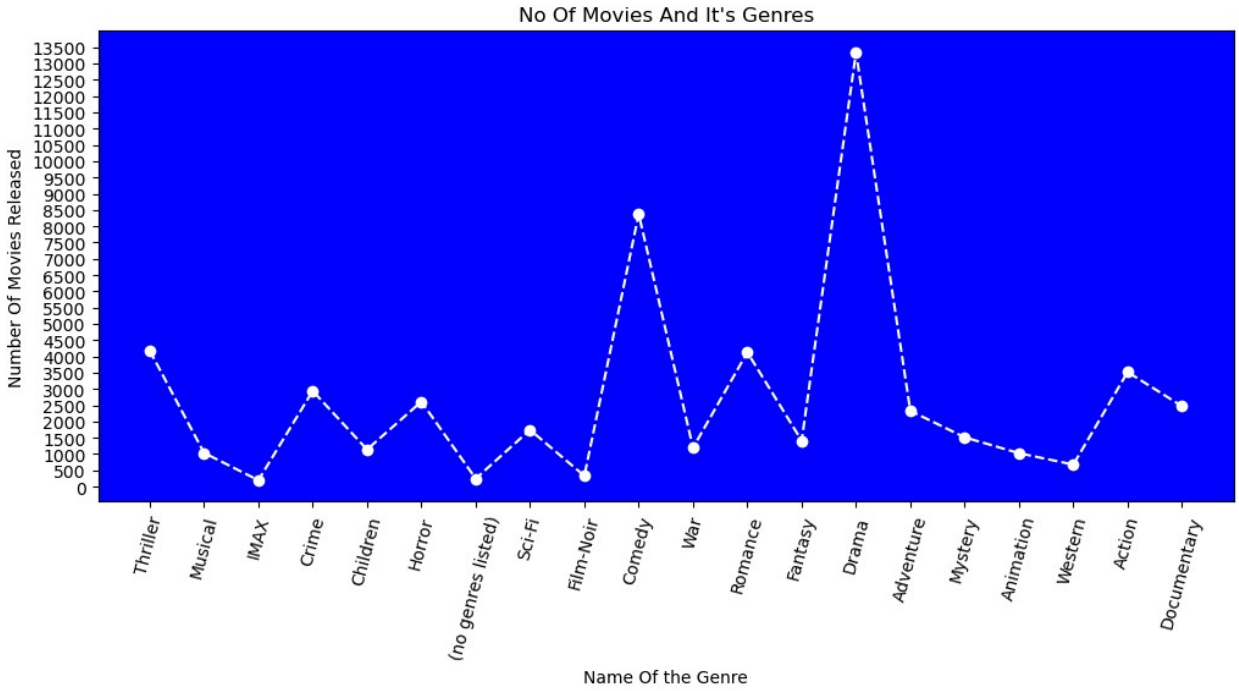
```
gen_counts=dict()
gen_counts=gen_counts.fromkeys(genres_list)
for i in range(len(genres_list)):
    gen_counts[genres_list[i]]=movies.loc[:,genres_list[i]].sum()
gen_counts
```

```
{'Thriller': 4178,
 'Musical': 1036,
 'IMAX': 196,
 'Crime': 2939,
 'Children': 1139,
 'Horror': 2611,
 '(no genres listed)': 246,
 'Sci-Fi': 1743,
 'Film-Noir': 330,
 'Comedy': 8374,
 'War': 1194,
 'Romance': 4127,
 'Fantasy': 1412,
 'Drama': 13344,
 'Adventure': 2329,
 'Mystery': 1514,
 'Animation': 1027,
 'Western': 676,
 'Action': 3520,
 'Documentary': 2471}
```

```
GenresFrame=pd.DataFrame({'Genre':gen_counts.keys(),'No Of
Movies':gen_counts.values()})
GenresFrame
```

	Genre	No Of Movies
0	Thriller	4178
1	Musical	1036
2	IMAX	196
3	Crime	2939
4	Children	1139
5	Horror	2611
6	(no genres listed)	246
7	Sci-Fi	1743
8	Film-Noir	330
9	Comedy	8374
10	War	1194
11	Romance	4127
12	Fantasy	1412
13	Drama	13344
14	Adventure	2329
15	Mystery	1514
16	Animation	1027
17	Western	676
18	Action	3520
19	Documentary	2471

```
plt.rcParams['figure.figsize']=(12,5)

fig,ax=plt.subplots()
plt.plot(GenresFrame['No Of Movies'],'--
wo',linewidth=1.5,markersize=6,zorder=2)
plt.title('No Of Movies And It\'s Genres')
plt.ylabel('Number Of Movies Released')
plt.xlabel('Name Of the Genre')
plt.xticks(ticks=range(len(GenresFrame)),labels=GenresFrame.Genre,rota
tion=75)
plt.yticks(ticks=range(0,14000,500))
plt.grid(axis='y',which='both',linewidth=50,color='blue')
plt.show()
```




```
# From the above graph, amoung all the movies, Drama movies released
more.
# after Drama movies, comedy movies release more.
# nearly 250 movies are not mapped with any genre.

movies.head()
```

```
   movieId                              title  Year  rating  \
0        1                   Toy Story   1995     3.9
1        2                     Jumanji   1995     3.2
2        3            Grumpier Old Men   1995     3.2
3        4           Waiting to Exhale   1995     2.9
4        5  Father of the Bride Part II   1995     3.1

                                        genres  (no genres listed)
Action  \
0  Adventure|Animation|Children|Comedy|Fantasy                    0
0
1                   Adventure|Children|Fantasy                    0
0
2                              Comedy|Romance                    0
0
3                        Comedy|Drama|Romance                    0
0
4                                      Comedy                    0
0

   Adventure  Animation  Children  ...  Horror  IMAX  Musical  Mystery
\
```

```
0          1          1          1  ...       0     0         0         0

1          1          0          1  ...       0     0         0         0

2          0          0          0  ...       0     0         0         0

3          0          0          0  ...       0     0         0         0

4          0          0          0  ...       0     0         0         0


   Romance  Sci-Fi  Thriller  War  Western  \
0        0       0         0    0        0
1        0       0         0    0        0
2        1       0         0    0        0
3        1       0         0    0        0
4        0       0         0    0        0

                                                tags
0  [Watched, computer animation, Disney animated ...
1  [time travel, adapted from:book, board game, c...
2  [old people that is actually funny, sequel fev...
3  [chick flick, revenge, characters, chick flick...
4  [Diane Keaton, family, sequel, Steve Martin, w...

[5 rows x 26 columns]
```

```
# now analyze the average rating of each genre.

temp=[]
for i in GenresFrame.Genre.tolist():
    temp.append(movies[movies.genres.str.contains(i)]
['rating'].mean())
temp
```

```
C:\Users\laasa\AppData\Local\Temp\ipykernel_7520\2243966505.py:3:
UserWarning: This pattern is interpreted as a regular expression, and
has match groups. To actually get the groups, use str.extract.
  temp.append(movies[movies.genres.str.contains(i)]['rating'].mean())

[3.0171852561033985,
 3.1822393822393824,
 3.293877551020408,
 3.166451173868663,
 2.956804214223003,
 2.6978935273841445,
 2.8060975609756094,
 2.8923121055651175,
 3.438484848484848,
 3.0753045139718176,
 3.318592964824121,
```

```
 3.2050884419675314,
 3.093484419263456,
 3.2611360911270983,
 3.070888793473594,
 3.1342800528401584,
 3.17682570593963,
 3.073224852071006,
 2.9766193181818186,
 3.434601375961149]
```

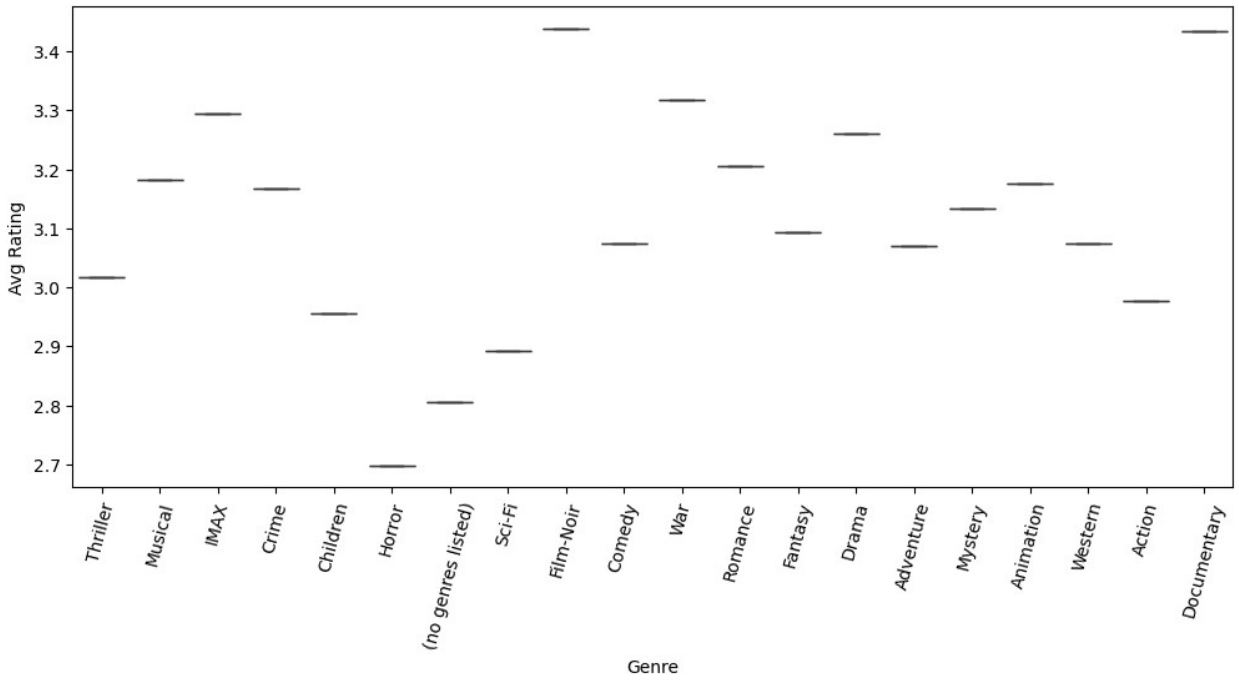
```
GenresFrame['Avg Rating']=temp
```

```
GenresFrame
```

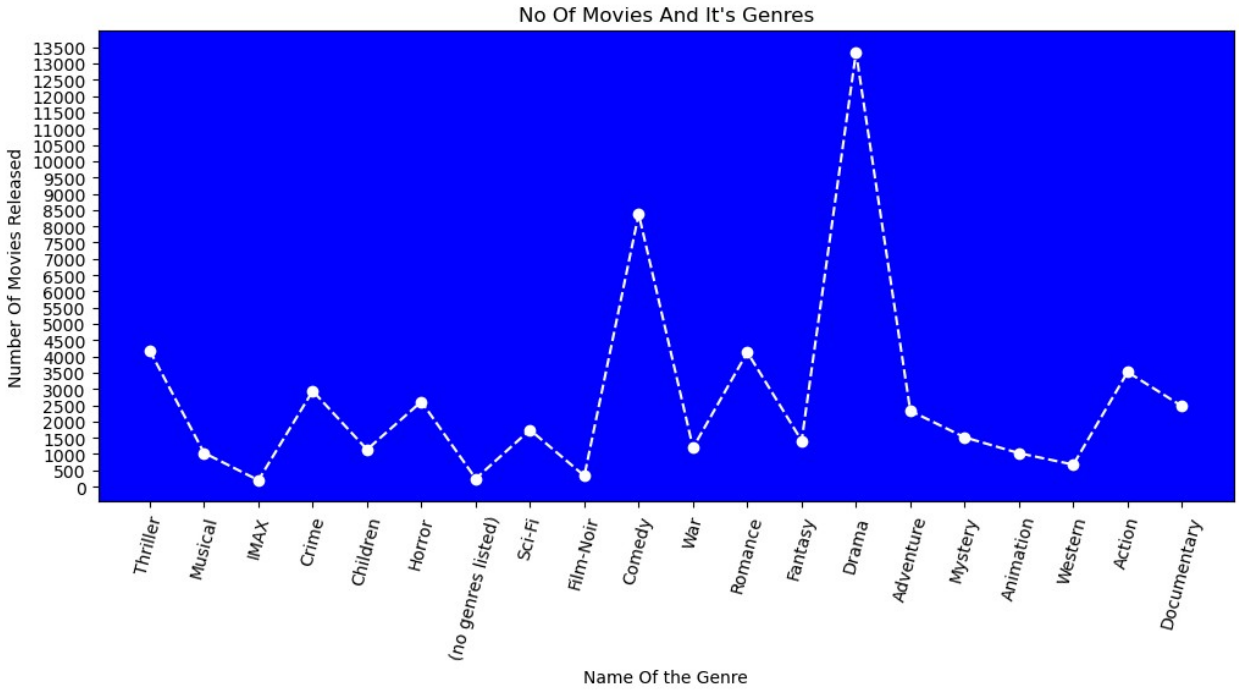
	Genre	No Of Movies	Avg Rating
0	Thriller	4178	3.017185
1	Musical	1036	3.182239
2	IMAX	196	3.293878
3	Crime	2939	3.166451
4	Children	1139	2.956804
5	Horror	2611	2.697894
6	(no genres listed)	246	2.806098
7	Sci-Fi	1743	2.892312
8	Film-Noir	330	3.438485
9	Comedy	8374	3.075305
10	War	1194	3.318593
11	Romance	4127	3.205088
12	Fantasy	1412	3.093484
13	Drama	13344	3.261136
14	Adventure	2329	3.070889
15	Mystery	1514	3.134280
16	Animation	1027	3.176826
17	Western	676	3.073225
18	Action	3520	2.976619
19	Documentary	2471	3.434601

```
# bi-variate analysis
```

```
sns.boxplot(data=GenresFrame,x='Genre',y='Avg Rating')
plt.xticks(rotation=75)
plt.show()
```




```
fig
```




```
# from the above graphs, there are less Film-Noir and Documentary
movies, but it's ratings are high.
# there are less ratings for horror movies.

movies.head()
```

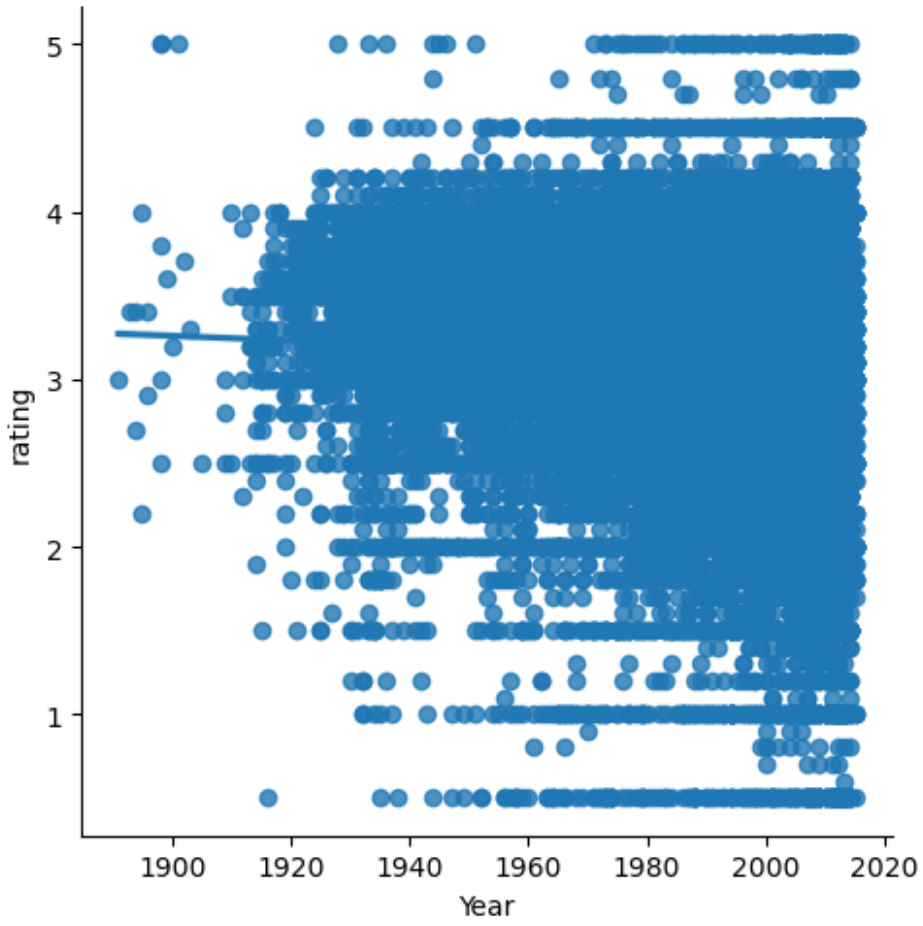
```
   movieId                               title  Year  rating  \
0        1                    Toy Story   1995     3.9
1        2                      Jumanji   1995     3.2
2        3             Grumpier Old Men   1995     3.2
3        4            Waiting to Exhale   1995     2.9
4        5  Father of the Bride Part II   1995     3.1

                                        genres  (no genres listed)
Action  \
0  Adventure|Animation|Children|Comedy|Fantasy                   0
0
1                   Adventure|Children|Fantasy                   0
0
2                              Comedy|Romance                   0
0
3                        Comedy|Drama|Romance                   0
0
4                                     Comedy                    0
0

   Adventure  Animation  Children  ...  Horror  IMAX  Musical  Mystery
\
0          1          1         1  ...       0     0        0        0

1          1          0         1  ...       0     0        0        0

2          0          0         0  ...       0     0        0        0

3          0          0         0  ...       0     0        0        0

4          0          0         0  ...       0     0        0        0


   Romance  Sci-Fi  Thriller  War  Western  \
0        0       0         0    0        0
1        0       0         0    0        0
2        1       0         0    0        0
3        1       0         0    0        0
4        0       0         0    0        0

                                                tags
0  [Watched, computer animation, Disney animated ...
1  [time travel, adapted from:book, board game, c...
2  [old people that is actually funny, sequel fev...
3  [chick flick, revenge, characters, chick flick...
4  [Diane Keaton, family, sequel, Steve Martin, w...

[5 rows x 26 columns]
```

```
movies.Year=movies.Year.str.strip().astype(int)
```

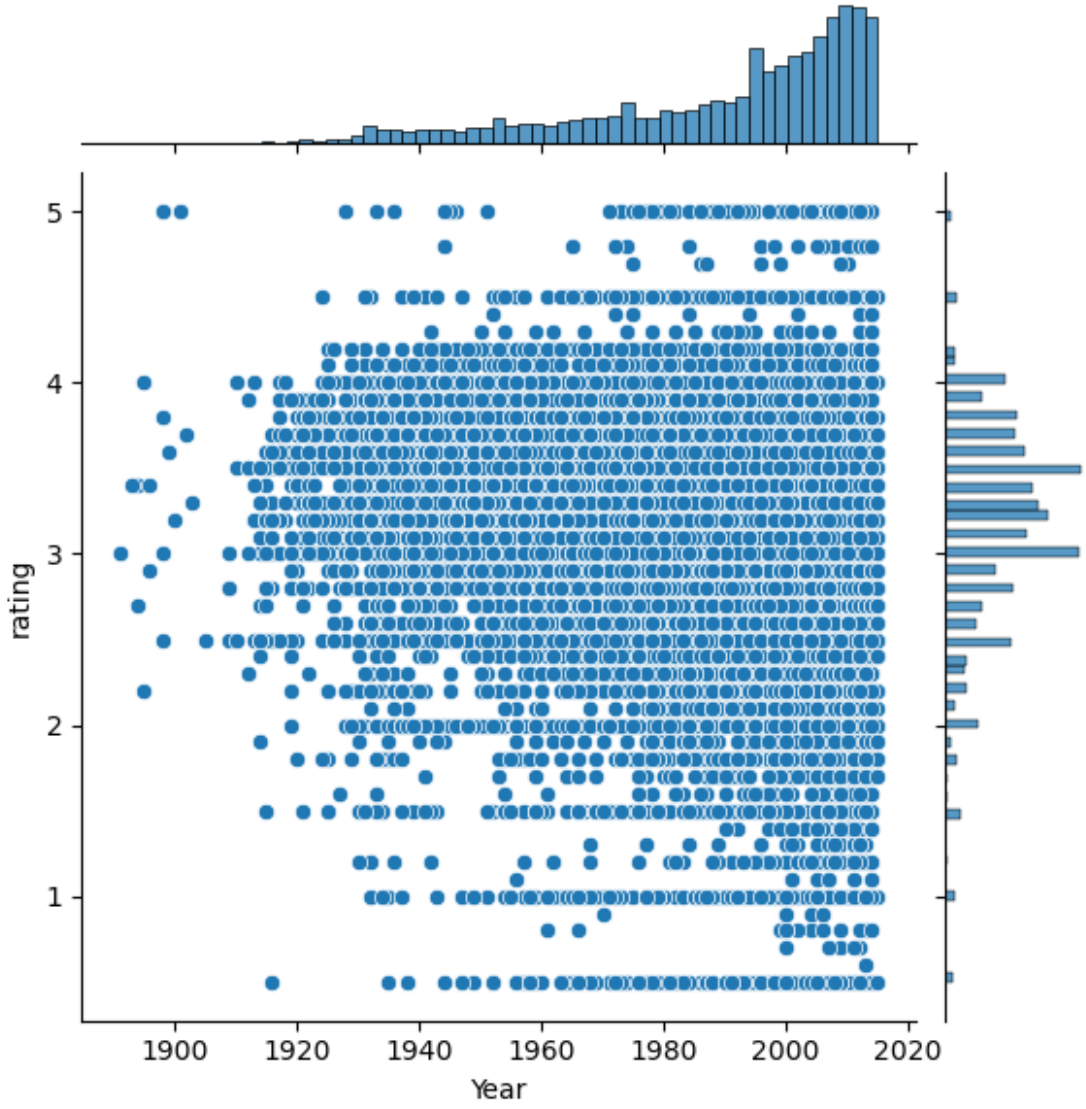
```
movies.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 27278 entries, 0 to 27277
Data columns (total 26 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   movieId             27278 non-null  int64  
 1   title               27278 non-null  object 
 2   Year                27278 non-null  int32  
 3   rating              27278 non-null  float64
 4   genres              27278 non-null  object 
 5   (no genres listed)  27278 non-null  int64  
 6   Action              27278 non-null  int64  
 7   Adventure           27278 non-null  int64  
 8   Animation           27278 non-null  int64  
 9   Children            27278 non-null  int64  
 10  Comedy              27278 non-null  int64  
 11  Crime               27278 non-null  int64  
 12  Documentary         27278 non-null  int64  
 13  Drama               27278 non-null  int64  
 14  Fantasy             27278 non-null  int64  
 15  Film-Noir           27278 non-null  int64  
 16  Horror              27278 non-null  int64  
 17  IMAX                27278 non-null  int64  
 18  Musical             27278 non-null  int64  
 19  Mystery             27278 non-null  int64  
 20  Romance             27278 non-null  int64  
 21  Sci-Fi              27278 non-null  int64  
 22  Thriller            27278 non-null  int64  
 23  War                 27278 non-null  int64  
 24  Western             27278 non-null  int64  
 25  tags                19545 non-null  object 
dtypes: float64(1), int32(1), int64(21), object(3)
memory usage: 5.3+ MB
```

```
sns.lmplot(data=movies.sort_values(by='Year'),x='Year',y='rating')
plt.show()
```




```
sns.jointplot(data=movies,x='Year',y='rating',kind='scatter')
plt.show()
```




```
movies[['Year','rating']].corr()# we have no postive corelations.
```

```
            Year    rating
Year    1.000000 -0.049293
rating -0.049293  1.000000
```