Modern Bias in Film Rating: Comparing 1990s to 2000s

by: Brian Mahaffey

Dataset(s)

Which dataset did you use of the following:

- Movielens IMDB Movie Dataset

Motivation

I have been using the IMDB top 250 Movies list (as rated by users) for many years in an effort to curate and watch the greatest movies. One aspect I have noticed over time is that average reviews for new popular films tend to rank higher than those of older films, thus displacing older films from the top rankings. Obviously with the top 250 movies of all time, the ratings/rankings are subjective, but this is a trend that has been often discussed. Source

- In this analysis, I hope to identify whether modern rating inflation is occurring.
- I will attempt this by comparing the ratings of films released in the 1990s to films released during 2000-2014 (“The Internet Era” of our dataset).
- This modern bias may also extrapolate to the curation and recommendation of any type of media losing relative perceived value compared to newer releases. In the age of so much media creation, it would be a shame to lose sight of the classics.

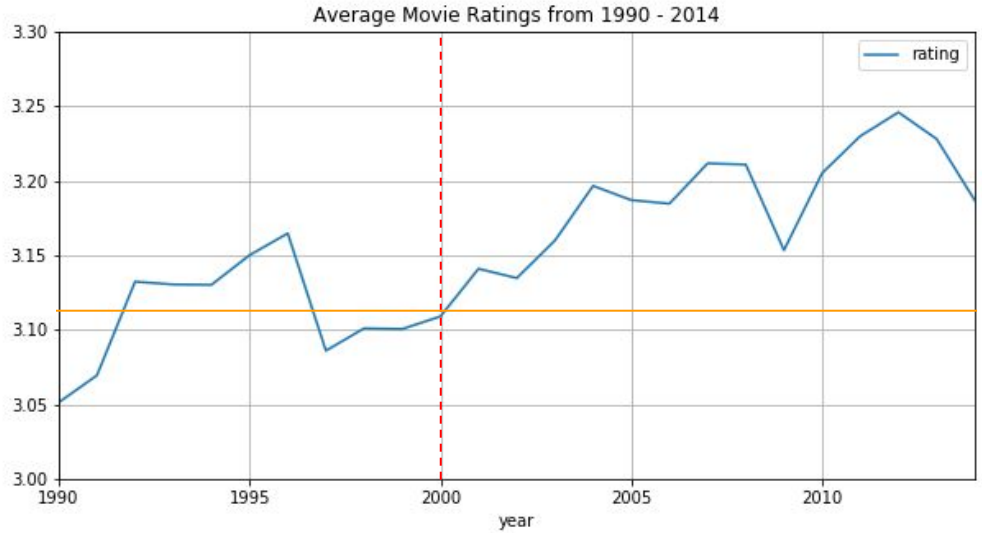
Research Question(s)

- Does the average rating of movies have a modern inflation bias?
- If so, were genres affected differently?

Findings

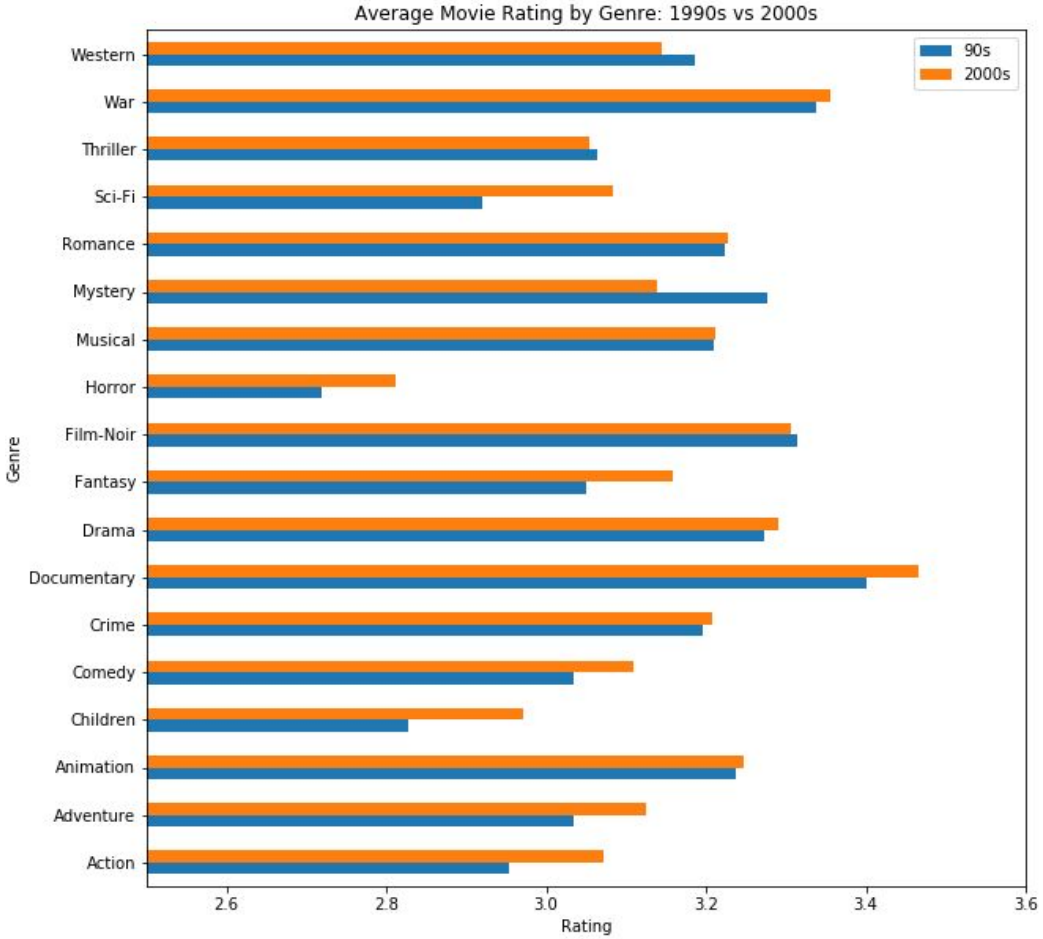
- There is a small increase in average movie ratings when comparing movies released in the 1990s and movies released from 2000-2014. This is based on the movielens dataset provided and my analysis of the data.
- After data cleaning, the following results were obtained:
    - Movies released between 2000-2014 were rated an average of 2.32% higher than movies released in the 1990s.
    - Certain genres were affected differently, with standout average rating changes being:
        - Sci-Fi +5.59%
        - Children +5.09%
        - Western -1.30%
        - Mystery -4.24%

Findings



- It is evident from the graph that average movie ratings have been trending higher during this time period.
- Due to the subjective nature of user ratings in general, it is impossible to definitively conclude this is due to modern bias.
- Perhaps movies are actually just getting better with time & technology.

Findings



- 14 of the 18 genres had lower ratings in the 1990s relative to 2000-2014.

Genre	% Change
Sci-Fi	5.59
Children	5.09
Action	4.03
Fantasy	3.55
Horror	3.46
Adventure	3.03
Comedy	2.47
Documentary	1.91
War	0.57
Drama	0.51
Crime	0.40
Animation	0.30
Romance	0.12
Musical	0.03
Film-Noir	-0.23
Thriller	-0.33
Western	-1.30
Mystery	-4.24

Findings

Genre	90s Mean Rating	2000s Mean Rating	Difference	Percentage Change
Action	2.953227	3.072349	0.119122	4.03
Adventure	3.033521	3.125399	0.091878	3.03
Animation	3.236963	3.246555	0.009592	0.30
Children	2.828015	2.972014	0.143999	5.09
Comedy	3.033601	3.108409	0.074808	2.47
Crime	3.195565	3.208344	0.012779	0.40
Documentary	3.401072	3.466128	0.065056	1.91
Drama	3.273500	3.290303	0.016803	0.51
Fantasy	3.050661	3.158915	0.108254	3.55
Film-Noir	3.314351	3.306858	-0.007493	-0.23
Horror	2.718391	2.812326	0.093935	3.46
Musical	3.209885	3.210710	0.000825	0.03
Mystery	3.277577	3.138727	-0.138849	-4.24
Romance	3.222790	3.226703	0.003914	0.12
Sci-Fi	2.920764	3.083934	0.163170	5.59
Thriller	3.064593	3.054528	-0.010065	-0.33
War	3.336950	3.356064	0.019114	0.57
Western	3.186490	3.145165	-0.041325	-1.30

Acknowledgements

I completed all of the analysis on my own. I explored numerous facets of the data which can be seen in my attached Jupyter Notebook.

- I was not given any feedback from friends or colleagues.

References

- I used the Pandas and data visualization exercise notebooks from this course as a basis for much of the data cleaning, analysis, and visualization code.
- I often referenced the official Python.org documentation to understand proper syntax and operations.
- When I was stuck with compiling errors, I searched StackExchange for solutions to my problems.

DSE200X Mini Project Final

December 16, 2019

1 Data Science Mini Project

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

Using the read_csv function in pandas, we will ingest these three files.

[2]:
```
movies = pd.read_csv('C:/Users/BRVR/Documents/Data Science MicroMasters/Course␣
↪1 - Python for Data Science/Week 4 - Pandas/movies.csv', sep=',')
print(type(movies))
movies.head()
```

```
<class 'pandas.core.frame.DataFrame'>
```

[2]:

	movieId	title	genres
0	1	Toy Story (1995)	Adventure|Animation|Children|Comedy|Fantasy
1	2	Jumanji (1995)	Adventure|Children|Fantasy
2	3	Grumpier Old Men (1995)	Comedy|Romance
3	4	Waiting to Exhale (1995)	Comedy|Drama|Romance
4	5	Father of the Bride Part II (1995)	Comedy

[3]:
```
ratings = pd.read_csv('C:/Users/BRVR/Documents/Data Science MicroMasters/Course␣
↪1 - Python for Data Science/Week 4 - Pandas/ratings.csv', sep=',',␣
↪parse_dates=['timestamp'])
ratings.head()
```

[3]:

	userId	movieId	rating	timestamp
0	1	2	3.5	1112486027
1	1	29	3.5	1112484676

```
2       1       32     3.5  1112484819
3       1       47     3.5  1112484727
4       1       50     3.5  1112484580
```

[4]:
```
# delete unnecessary columns
del ratings['userId']
del ratings['timestamp']
```

[5]:
```
ratings.head()
```

[5]:
```
   movieId  rating
0        2     3.5
1       29     3.5
2       32     3.5
3       47     3.5
4       50     3.5
```

[6]:
```
ratings.index
```

[6]:
```
RangeIndex(start=0, stop=20000263, step=1)
```

Data Cleaning: Check for missing data:

[7]:
```
#is any row NULL ?
movies.isnull().any()
```

[7]:
```
movieId    False
title      False
genres     False
dtype: bool
```

[8]:
```
ratings.isnull().any()
```

[8]:
```
movieId    False
rating     False
dtype: bool
```

Let's only include movies with 5 or more unique ratings

[9]:
```
value_counts_by_id = ratings['movieId'].value_counts()
value_counts_by_id = value_counts_by_id.to_frame(name='count')
```

[10]:
```
value_counts_by_id['movieId'] = value_counts_by_id.index
```

[11]:
```
# select only movies that have greater than 5 reviews value_counts_by_id
relevant_counts = value_counts_by_id[value_counts_by_id['count'] >= 5]
```

[12]:
```
len(relevant_counts)
```

[12]:
```
18345
```

[13]:
```
# now we join the relevant counts to the appropriate DataFrames
# we want to include a rated movie for every count that exists in relevant␣
 ↪counts
movie_freq = pd.merge(ratings, relevant_counts, on="movieId", how='inner')
```

[14]:
```
movie_freq.tail()
```

[14]:
```
          movieId  rating  count
19984019    71755     5.0      5
19984020    71755     4.5      5
19984021    71755     2.5      5
19984022    71755     2.5      5
19984023    71755     4.5      5
```

[15]:
```
average_rating = movie_freq.groupby('movieId').mean()
```

[16]:
```
average_rating.head()
```

[16]:
```
            rating  count
movieId
1         3.921240  49695
2         3.211977  22243
3         3.151040  12735
4         2.861393   2756
5         3.064592  12161
```

Merge the average_rating and movies dataframes:

[17]:
```
df = average_rating.merge(movies, on='movieId', how='inner')
df.head()
```

[17]:
```
   movieId    rating  count                               title  \
0        1  3.921240  49695                    Toy Story (1995)
1        2  3.211977  22243                      Jumanji (1995)
2        3  3.151040  12735             Grumpier Old Men (1995)
3        4  2.861393   2756            Waiting to Exhale (1995)
4        5  3.064592  12161  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
```

[18]:
```
df.shape
```

[18]:
```
(18345, 5)
```

Extract the year from title into separate column

[19]:
```
df['year'] = df['title'].str.extract('.*\((.*)\).*', expand=True)
```

[20]:
```
df.isnull().sum()
```

[20]:
```
movieId    0
rating     0
count      0
title      0
```

```
genres     0
year       2
dtype: int64
```

Remove two movies with missing year

[21]:
```
df['year'].sort_values(ascending=False)
```

[21]:
```
18344    2015
18321    2015
18319    2015
18318    2015
18317    2015
18316    2015
18311    2015
18306    2015
18305    2015
18304    2015
18254    2015
18298    2015
18295    2015
18291    2015
18290    2015
18289    2015
18235    2015
17963    2015
18343    2015
18261    2015
18250    2015
18320    2015
18253    2015
18335    2015
18341    2015
18339    2015
18338    2015
18331    2015
18330    2015
18340    2015
         ...
7812     1917
16061    1917
16053    1917
9814     1917
13545    1916
7093     1916
17075    1916
16052    1916
12343    1916
12996    1915
```

```
16054    1915
6917     1915
16055    1915
8279     1915
13700    1914
13946    1914
2145     1914
12646    1914
13304    1912
16118    1910
10986    1903
9728     1902
18194    1900
14747    1898
16685    1896
16360    1896
15490    1894
16225    1894
10235     NaN
18101     NaN
Name: year, Length: 18345, dtype: object
```

[22]:
```
df.dropna(subset=['year'], inplace=True)
```

[23]:
```
df.shape
```

[23]:
```
(18343, 6)
```

[24]:
```
df = df[df.year != '2007-']
df = df[df.year != '1975-1979']
df = df[df.year != '2009 ']
```

[25]:
```
df.shape
```

[25]:
```
(18341, 6)
```

[26]:
```
df.isnull().sum()
```

[26]:
```
movieId    0
rating     0
count      0
title      0
genres     0
year       0
dtype: int64
```

Good, we have clean data. From previous analysis, we already know all ratings values are within the proper range of 0 to 5.

Next, Group each rating based on movieId and find the mean rating of each movieId

[27]:
```
df.head()
```

[27]:
```
   movieId    rating  count                               title  \
0        1  3.921240  49695                    Toy Story (1995)
1        2  3.211977  22243                      Jumanji (1995)
2        3  3.151040  12735             Grumpier Old Men (1995)
3        4  2.861393   2756            Waiting to Exhale (1995)
4        5  3.064592  12161  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
```

Filtering only movies released from 1990 - 1999 and from 2000 - 2014

Note, 2015 has incomplete data only up to mar 31, 2015

[28]:
```
atleast90s = df['year'] > '1989'

before2000 = df['year'] < '2000'

after90s = df['year'] > '1999'
not_2015 = df['year'] < '2015'


movies_90s = df[atleast90s & before2000]
movies_2000s = df[after90s & not_2015]

df.shape, movies_90s.shape, movies_2000s.shape
```

[28]:
```
((18341, 6), (3538, 6), (8380, 6))
```

[38]:
```
movies_90s.head(10)
```

[38]:
```
   movieId    rating  count                               title  \
0        1  3.921240  49695                    Toy Story (1995)
1        2  3.211977  22243                      Jumanji (1995)
2        3  3.151040  12735             Grumpier Old Men (1995)
3        4  2.861393   2756            Waiting to Exhale (1995)
4        5  3.064592  12161  Father of the Bride Part II (1995)
5        6  3.834930  23899                           Heat (1995)
6        7  3.366484  12961                        Sabrina (1995)
7        8  3.142049   1415                    Tom and Huck (1995)
8        9  3.004924   3960                    Sudden Death (1995)
9       10  3.430029  29005                       GoldenEye (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
5                      Action|Crime|Thriller  1995
6                             Comedy|Romance  1995
7                        Adventure|Children  1995
8                                     Action  1995
9                  Action|Adventure|Thriller  1995
```

[31]:
```
movies_2000s.head(10)
```

[31]:
```
      movieId    rating  count                        title  \
2683     2769  3.129956    681            Yards, The (2000)
3090     3177  2.810680   1236           Next Friday (2000)
3103     3190  2.280392   1020             Supernova (2000)
3138     3225  2.644370    897           Down to You (2000)
3140     3228  2.104167     24        Wirey Spindell (2000)
3150     3239  2.270732    205      Isn't She Great? (2000)
3184     3273  2.461577   6051              Scream 3 (2000)
3186     3275  3.947365   8027  Boondock Saints, The (2000)
3187     3276  2.925926    297               Gun Shy (2000)
3189     3279  2.050000     20              Knockout (2000)

                           genres  year
2683                  Crime|Drama  2000
3090                       Comedy  2000
3103       Adventure|Sci-Fi|Thriller  2000
3138                Comedy|Romance  2000
3140                       Comedy  2000
3150                       Comedy  2000
3184  Comedy|Horror|Mystery|Thriller  2000
3186     Action|Crime|Drama|Thriller  2000
3187                       Comedy  2000
3189                 Action|Drama  2000
```

Check if all values are in range 1990 - 1999

[32]:
```
filter_1 = movies_90s['year'] > '1999'
filter_1.any()
```

[32]:
```
False
```

[33]:
```
filter_2 = movies_90s['year'] < '1990'
filter_1.any()
```

[33]:
```
False
```

[34]:
```
movies_90s.isnull().sum()
```

[34]:
```
movieId    0
rating     0
count      0
title      0
```

```
genres     0
year       0
dtype: int64
```

Check if all values are in range 2000 - 2014

[35]:
```
filter_3 = movies_2000s['year'] > '2014'
filter_3.any()
```

[35]:
```
False
```

[36]:
```
filter_4 = movies_2000s['year'] < '2000'
filter_4.any()
```

[36]:
```
False
```

[37]:
```
movies_2000s.isnull().sum()
```

[37]:
```
movieId    0
rating     0
count      0
title      0
genres     0
year       0
dtype: int64
```

Our data seems to only include the correct year range
Let's filter by genre

[41]:
```
## List of genres as a Python list

genres =␣
 ↪['Action','Adventure','Animation','Children','Comedy','Crime','Documentary','Drama','Fantas
```

[42]:
```
genres
```

[42]:
```
['Action',
 'Adventure',
 'Animation',
 'Children',
 'Comedy',
 'Crime',
 'Documentary',
 'Drama',
 'Fantasy',
 'Film-Noir',
 'Horror',
 'Musical',
 'Mystery',
 'Romance',
 'Sci-Fi',
 'Thriller',
 'War',
```

```
 'Western']
```

[43]:
```
dfa = df
dfa = dfa[(dfa['year'] > '1959') & (dfa['year'] < '2015')]
dfa['year'].sort_values()
```

[43]:
```
2661     1960
3948     1960
3939     1960
7795     1960
3856     1960
7884     1960
16404    1960
15291    1960
8008     1960
11879    1960
3708     1960
6385     1960
3502     1960
17710    1960
3377     1960
3374     1960
3118     1960
12053    1960
15521    1960
4086     1960
7648     1960
7645     1960
15694    1960
6324     1960
4689     1960
4685     1960
6320     1960
6318     1960
6312     1960
7451     1960
         ...
17947    2014
17948    2014
17989    2014
17988    2014
17986    2014
17985    2014
17982    2014
17980    2014
17979    2014
17976    2014
17974    2014
```

```
17973    2014
17972    2014
17970    2014
17900    2014
17968    2014
17964    2014
17962    2014
17960    2014
17959    2014
17958    2014
17957    2014
17956    2014
17955    2014
17953    2014
17952    2014
17950    2014
17949    2014
17966    2014
17654    2014
Name: year, Length: 16205, dtype: object
```

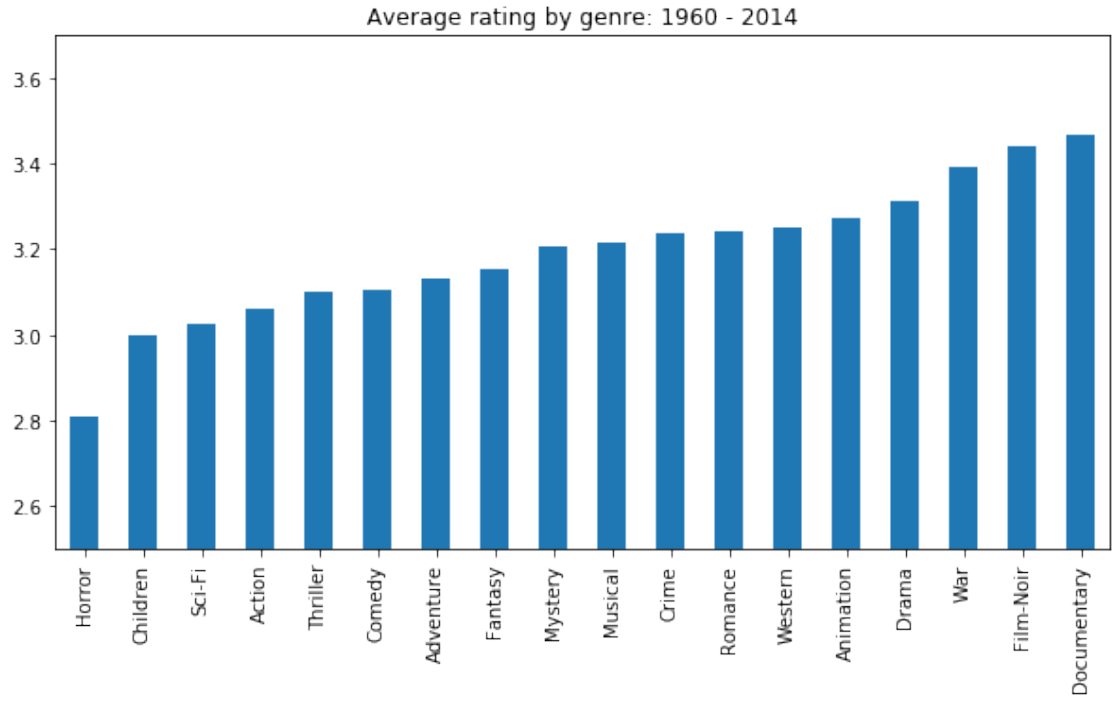
[44]:
```
#genres for all years
#Adding all genres as columns with boolean type, True if movie belongs to that␣
 ↪genre or False otherwise
cols = dfa.columns.values
cols = np.append(cols, list(genres))
genres_list = pd.DataFrame(dfa, columns=cols)
genres_list = genres_list.fillna(False)
for genre in genres:
    genres_list[genre] = genres_list['genres'].str.contains(genre)
```

[45]:
```
genres_list.shape
```

[45]:
```
(16205, 24)
```

[46]:
```
# Genre ratings for all years 1960 - 2014
avg_ratings = {genre : genres_list[genres_list[genre]]['rating'].mean() for␣
 ↪genre in genres}
avg_ratings = pd.Series(avg_ratings)
ax = avg_ratings.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average rating by genre: 1960 - 2014")
ax.set_ylim(2.5,3.7)
```

[46]:
```
(2.5, 3.7)
```



[47]:
```
by_year = dfa[(dfa['year'] > '1959') & (dfa['year'] < '2015')]
by_year = by_year[['rating', 'year']].groupby('year', as_index=True).mean()
```

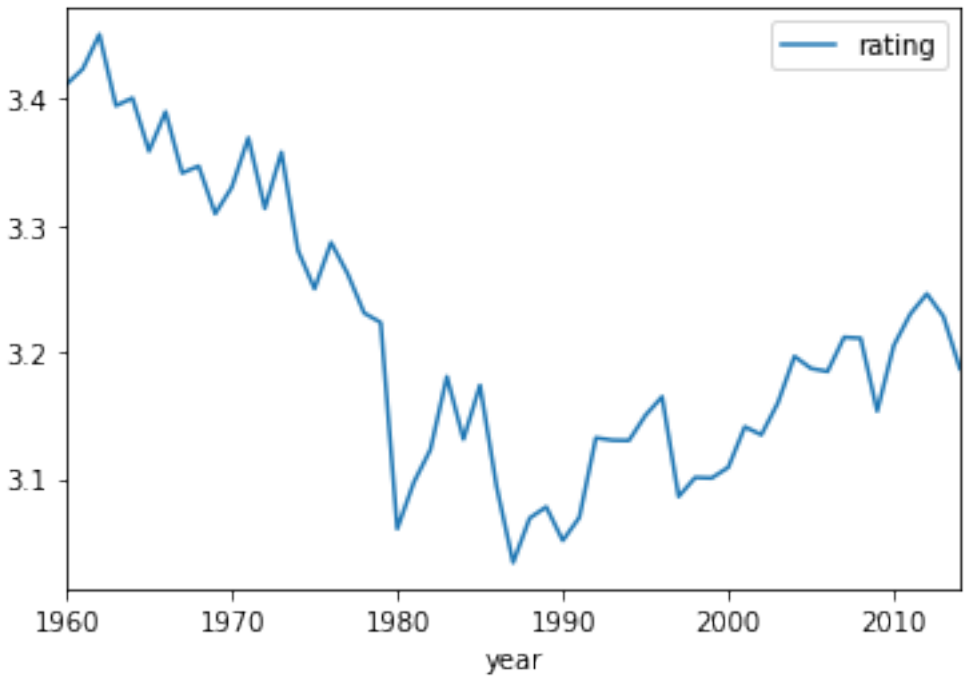
[48]:
```
by_year.index
```

[48]:
```
Index(['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'],
      dtype='object', name='year')
```

[49]:
```
plt.figure()
by_year.plot(y='rating')
```

[49]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1730119e860>
```

```
<Figure size 432x288 with 0 Axes>
```



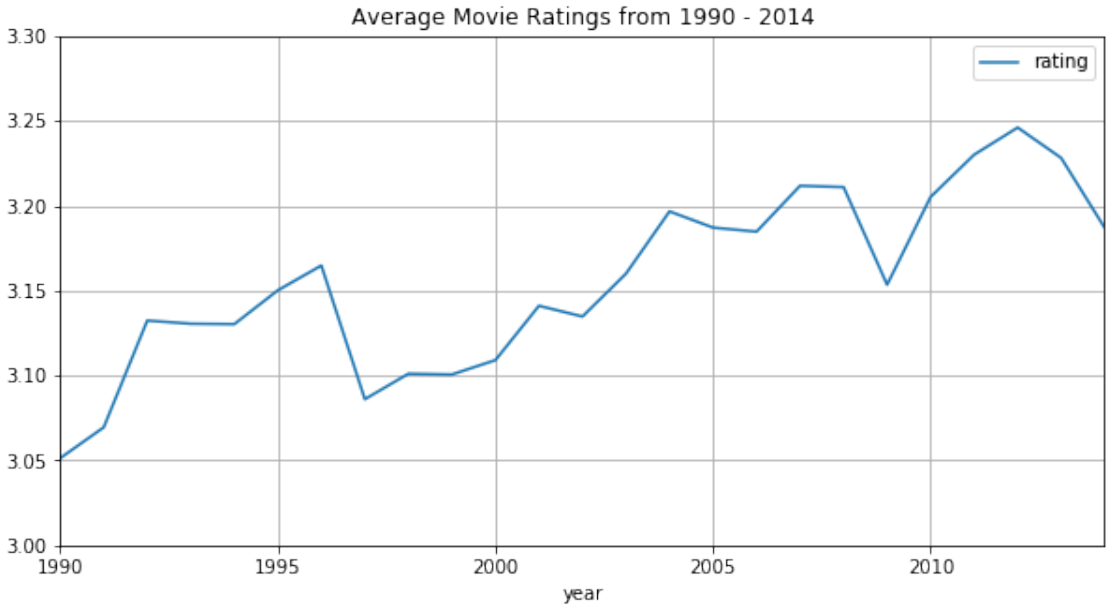
[50]:
```
by_year90plus = dfa[(dfa['year'] > '1989') & (dfa['year'] < '2015')]
by_year90plus = by_year90plus[['rating', 'year']].groupby('year',␣
 ↪as_index=True).mean()
```

[51]:
```
by_year90plus.index
```

[51]:
```
Index(['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'],
      dtype='object', name='year')
```

[52]:
```
ax = by_year90plus.plot(figsize=(10,5), title = "Average Movie Ratings from␣
 ↪1990 - 2014", grid=True)
ax.set_ylim(3.0,3.3)

plt.savefig(r'Average Rating by Year.png')
plt.show()
```



[53]:
```
genres_list['year'].sort_values()
```

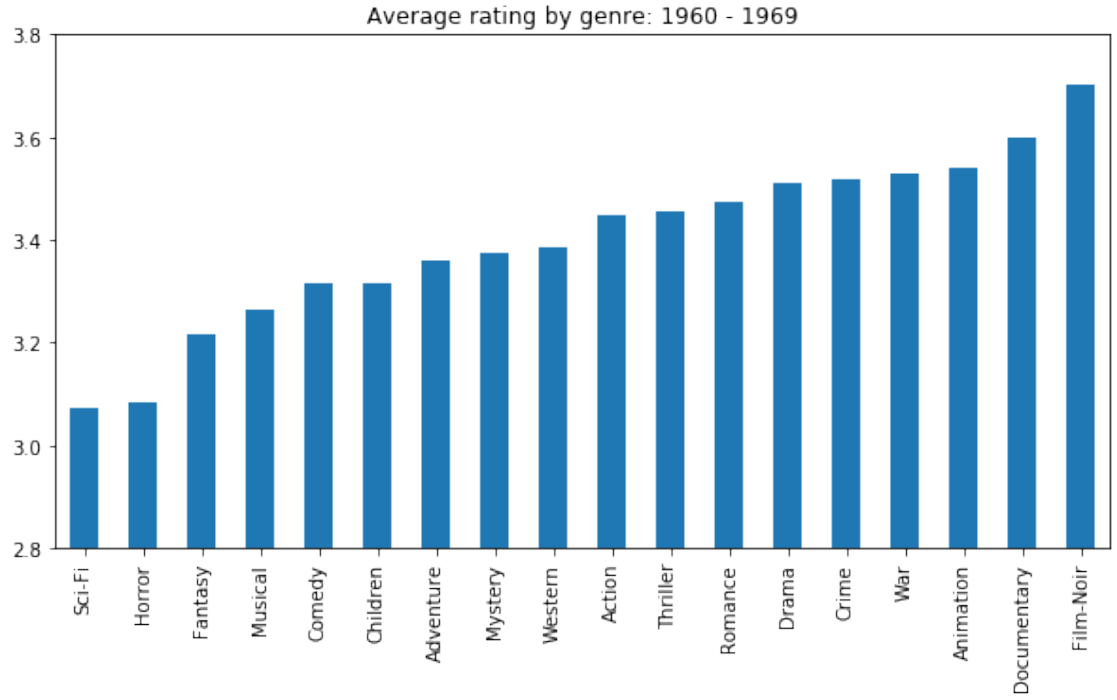
[53]:
```
2661     1960
3948     1960
3939     1960
7795     1960
3856     1960
7884     1960
16404    1960
15291    1960
8008     1960
11879    1960
3708     1960
6385     1960
3502     1960
17710    1960
3377     1960
3374     1960
3118     1960
12053    1960
15521    1960
4086     1960
7648     1960
7645     1960
15694    1960
6324     1960
4689     1960
4685     1960
```

```
6320     1960
6318     1960
6312     1960
7451     1960
         ...
17947    2014
17948    2014
17989    2014
17988    2014
17986    2014
17985    2014
17982    2014
17980    2014
17979    2014
17976    2014
17974    2014
17973    2014
17972    2014
17970    2014
17900    2014
17968    2014
17964    2014
17962    2014
17960    2014
17959    2014
17958    2014
17957    2014
17956    2014
17955    2014
17953    2014
17952    2014
17950    2014
17949    2014
17966    2014
17654    2014
Name: year, Length: 16205, dtype: object
```

[54]:
```
#genres for 1960s
#Adding all genres as columns with boolean type, True if movie belongs to that␣
 ↪genre or False otherwise
cols = movies_60s.columns.values
cols = np.append(cols, list(genres))
genres_list60s = pd.DataFrame(movies_60s, columns=cols)
genres_list60 = genres_list60s.fillna(False)
for genre in genres:
    genres_list60s[genre] = genres_list60s['genres'].str.contains(genre)
```

[55]:
```
# Genre ratings for years 1960 - 1969
avg_ratings60s = {genre : genres_list60s[genres_list60s[genre]]['rating'].
 ↪mean() for genre in genres}
avg_ratings60s = pd.Series(avg_ratings60s)
ax = avg_ratings60s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average rating by genre: 1960 - 1969")
ax.set_ylim(2.8,3.8)
```

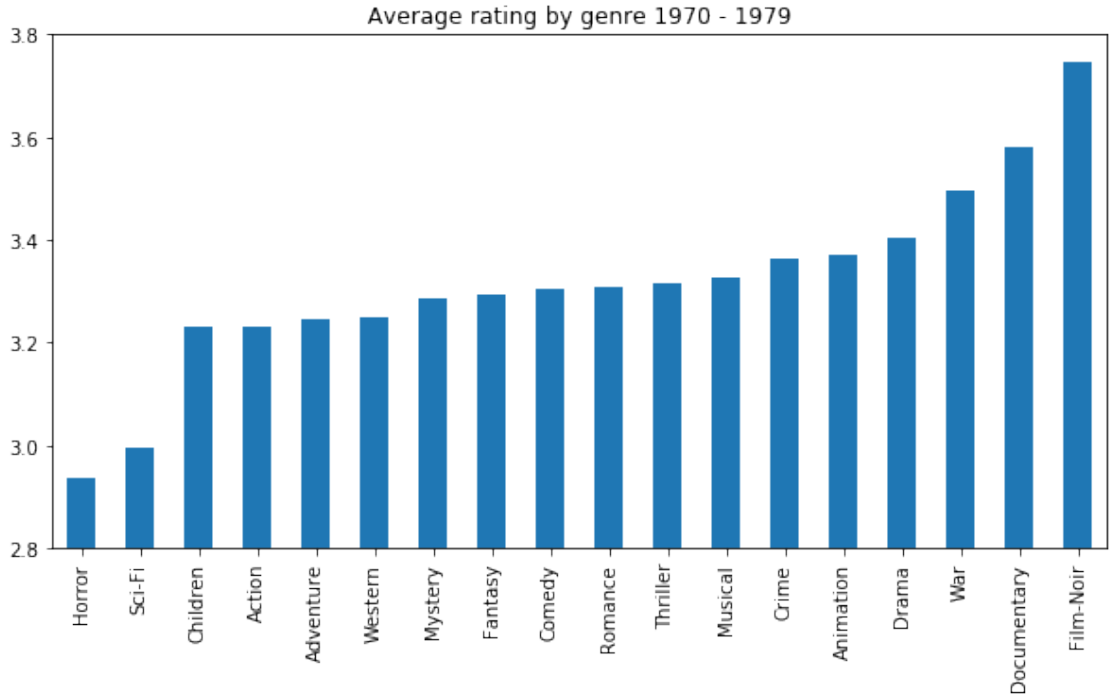
[55]:
```
(2.8, 3.8)
```



[56]:
```
#Adding 70s genres as columns with boolean type, True if movie belongs to that␣
 ↪genre or False otherwise
cols = movies_70s.columns.values
cols = np.append(cols, list(genres))
genres_list70s = pd.DataFrame(movies_70s, columns=cols)
genres_list70s = genres_list70s.fillna(False)
for genre in genres:
    genres_list70s[genre] = genres_list70s['genres'].str.contains(genre)
```

[57]:
```
avg_ratings70s = {genre : genres_list70s[genres_list70s[genre]]['rating'].
 ↪mean() for genre in genres}
avg_ratings70s = pd.Series(avg_ratings70s)
ax = avg_ratings70s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average rating by genre 1970 - 1979")
ax.set_ylim(2.8,3.8)
```

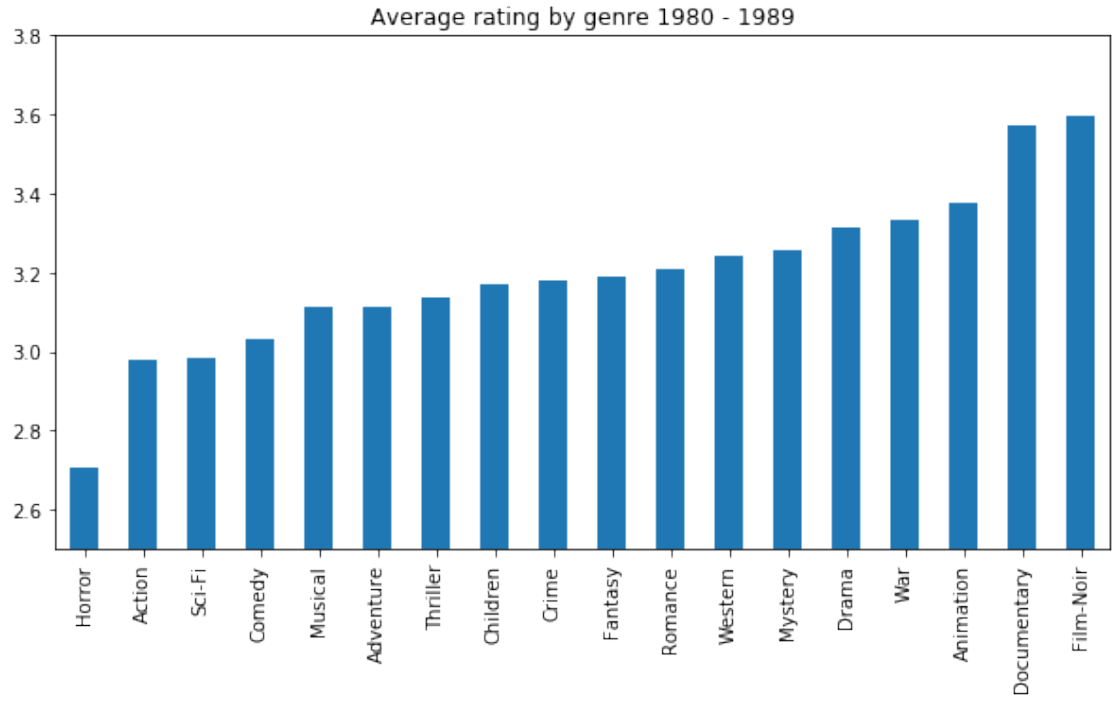
[57]: (2.8, 3.8)



[58]:
```
#Adding 80s genres as columns with boolean type, True if movie belongs to that␣
 ↪genre or False otherwise
cols = movies_80s.columns.values
cols = np.append(cols, list(genres))
genres_list80s = pd.DataFrame(movies_80s, columns=cols)
genres_list80s = genres_list80s.fillna(False)
for genre in genres:
    genres_list80s[genre] = genres_list80s['genres'].str.contains(genre)
```

[59]:
```
avg_ratings80s = {genre : genres_list80s[genres_list80s[genre]]['rating'].
 ↪mean() for genre in genres}
avg_ratings80s = pd.Series(avg_ratings80s)
ax = avg_ratings80s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average rating by genre 1980 - 1989")
ax.set_ylim(2.5,3.8)
```

[59]: (2.5, 3.8)



2 Now plot avg rating by genre for each decade

[226]:
```
decades_genre = pd.DataFrame
decades_genre = pd.concat([avg_ratings60s, avg_ratings70s, avg_ratings80s,␣
 ↪avg_ratings90s, avg_ratings2000s], axis=1, sort=False)
decades_genre.columns = ['1960s', '1970s', '1980s', '1990s', '2000s']
decades_genre
```

[226]:

	1960s	1970s	1980s	1990s	2000s
Action	3.447565	3.232296	2.976349	2.953227	3.072349
Adventure	3.358442	3.245141	3.110485	3.033521	3.125399
Animation	3.541238	3.371581	3.374981	3.236963	3.246555
Children	3.314774	3.231742	3.170656	2.828015	2.972014
Comedy	3.313809	3.305902	3.030880	3.033601	3.108409
Crime	3.518991	3.363937	3.181160	3.195565	3.208344
Documentary	3.599005	3.579967	3.573923	3.401072	3.466128
Drama	3.510661	3.402712	3.314711	3.273500	3.290303
Fantasy	3.215549	3.292992	3.188913	3.050661	3.158915
Film-Noir	3.702696	3.747006	3.596654	3.314351	3.306858
Horror	3.084057	2.935389	2.706236	2.718391	2.812326
Musical	3.264017	3.326989	3.110248	3.209885	3.210710
Mystery	3.374070	3.287314	3.253651	3.277577	3.138727
Romance	3.473220	3.308517	3.207128	3.222790	3.226703

```
Sci-Fi       3.070898  2.994516  2.983322  2.920764  3.083934
Thriller     3.455471  3.315102  3.137742  3.064593  3.054528
War          3.528261  3.494813  3.333025  3.336950  3.356064
Western      3.387002  3.249468  3.239208  3.186490  3.145165
```

[227]:
```
dgt = decades_genre.T
```

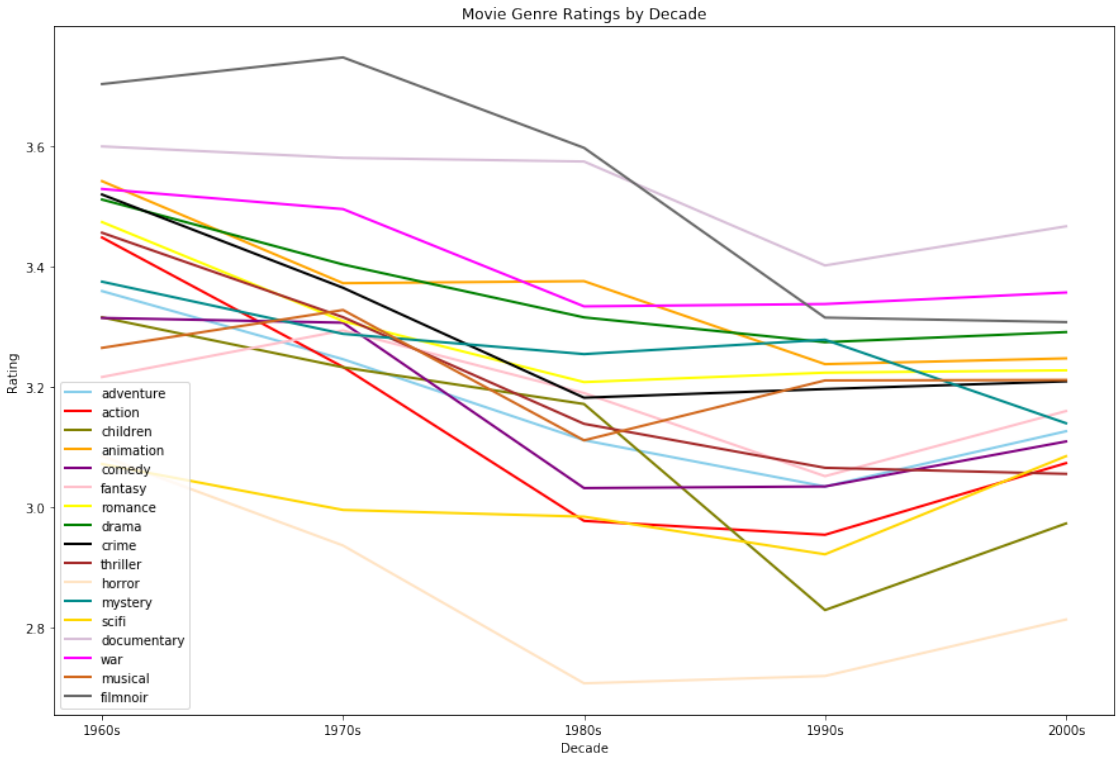
[229]:
```
dfd=pd.DataFrame({'x': dgt.index,
                  'adventure': dgt['Adventure'],
                  'action': dgt['Action'],
                  'children': dgt['Children'],
                  'animation': dgt['Animation'],
                  'comedy': dgt['Comedy'],
                  'fantasy': dgt['Fantasy'],
                  'romance': dgt['Romance'],
                  'drama': dgt['Drama'],
                  'crime': dgt['Crime'],
                  'thriller': dgt['Thriller'],
                  'horror': dgt['Horror'],
                  'mystery': dgt['Mystery'],
                  'scifi': dgt['Sci-Fi'],
                  'documentary': dgt['Documentary'],
                  'war': dgt['War'],
                  'musical': dgt['Musical'],
                  'western': dgt['Western'],
                  'filmnoir': dgt['Film-Noir'],  })
```

[232]:
```
plt.figure(figsize=(15, 10))
#ax1 = plt.subplot((25,1,1), kind='bar')

plt.plot( 'x', 'adventure', data=dfd, marker='', color='skyblue', linewidth=2,␣
 ↪label="adventure")
plt.plot( 'x', 'action', data=dfd, marker='', color='red', linewidth=2,␣
 ↪label="action")
plt.plot( 'x', 'children', data=dfd, marker='', color='olive', linewidth=2,␣
 ↪label="children")
plt.plot( 'x', 'animation', data=dfd, marker='', color='orange', linewidth=2,␣
 ↪label="animation")
plt.plot( 'x', 'comedy', data=dfd, marker='', color='purple', linewidth=2,␣
 ↪label="comedy")
plt.plot( 'x', 'fantasy', data=dfd, marker='', color='pink', linewidth=2,␣
 ↪label="fantasy")
plt.plot( 'x', 'romance', data=dfd, marker='', color='yellow', linewidth=2,␣
 ↪label="romance")
plt.plot( 'x', 'drama', data=dfd, marker='', color='green', linewidth=2,␣
 ↪label="drama")
plt.plot( 'x', 'crime', data=dfd, marker='', color='black', linewidth=2,␣
 ↪label="crime")
```

```
plt.plot( 'x', 'thriller', data=dfd, marker='', color='brown', linewidth=2,␣
 ↪label="thriller")
plt.plot( 'x', 'horror', data=dfd, marker='', color='bisque', linewidth=2,␣
 ↪label="horror")
plt.plot( 'x', 'mystery', data=dfd, marker='', color='darkcyan', linewidth=2,␣
 ↪label="mystery")
plt.plot( 'x', 'scifi', data=dfd, marker='', color='gold', linewidth=2,␣
 ↪label="scifi")
plt.plot( 'x', 'documentary', data=dfd, marker='', color='thistle',␣
 ↪linewidth=2, label="documentary")
plt.plot( 'x', 'war', data=dfd, marker='', color='fuchsia', linewidth=2,␣
 ↪label="war")
plt.plot( 'x', 'musical', data=dfd, marker='', color='chocolate', linewidth=2,␣
 ↪label="musical")
plt.plot( 'x', 'filmnoir', data=dfd, marker='', color='dimgray', linewidth=2,␣
 ↪label="filmnoir")


plt.title('Movie Genre Ratings by Decade')
plt.xlabel('Decade')
plt.ylabel('Rating')
plt.legend()
plt.show()
```



[122]:
```
#Adding 90s genres as columns with boolean type, True if movie belongs to that␣
 ↪genre or False otherwise
cols = movies_90s.columns.values
cols = np.append(cols, list(genres))
genres_list90s = pd.DataFrame(movies_90s, columns=cols)
genres_list90s = genres_list90s.fillna(False)
for genre in genres:
    genres_list90s[genre] = genres_list90s['genres'].str.contains(genre)
```

[123]:
```
genres_list90s.shape
```

[123]:
```
(3538, 24)
```

[125]:
```
genres_list90s.head()
```

[125]:
```
   movieId    rating  count                                title  \
0        1  3.921240  49695                    Toy Story (1995)
1        2  3.211977  22243                      Jumanji (1995)
2        3  3.151040  12735             Grumpier Old Men (1995)
3        4  2.861393   2756            Waiting to Exhale (1995)
4        5  3.064592  12161  Father of the Bride Part II (1995)

                                        genres  year  Action  Adventure  \
0  Adventure|Animation|Children|Comedy|Fantasy  1995   False       True
1                   Adventure|Children|Fantasy  1995   False       True
2                             Comedy|Romance  1995   False      False
3                       Comedy|Drama|Romance  1995   False      False
4                                     Comedy  1995   False      False

   Animation  Children  ...  Fantasy  Film-Noir  Horror  Musical  Mystery  \
0       True      True  ...     True      False   False    False    False
1      False      True  ...     True      False   False    False    False
2      False     False  ...    False      False   False    False    False
3      False     False  ...    False      False   False    False    False
4      False     False  ...    False      False   False    False    False

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

[5 rows x 24 columns]
```

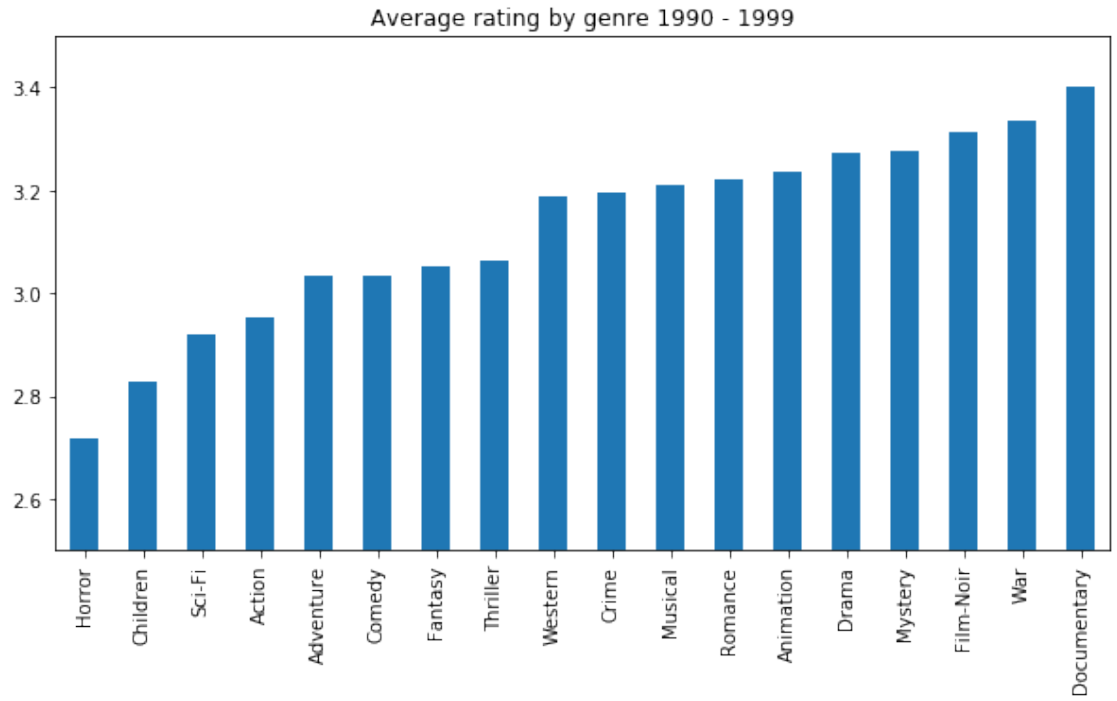
Let's do the same for 2000s

[126]:
```
#Adding 2000s genres as columns with boolean type, True if movie belongs to␣
 ↪that genre or False otherwise
```

```
cols = movies_2000s.columns.values
cols = np.append(cols, list(genres))
genres_list2000s = pd.DataFrame(movies_2000s, columns=cols)
genres_list2000s = genres_list2000s.fillna(False)
for genre in genres:
    genres_list2000s[genre] = genres_list2000s['genres'].str.contains(genre)
```

[127]:
```
avg_ratings90s = {genre : genres_list90s[genres_list90s[genre]]['rating'].
 ↪mean() for genre in genres}
avg_ratings90s = pd.Series(avg_ratings90s)
ax = avg_ratings90s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average rating by genre 1990 - 1999")
ax.set_ylim(2.5,3.5)
```

[127]:
```
(2.5, 3.5)
```



[128]:
```
avg_ratings90s.sort_values(ascending=False)
```

[128]:
```
Documentary    3.401072
War            3.336950
Film-Noir      3.314351
Mystery        3.277577
Drama          3.273500
Animation      3.236963
Romance        3.222790
Musical        3.209885
```

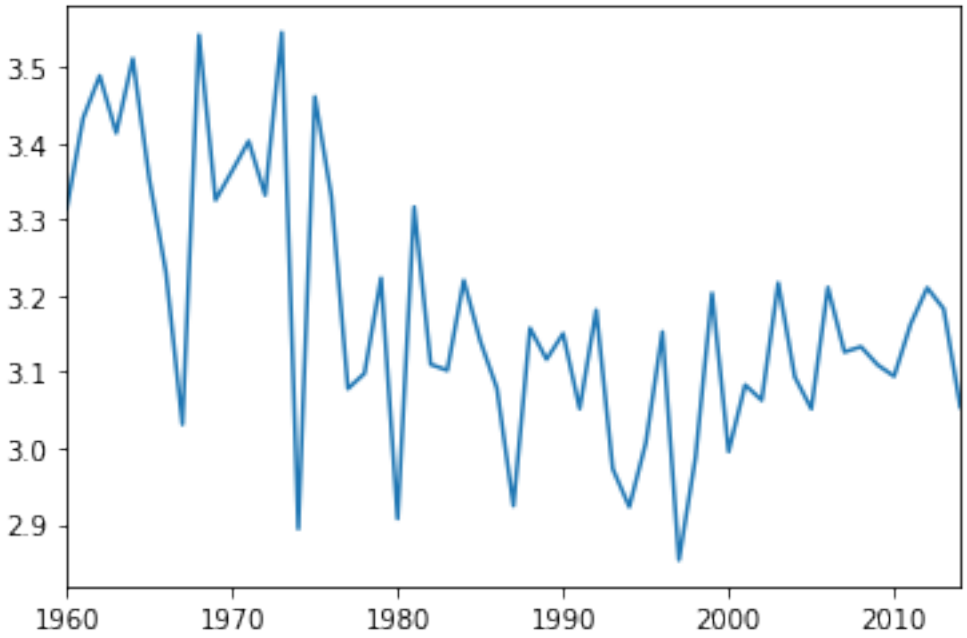
```
Crime          3.195565
Western        3.186490
Thriller       3.064593
Fantasy        3.050661
Comedy         3.033601
Adventure      3.033521
Action         2.953227
Sci-Fi         2.920764
Children       2.828015
Horror         2.718391
dtype: float64
```

[129]:
```
genres_list90s[genres].sum().sort_values(ascending=False)
```

[129]:
```
Drama          1796
Comedy         1299
Romance         602
Thriller        592
Action          516
Crime           391
Adventure       308
Horror          245
Sci-Fi          227
Children        221
Fantasy         191
Documentary     185
Mystery         163
Animation       128
War              94
Musical          82
Western          39
Film-Noir        17
dtype: int64
```

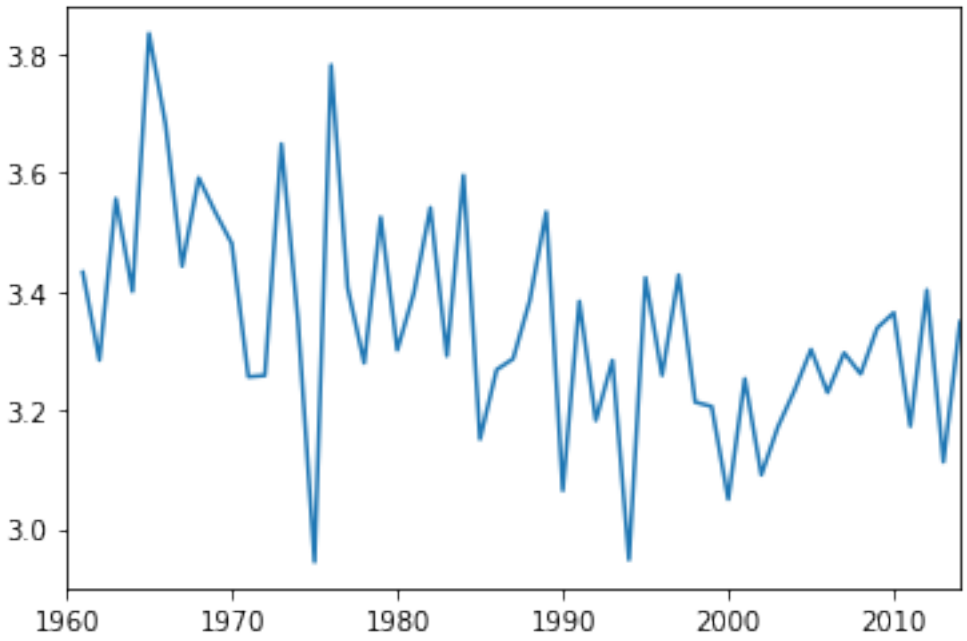
[132]:
```
dfa2['adventure'].plot()
```

[132]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x1730361f358>
```



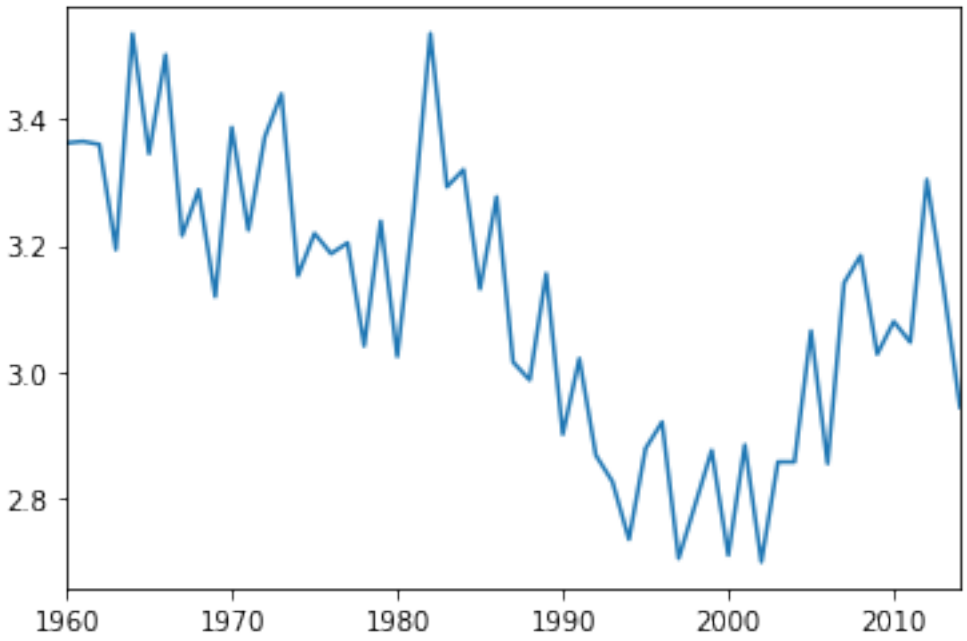
[76]:
```
dfa2['animation'].plot()
```

[76]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x173031f4630>
```



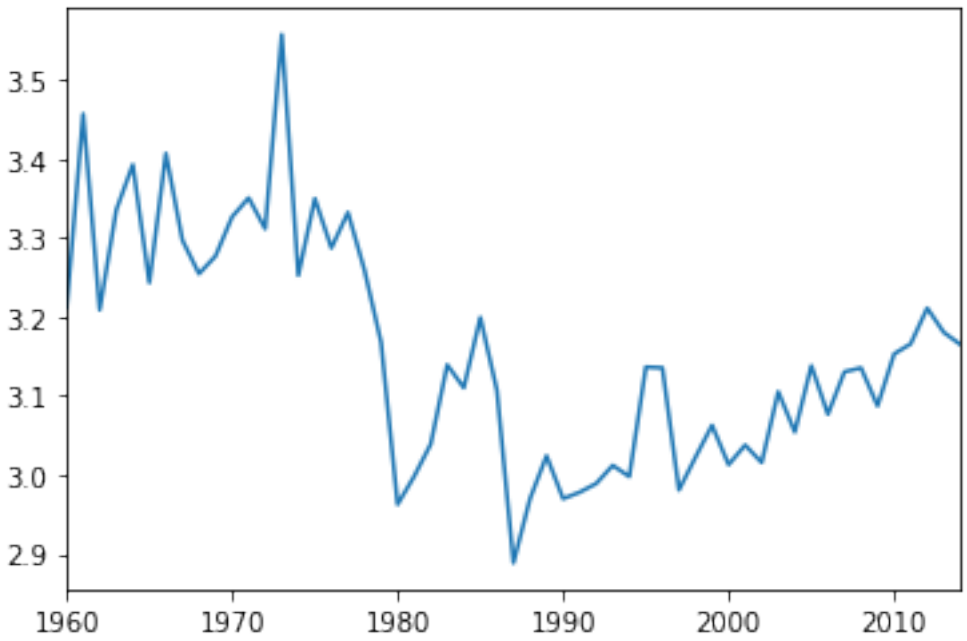
[77]:
```
dfa2['children'].plot()
```

[77]: <matplotlib.axes._subplots.AxesSubplot at 0x17302658b00>



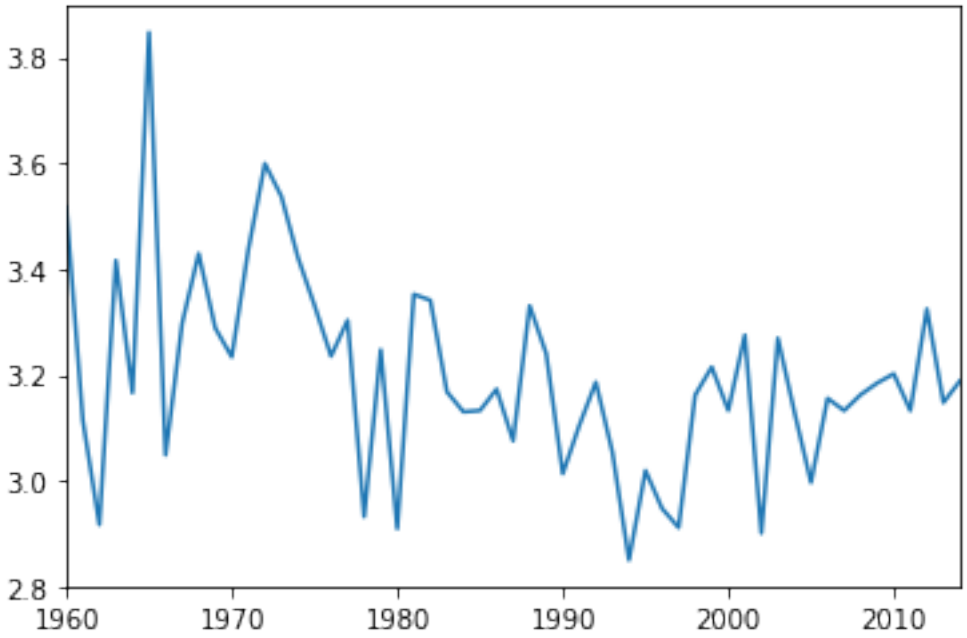
[78]:
```
dfa2['comedy'].plot()
```

[78]: <matplotlib.axes._subplots.AxesSubplot at 0x173026add68>



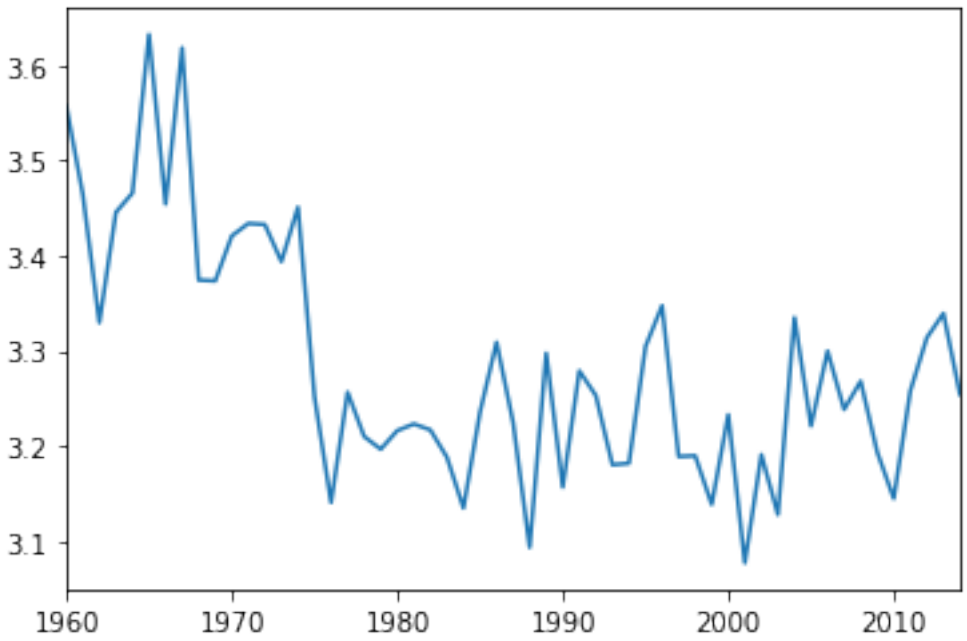
[79]:
```
dfa2['fantasy'].plot()
```

[79]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17302636b00>
```



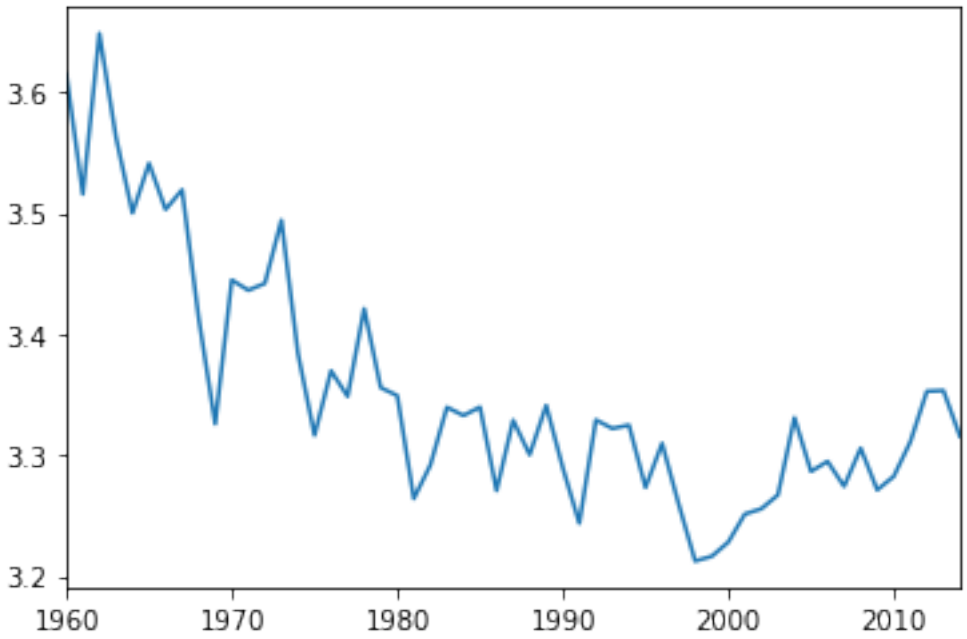
[80]:
```
dfa2['romance'].plot()
```

[80]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17301a96128>
```



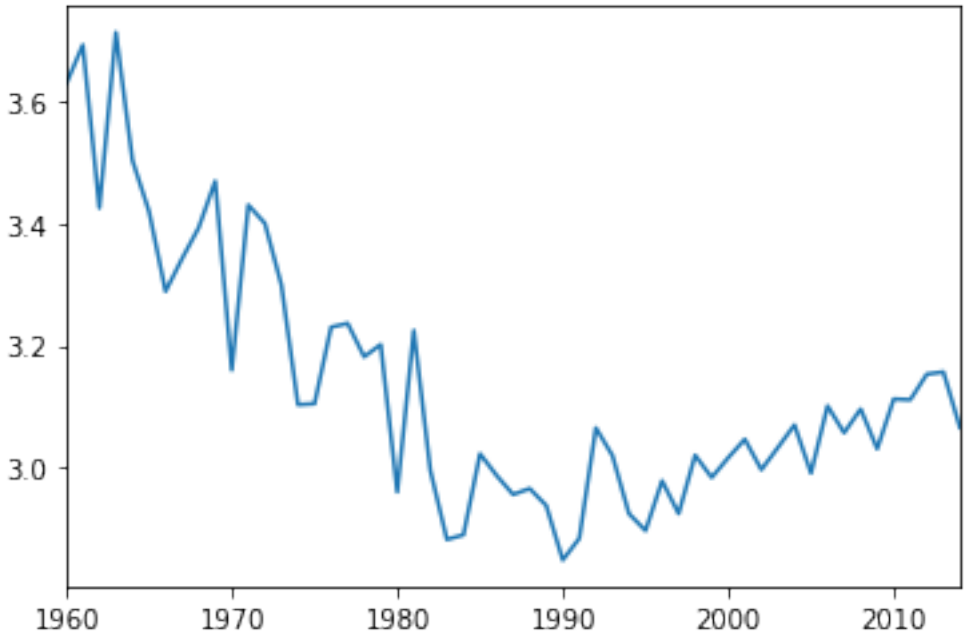
[81]:
```
dfa2['drama'].plot()
```

[81]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x173016cd748>
```



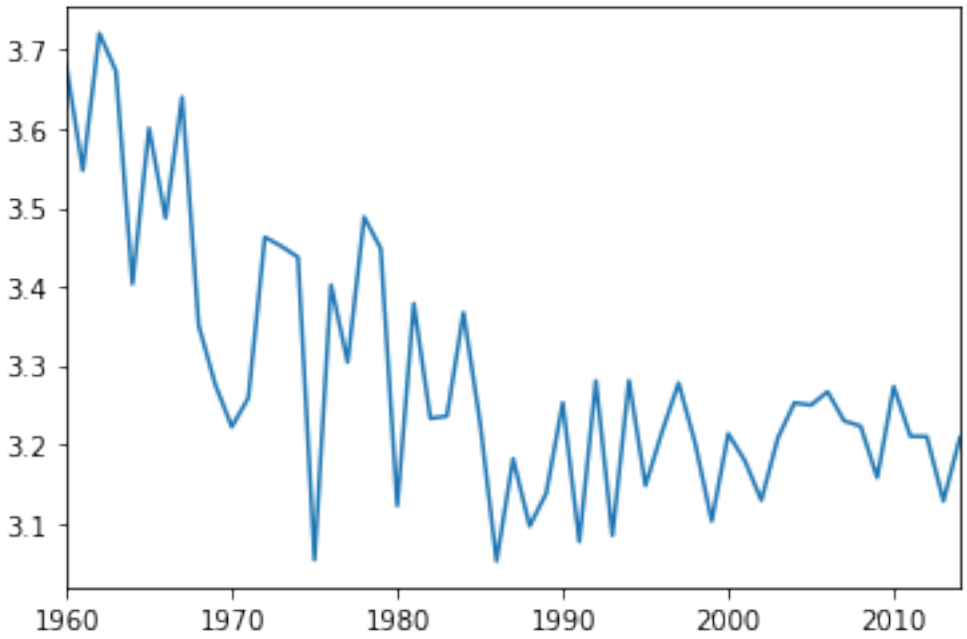
[82]:
```
dfa2['action'].plot()
```

[82]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17302b305c0>
```



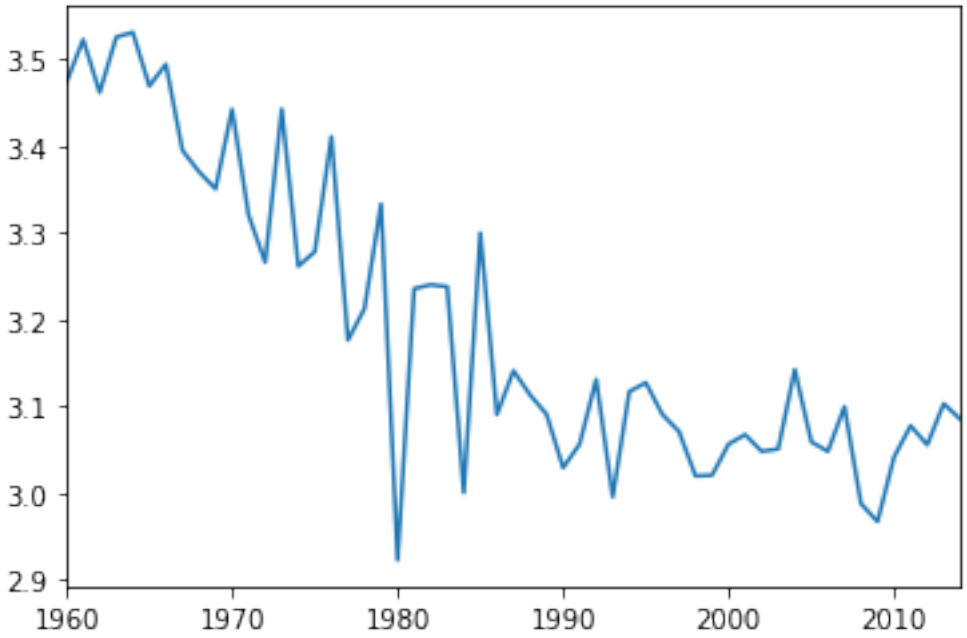
[83]:
```
dfa2['crime'].plot()
```

[83]: <matplotlib.axes._subplots.AxesSubplot at 0x173015bf710>



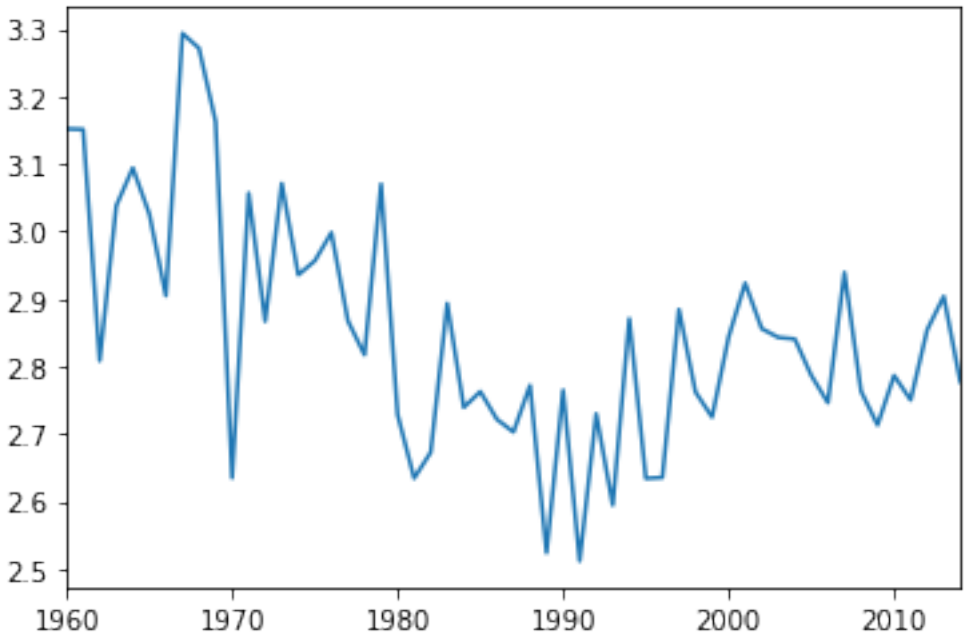
[84]:
```
dfa2['thriller'].plot()
```

[84]: <matplotlib.axes._subplots.AxesSubplot at 0x173015bfcc0>



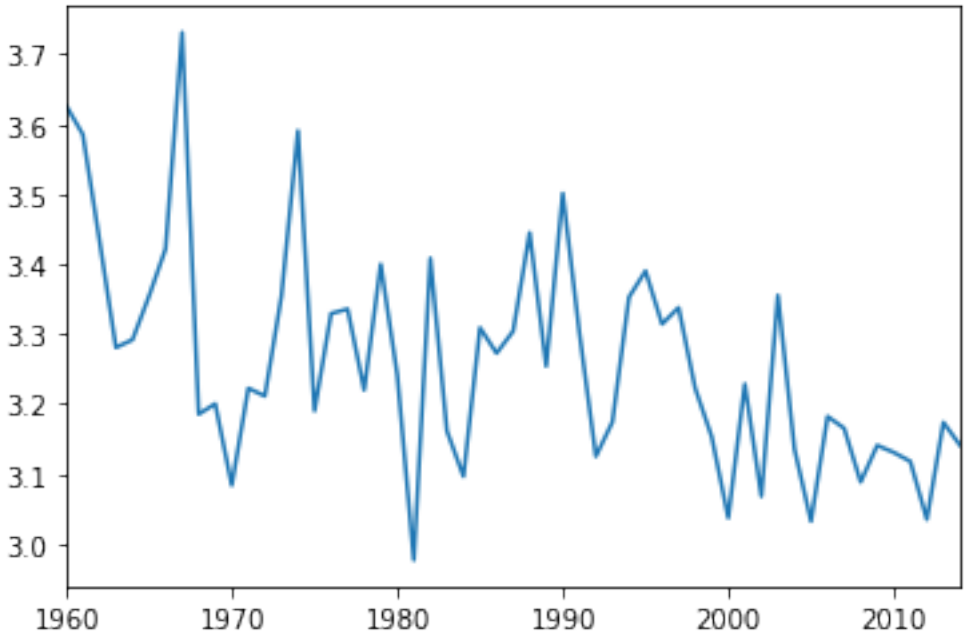
[85]:
```
dfa2['horror'].plot()
```

[85]: <matplotlib.axes._subplots.AxesSubplot at 0x173006d52e8>



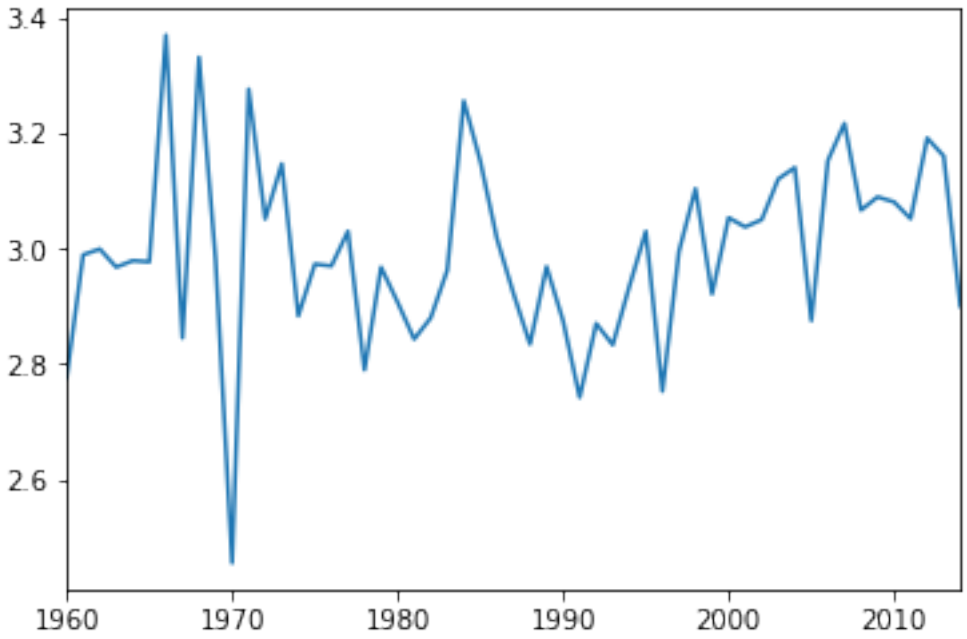
[86]:
```
dfa2['mystery'].plot()
```

[86]: <matplotlib.axes._subplots.AxesSubplot at 0x173016ac7b8>



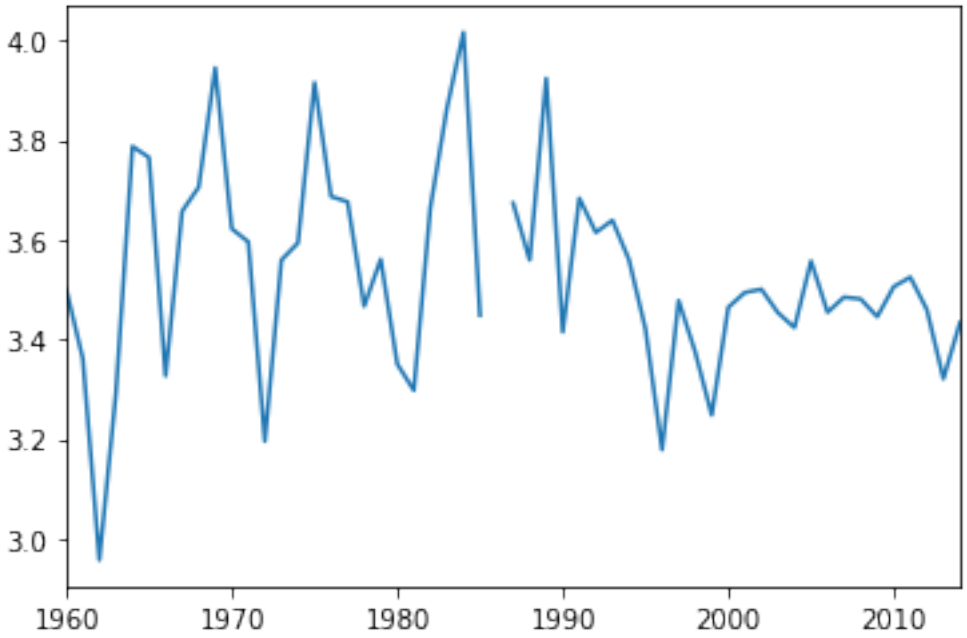
[87]:
```
dfa2['scifi'].plot()
```

[87]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x173026dc908>
```



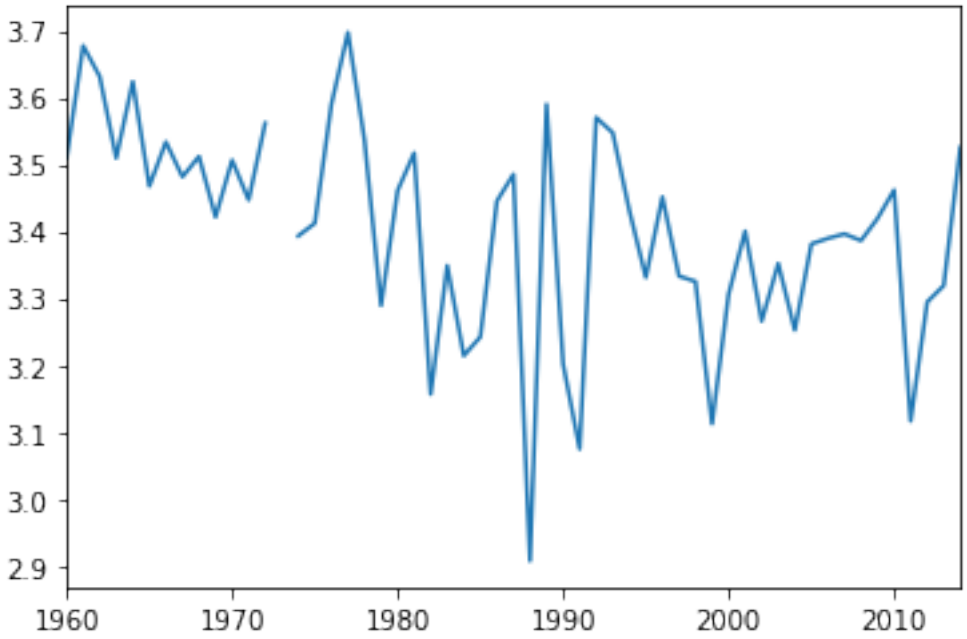
[88]:
```
dfa2['documentary'].plot()
```

[88]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x173027320b8>
```



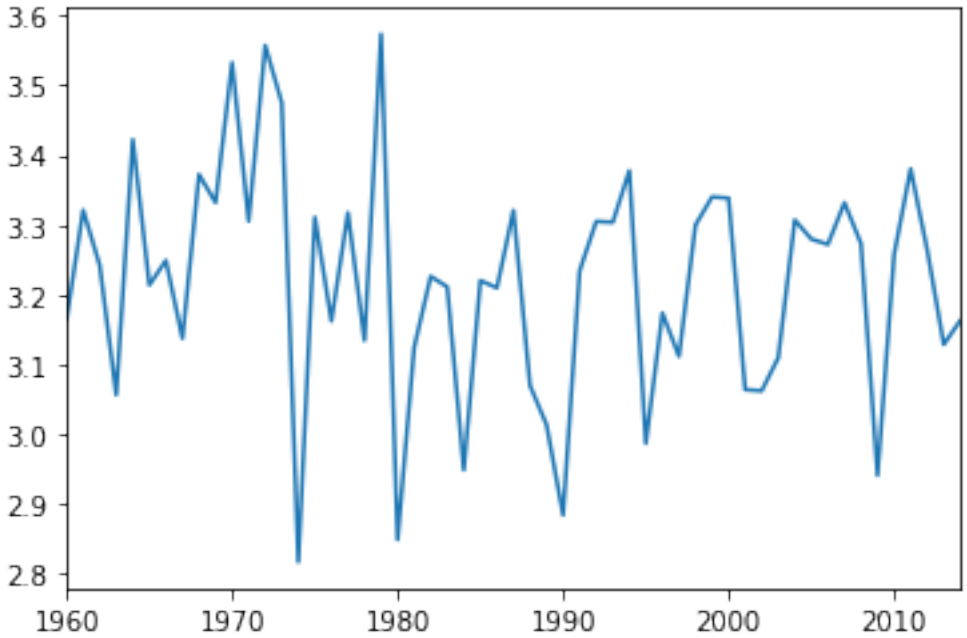
[89]:
```
dfa2['war'].plot()
```

[89]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17302acc518>
```



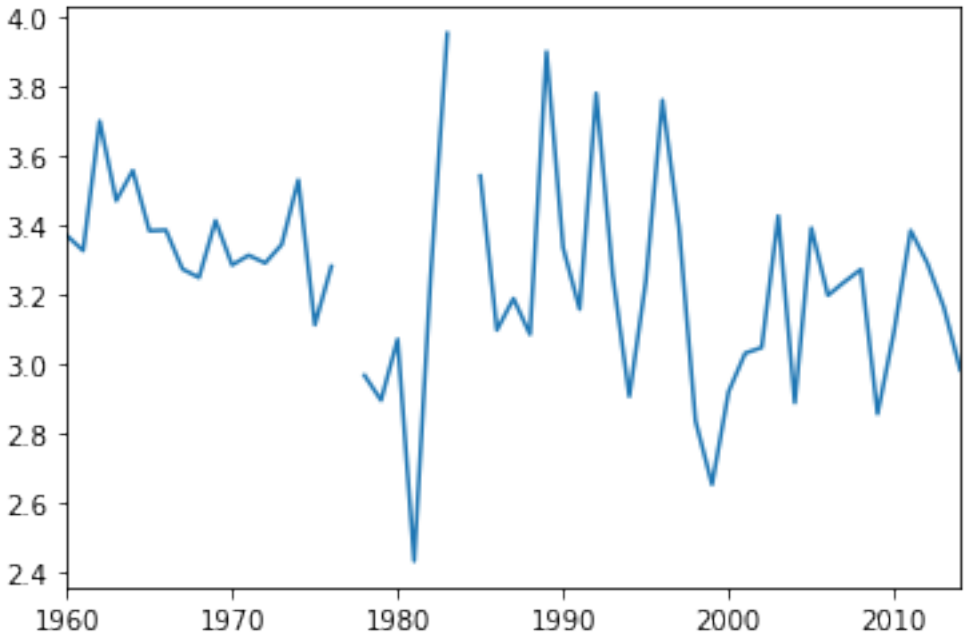
[90]:
```
dfa2['musical'].plot()
```

[90]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17302acce48>
```



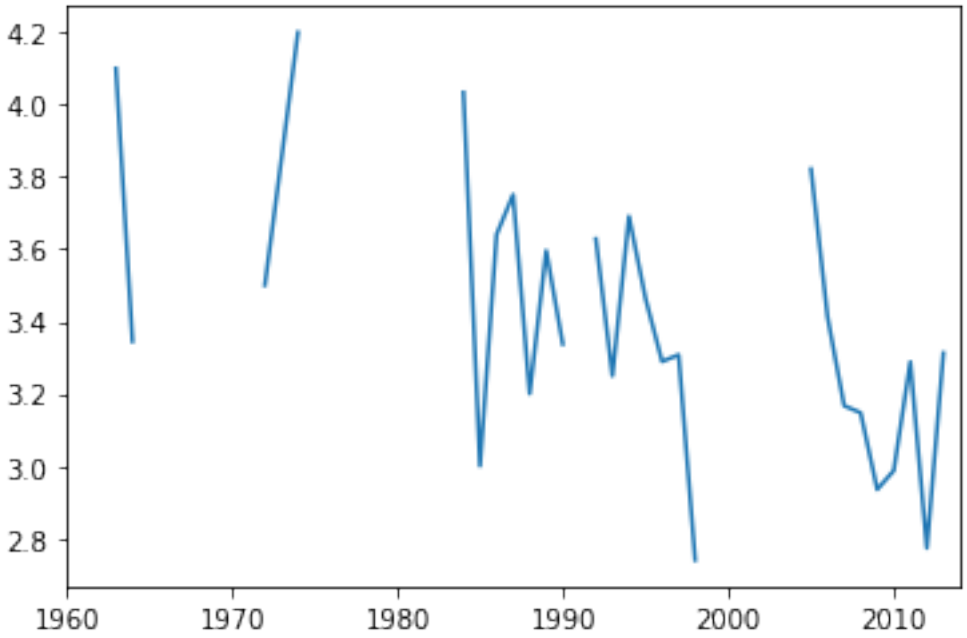
[91]:
```
dfa2['western'].plot()
```

[91]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17302fe8f98>
```



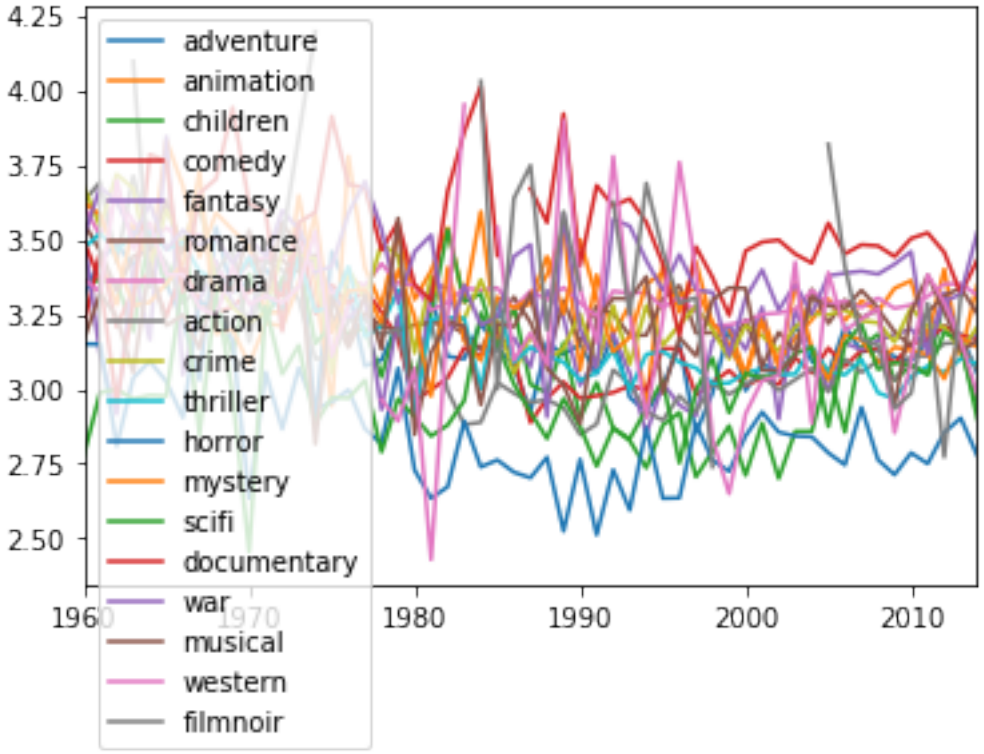
[92]:
```
dfa2['filmnoir'].plot()
```

[92]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x17302fe81d0>
```



[95]:
```
dfa2.plot()
```

[95]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x173031a78d0>
```



[134]:
```
genre_list = list(genres)
```

[135]:
```
genre_list
```

[135]:
```
['Action',
 'Adventure',
 'Animation',
 'Children',
 'Comedy',
 'Crime',
 'Documentary',
 'Drama',
 'Fantasy',
 'Film-Noir',
 'Horror',
 'Musical',
 'Mystery',
 'Romance',
 'Sci-Fi',
```

```
 'Thriller',
 'War',
 'Western']
```

[136]:
```
genres_rating_list = list(avg_ratings90s)
```

[137]:
```
dfg = {'Genre':genres, 'Genres Mean Rating':genres_rating_list}
```

[138]:
```
genres_rating = pd.DataFrame(dfg)
```

[139]:
```
genres_rating
```

[139]:

	Genre	Genres Mean Rating
0	Action	2.953227
1	Adventure	3.033521
2	Animation	3.236963
3	Children	2.828015
4	Comedy	3.033601
5	Crime	3.195565
6	Documentary	3.401072
7	Drama	3.273500
8	Fantasy	3.050661
9	Film-Noir	3.314351
10	Horror	2.718391
11	Musical	3.209885
12	Mystery	3.277577
13	Romance	3.222790
14	Sci-Fi	2.920764
15	Thriller	3.064593
16	War	3.336950
17	Western	3.186490

[140]:
```
genres_rating['Mean'] = genres_rating['Genres Mean Rating'].mean()
```

[141]:
```
genre_mean = round(genres_rating['Genres Mean Rating'], 2)
```

[142]:
```
genres_rating['Genre Mean'] = genre_mean
```

[143]:
```
genres_rating
```

[143]:

	Genre	Genres Mean Rating	Mean	Genre Mean
0	Action	2.953227	3.12544	2.95
1	Adventure	3.033521	3.12544	3.03
2	Animation	3.236963	3.12544	3.24
3	Children	2.828015	3.12544	2.83
4	Comedy	3.033601	3.12544	3.03
5	Crime	3.195565	3.12544	3.20
6	Documentary	3.401072	3.12544	3.40
7	Drama	3.273500	3.12544	3.27
8	Fantasy	3.050661	3.12544	3.05
9	Film-Noir	3.314351	3.12544	3.31
10	Horror	2.718391	3.12544	2.72

```
11      Musical            3.209885  3.12544        3.21
12      Mystery            3.277577  3.12544        3.28
13      Romance            3.222790  3.12544        3.22
14       Sci-Fi            2.920764  3.12544        2.92
15     Thriller            3.064593  3.12544        3.06
16          War            3.336950  3.12544        3.34
17      Western            3.186490  3.12544        3.19
```

[144]:
```
genres
```

[144]:
```
['Action',
 'Adventure',
 'Animation',
 'Children',
 'Comedy',
 'Crime',
 'Documentary',
 'Drama',
 'Fantasy',
 'Film-Noir',
 'Horror',
 'Musical',
 'Mystery',
 'Romance',
 'Sci-Fi',
 'Thriller',
 'War',
 'Western']
```

[145]:
```
my_rating_list = [round(genres_rating_list, 2) for genres_rating_list in␣
↪genres_rating_list]
```

[146]:
```
my_rating_list
```

[146]:
```
[2.95,
 3.03,
 3.24,
 2.83,
 3.03,
 3.2,
 3.4,
 3.27,
 3.05,
 3.31,
 2.72,
 3.21,
 3.28,
 3.22,
 2.92,
```

```
 3.06,
 3.34,
 3.19]
```

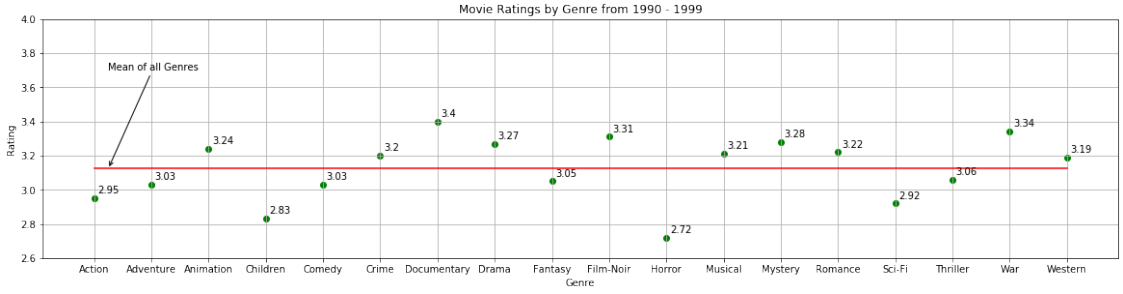
[147]:
```
plt.figure(figsize=(20, 10))

ax1 = plt.subplot(2,1,1)
x = [x for x in range(0, 18)]
xticks_genre_list = genre_list
y = my_rating_list
plt.xticks(range(len(x)), xticks_genre_list)
plt.scatter(x,y, color='g')
plt.plot(x, genres_rating['Mean'], color="red")
plt.autoscale(tight=False)
#plt.rcParams["figure.figsize"] = (10,2)
plt.title('Movie Ratings by Genre from 1990 - 1999')
plt.xlabel('Genre')
plt.ylabel('Rating')
plt.ylim(ymax = 4, ymin = 2.6)
plt.grid(True)


plt.annotate("Mean of all Genres",
             xy=(0.25,3.12544), xycoords='data',
             xytext=(0.25, 3.7), textcoords='data',
             arrowprops=dict(arrowstyle="->",
                             connectionstyle="arc3"),
             )

for i,j in enumerate( y ):
    ax1.annotate( j, ( x[i] + 0.06, y[i] + 0.03))

plt.savefig(r'90smovie-ratings-by-genre2.png')
plt.show()
```



Now let's see how the results change if we remove all movies rated 2.5 and below:

[148]:
```
highly_rated = genres_list90s['rating'] > 2.5


high90s = genres_list90s[highly_rated]
high90s
```

[148]:

	movieId	rating	count
0	1	3.921240	49695
1	2	3.211977	22243
2	3	3.151040	12735
3	4	2.861393	2756
4	5	3.064592	12161
5	6	3.834930	23899
6	7	3.366484	12961
7	8	3.142049	1415
8	9	3.004924	3960
9	10	3.430029	29005
10	11	3.667713	18162
11	12	2.619766	3845
12	13	3.272416	1461
13	14	3.432082	6022
14	15	2.721993	2910
15	16	3.787455	17394
16	17	3.968573	20667
17	18	3.373631	5203
18	19	2.607412	20938
19	20	2.880754	4084
20	21	3.581689	24116
21	22	3.319400	9928
22	23	3.148235	4250
23	24	3.199849	7971
24	25	3.689510	21553
25	26	3.628857	2755
26	27	3.413520	1642
27	28	4.057546	3154
28	29	3.952230	8520
29	30	3.633880	1281
...	...	...	...
16730	99397	3.428571	14
16757	99642	3.535714	14
16758	99669	3.416667	12
16824	100085	3.583333	6
16825	100087	3.000000	6
16914	100906	2.875000	8
16958	101476	3.083333	6
16959	101479	2.857143	7
17036	102217	3.990000	50

```
17184   103621  3.439394     33
17231   104072  3.550000     10
17235   104085  3.300000      5
17397   105837  3.300000      5
17409   105968  3.250000      6
17467   106614  3.000000      5
17475   106751  3.500000     10
17572   107780  3.571429      7
17647   108979  4.042373    177
17967   113374  3.409091     11
18012   114240  3.428571      7
18068   115075  3.100000      5
18119   115941  3.458333     12
18120   115945  3.416667      6
18121   115949  2.916667      6
18175   117492  3.500000      5
18184   117849  3.400000      5
18221   118890  3.947368     19
18231   119065  3.200000      5
18326   128854  3.500000      5
18328   128944  2.714286      7
```

```
                                                 title  \
0                                     Toy Story (1995)
1                                       Jumanji (1995)
2                                  Grumpier Old Men (1995)
3                                 Waiting to Exhale (1995)
4                       Father of the Bride Part II (1995)
5                                          Heat (1995)
6                                       Sabrina (1995)
7                                  Tom and Huck (1995)
8                                  Sudden Death (1995)
9                                     GoldenEye (1995)
10                        American President, The (1995)
11                     Dracula: Dead and Loving It (1995)
12                                        Balto (1995)
13                                        Nixon (1995)
14                               Cutthroat Island (1995)
15                                        Casino (1995)
16                       Sense and Sensibility (1995)
17                                  Four Rooms (1995)
18                  Ace Ventura: When Nature Calls (1995)
19                                  Money Train (1995)
20                                   Get Shorty (1995)
21                                      Copycat (1995)
22                                   Assassins (1995)
23                                      Powder (1995)
```

```
24                              Leaving Las Vegas (1995)
25                                        Othello (1995)
26                                   Now and Then (1995)
27                                     Persuasion (1995)
28     City of Lost Children, The (Cité des enfants p...
29     Shanghai Triad (Yao a yao yao dao waipo qiao) ...
...                                                  ...
16730    Lipton Cockton in the Shadows of Sodoma (1995)
16757  Tiny Toon Adventures: How I Spent My Vacation ...
16758                                    Aftermath (1994)
16824  Iceman Tapes: Conversations with a Killer, The...
16825                        Night of the Demons 2 (1994)
16914                                 Maniac Cop 2 (1990)
16958  Big Girls Don't Cry... They Get Even (Stepkids...
16959                     Curse of the Blair Witch (1999)
17036                      Bill Hicks: Revelations (1993)
17184                                   Brain Dead (1990)
17231                   The Count of Monte Cristo (1998)
17235                                 Class of 1999 (1990)
17397  Godzilla vs. SpaceGodzilla (Gojira VS Supesugo...
17409                              Inherit the Wind (1999)
17467         Christmas Party, The (Joulubileet) (1996)
17475                  Misérables in Concert, Les (1996)
17572                                        Cats (1998)
17647                                 Cowboy Bebop (1998)
17967  Old Lady and the Pigeons, The (La vieille dame...
18012                                      Aladdin (1992)
18068  Swan Princess: Escape from Castle Mountain, Th...
18119  The Land Before Time IV: Journey Through the M...
18120  The Land Before Time VI: The Secret of Saurus ...
18121  An American Tail: The Mystery of the Night Mon...
18175                 Alien Nation: Body and Soul (1995)
18184                              La Belle Verte (1996)
18221                      Bill Hicks: Relentless (1992)
18231          Scooby-Doo! and the Witch's Ghost (1999)
18326                 Chris Rock: Bring the Pain (1996)
18328                 Honey, We Shrunk Ourselves (1997)

                                              genres  year  Action  \
0           Adventure|Animation|Children|Comedy|Fantasy  1995   False
1                            Adventure|Children|Fantasy  1995   False
2                                      Comedy|Romance  1995   False
3                                Comedy|Drama|Romance  1995   False
4                                              Comedy  1995   False
5                                 Action|Crime|Thriller  1995    True
6                                      Comedy|Romance  1995   False
7                                   Adventure|Children  1995   False
```

8	Action	1995	True
9	Action|Adventure|Thriller	1995	True
10	Comedy|Drama|Romance	1995	False
11	Comedy|Horror	1995	False
12	Adventure|Animation|Children	1995	False
13	Drama	1995	False
14	Action|Adventure|Romance	1995	True
15	Crime|Drama	1995	False
16	Drama|Romance	1995	False
17	Comedy	1995	False
18	Comedy	1995	False
19	Action|Comedy|Crime|Drama|Thriller	1995	True
20	Comedy|Crime|Thriller	1995	False
21	Crime|Drama|Horror|Mystery|Thriller	1995	False
22	Action|Crime|Thriller	1995	True
23	Drama|Sci-Fi	1995	False
24	Drama|Romance	1995	False
25	Drama	1995	False
26	Children|Drama	1995	False
27	Drama|Romance	1995	False
28	Adventure|Drama|Fantasy|Mystery|Sci-Fi	1995	False
29	Crime|Drama	1995	False
...	...	...	...
16730	Drama|Mystery|Sci-Fi	1995	False
16757	Adventure|Animation|Comedy	1992	False
16758	Horror	1994	False
16824	Crime|Documentary	1992	False
16825	Horror	1994	False
16914	Action|Horror|Thriller	1990	True
16958	Comedy	1992	False
16959	Documentary|Horror|Thriller	1999	False
17036	Comedy	1993	False
17184	Horror|Sci-Fi	1990	False
17231	Adventure|Drama|Romance	1998	False
17235	Action|Horror|Sci-Fi	1990	True
17397	Action|Sci-Fi	1994	True
17409	Drama	1999	False
17467	Comedy	1996	False
17475	Drama|Musical	1996	False
17572	Musical	1998	False
17647	Action|Adventure|Animation|Crime|Sci-Fi	1998	True
17967	Animation|Comedy	1997	False
18012	Adventure|Animation|Children|Comedy|Fantasy	1992	False
18068	Animation|Children|Fantasy|Romance	1997	False
18119	Adventure|Animation|Children	1996	False
18120	Animation|Children	1998	False
18121	Adventure|Animation|Children|Fantasy|Mystery|S...	1999	False

```
18175                                          Sci-Fi  1995   False
18184                                          Comedy  1996   False
18221                                          Comedy  1992   False
18231                          Animation|Comedy|Mystery  1999   False
18326                                          Comedy  1996   False
18328            Action|Adventure|Children|Comedy|Sci-Fi  1997    True

       Adventure  Animation  Children  ...  Fantasy  Film-Noir  Horror  \
0           True       True      True  ...     True      False   False
1           True      False      True  ...     True      False   False
2          False      False     False  ...    False      False   False
3          False      False     False  ...    False      False   False
4          False      False     False  ...    False      False   False
5          False      False     False  ...    False      False   False
6          False      False     False  ...    False      False   False
7           True      False      True  ...    False      False   False
8          False      False     False  ...    False      False   False
9           True      False     False  ...    False      False   False
10         False      False     False  ...    False      False   False
11         False      False     False  ...    False      False    True
12          True       True      True  ...    False      False   False
13         False      False     False  ...    False      False   False
14          True      False     False  ...    False      False   False
15         False      False     False  ...    False      False   False
16         False      False     False  ...    False      False   False
17         False      False     False  ...    False      False   False
18         False      False     False  ...    False      False   False
19         False      False     False  ...    False      False   False
20         False      False     False  ...    False      False   False
21         False      False     False  ...    False      False    True
22         False      False     False  ...    False      False   False
23         False      False     False  ...    False      False   False
24         False      False     False  ...    False      False   False
25         False      False     False  ...    False      False   False
26         False      False      True  ...    False      False   False
27         False      False     False  ...    False      False   False
28          True      False     False  ...     True      False   False
29         False      False     False  ...    False      False   False
...          ...        ...       ...  ...      ...        ...     ...
16730      False      False     False  ...    False      False   False
16757       True       True     False  ...    False      False   False
16758      False      False     False  ...    False      False    True
16824      False      False     False  ...    False      False   False
16825      False      False     False  ...    False      False    True
16914      False      False     False  ...    False      False    True
16958      False      False     False  ...    False      False   False
16959      False      False     False  ...    False      False    True
```

17036	False	False	False	...	False	False	False
17184	False	False	False	...	False	False	True
17231	True	False	False	...	False	False	False
17235	False	False	False	...	False	False	True
17397	False	False	False	...	False	False	False
17409	False	False	False	...	False	False	False
17467	False	False	False	...	False	False	False
17475	False	False	False	...	False	False	False
17572	False	False	False	...	False	False	False
17647	True	True	False	...	False	False	False
17967	False	True	False	...	False	False	False
18012	True	True	True	...	True	False	False
18068	False	True	True	...	True	False	False
18119	True	True	True	...	False	False	False
18120	False	True	True	...	False	False	False
18121	True	True	True	...	True	False	False
18175	False	False	False	...	False	False	False
18184	False	False	False	...	False	False	False
18221	False	False	False	...	False	False	False
18231	False	True	False	...	False	False	False
18326	False	False	False	...	False	False	False
18328	True	False	True	...	False	False	False

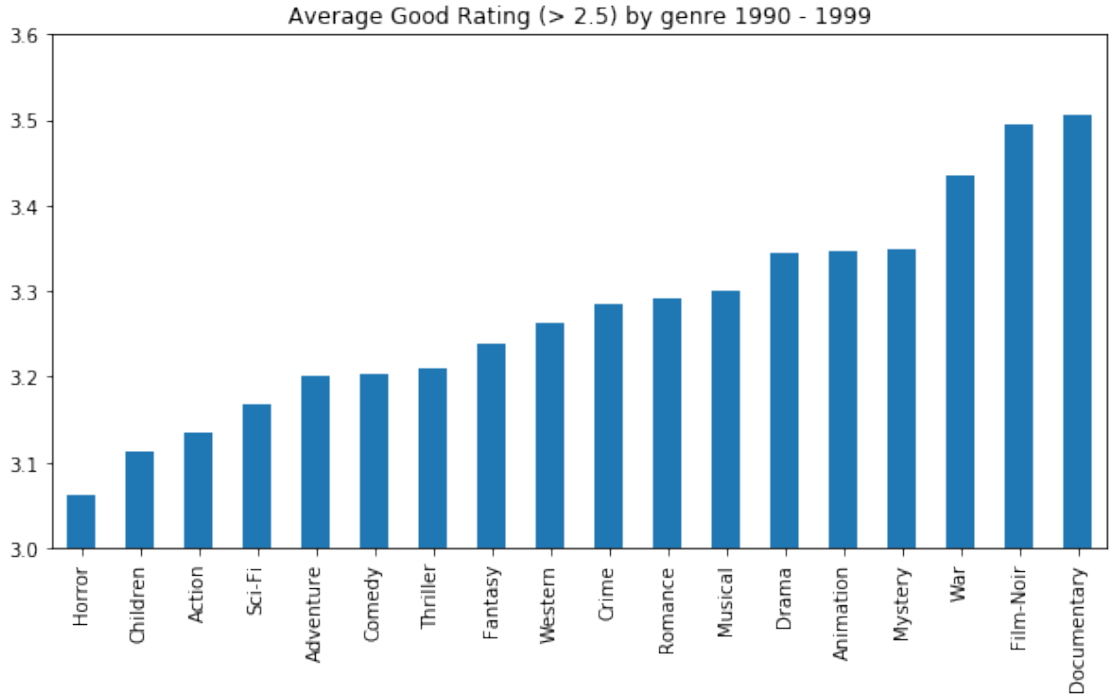
	Musical	Mystery	Romance	Sci-Fi	Thriller	War	Western
0	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False
2	False	False	True	False	False	False	False
3	False	False	True	False	False	False	False
4	False	False	False	False	False	False	False
5	False	False	False	False	True	False	False
6	False	False	True	False	False	False	False
7	False	False	False	False	False	False	False
8	False	False	False	False	False	False	False
9	False	False	False	False	True	False	False
10	False	False	True	False	False	False	False
11	False	False	False	False	False	False	False
12	False	False	False	False	False	False	False
13	False	False	False	False	False	False	False
14	False	False	True	False	False	False	False
15	False	False	False	False	False	False	False
16	False	False	True	False	False	False	False
17	False	False	False	False	False	False	False
18	False	False	False	False	False	False	False
19	False	False	False	False	True	False	False
20	False	False	False	False	True	False	False
21	False	True	False	False	True	False	False
22	False	False	False	False	True	False	False

```
23       False    False    False    True     False  False    False
24       False    False     True   False     False  False    False
25       False    False    False   False     False  False    False
26       False    False    False   False     False  False    False
27       False    False     True   False     False  False    False
28       False     True    False    True     False  False    False
29       False    False    False   False     False  False    False
...        ...      ...      ...     ...       ...    ...      ...
16730    False     True    False    True     False  False    False
16757    False    False    False   False     False  False    False
16758    False    False    False   False     False  False    False
16824    False    False    False   False     False  False    False
16825    False    False    False   False     False  False    False
16914    False    False    False   False      True  False    False
16958    False    False    False   False     False  False    False
16959    False    False    False   False      True  False    False
17036    False    False    False   False     False  False    False
17184    False    False    False    True     False  False    False
17231    False    False     True   False     False  False    False
17235    False    False    False    True     False  False    False
17397    False    False    False    True     False  False    False
17409    False    False    False   False     False  False    False
17467    False    False    False   False     False  False    False
17475     True    False    False   False     False  False    False
17572     True    False    False   False     False  False    False
17647    False    False    False    True     False  False    False
17967    False    False    False   False     False  False    False
18012    False    False    False   False     False  False    False
18068    False    False     True   False     False  False    False
18119    False    False    False   False     False  False    False
18120    False    False    False   False     False  False    False
18121    False     True    False    True     False  False    False
18175    False    False    False    True     False  False    False
18184    False    False    False   False     False  False    False
18221    False    False    False   False     False  False    False
18231    False     True    False   False     False  False    False
18326    False    False    False   False     False  False    False
18328    False    False    False    True     False  False    False

[3057 rows x 24 columns]
```

[149]:
```
avg_high90s = {genre : high90s[high90s[genre]]['rating'].mean() for genre in␣
 ↪genres}
avg_high90s = pd.Series(avg_high90s)
ax = avg_high90s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average Good Rating (> 2.5) by genre 1990 - 1999")
ax.set_ylim(3.0,3.6)
```

[149]: (3.0, 3.6)



[150]:
```
avg_high90s.sort_values(ascending=False)
```

[150]:
```
Documentary    3.506184
Film-Noir      3.494227
War            3.435419
Mystery        3.348599
Animation      3.345774
Drama          3.343659
Musical        3.301245
Romance        3.291515
Crime          3.284914
Western        3.262589
Fantasy        3.237577
Thriller       3.209105
Comedy         3.204293
Adventure      3.201902
Sci-Fi         3.166805
Action         3.135262
Children       3.111927
Horror         3.062158
dtype: float64
```

[151]:
```
high90s[genres].sum().sort_values(ascending=False)
```

[151]:
```
Drama          1682
Comedy         1079
Romance         562
Thriller        508
Action          422
Crime           359
Adventure       257
Sci-Fi          174
Documentary     173
Horror          162
Fantasy         157
Children        154
Mystery         152
Animation       115
War              86
Musical          75
Western          36
Film-Noir        15
dtype: int64
```

[152]:
```
avg_ratings90s.sort_values(ascending=False)
```

[152]:
```
Documentary    3.401072
War            3.336950
Film-Noir      3.314351
Mystery        3.277577
Drama          3.273500
Animation      3.236963
Romance        3.222790
Musical        3.209885
Crime          3.195565
Western        3.186490
Thriller       3.064593
Fantasy        3.050661
Comedy         3.033601
Adventure      3.033521
Action         2.953227
Sci-Fi         2.920764
Children       2.828015
Horror         2.718391
dtype: float64
```

[153]:
```
genres_list90s[genres].sum().sort_values(ascending=False)
```

[153]:
```
Drama          1796
Comedy         1299
Romance         602
Thriller        592
Action          516
```

```
Crime           391
Adventure       308
Horror          245
Sci-Fi          227
Children        221
Fantasy         191
Documentary     185
Mystery         163
Animation       128
War              94
Musical          82
Western          39
Film-Noir        17
dtype: int64
```

Try with dropping <= 3.0

[154]:
```
highest_rated = genres_list90s['rating'] > 3.0


highest90s = genres_list90s[highest_rated]
highest90s
```

[154]:

	movieId	rating	count	\
0	1	3.921240	49695	
1	2	3.211977	22243	
2	3	3.151040	12735	
4	5	3.064592	12161	
5	6	3.834930	23899	
6	7	3.366484	12961	
7	8	3.142049	1415	
8	9	3.004924	3960	
9	10	3.430029	29005	
10	11	3.667713	18162	
12	13	3.272416	1461	
13	14	3.432082	6022	
15	16	3.787455	17394	
16	17	3.968573	20667	
17	18	3.373631	5203	
20	21	3.581689	24116	
21	22	3.319400	9928	
22	23	3.148235	4250	
23	24	3.199849	7971	
24	25	3.689510	21553	
25	26	3.628857	2755	
26	27	3.413520	1642	
27	28	4.057546	3154	
28	29	3.952230	8520	
29	30	3.633880	1281	

```
30          31  3.250344   9435
31          32  3.898055  44980
32          33  3.007692     65
33          34  3.643094  32255
34          35  3.501674   1493
...        ...       ...    ...
16425    96520  4.083333      6
16440    96608  4.142857      7
16575    97828  3.400000      5
16676    98852  3.750000      8
16687    98985  3.454545     11
16715    99191  3.600000     10
16730    99397  3.428571     14
16757    99642  3.535714     14
16758    99669  3.416667     12
16824   100085  3.583333      6
16958   101476  3.083333      6
17036   102217  3.990000     50
17184   103621  3.439394     33
17231   104072  3.550000     10
17235   104085  3.300000      5
17397   105837  3.300000      5
17409   105968  3.250000      6
17475   106751  3.500000     10
17572   107780  3.571429      7
17647   108979  4.042373    177
17967   113374  3.409091     11
18012   114240  3.428571      7
18068   115075  3.100000      5
18119   115941  3.458333     12
18120   115945  3.416667      6
18175   117492  3.500000      5
18184   117849  3.400000      5
18221   118890  3.947368     19
18231   119065  3.200000      5
18326   128854  3.500000      5

                                                  title  \
0                                      Toy Story (1995)
1                                        Jumanji (1995)
2                                   Grumpier Old Men (1995)
4                       Father of the Bride Part II (1995)
5                                           Heat (1995)
6                                        Sabrina (1995)
7                                   Tom and Huck (1995)
8                                   Sudden Death (1995)
9                                      GoldenEye (1995)
```

```
10                        American President, The (1995)
12                                     Balto (1995)
13                                     Nixon (1995)
15                                    Casino (1995)
16                          Sense and Sensibility (1995)
17                                Four Rooms (1995)
20                                Get Shorty (1995)
21                                   Copycat (1995)
22                                 Assassins (1995)
23                                    Powder (1995)
24                             Leaving Las Vegas (1995)
25                                    Othello (1995)
26                                Now and Then (1995)
27                                 Persuasion (1995)
28     City of Lost Children, The (Cité des enfants p...
29     Shanghai Triad (Yao a yao yao dao waipo qiao) ...
30                               Dangerous Minds (1995)
31             Twelve Monkeys (a.k.a. 12 Monkeys) (1995)
32                             Wings of Courage (1995)
33                                         Babe (1995)
34                                 Carrington (1995)
...                                                ...
16425              Prime Suspect: The Lost Child (1995)
16440                             Runaway Brain (1995)
16575                                   Hamoun (1990)
16676  Once Upon a Time in China and America (Wong Fe...
16687      Three Brothers, The (Les trois frères) (1995)
16715                             Campfire Tales (1997)
16730    Lipton Cockton in the Shadows of Sodoma (1995)
16757  Tiny Toon Adventures: How I Spent My Vacation ...
16758                                  Aftermath (1994)
16824  Iceman Tapes: Conversations with a Killer, The...
16958  Big Girls Don't Cry... They Get Even (Stepkids...
17036                     Bill Hicks: Revelations (1993)
17184                                  Brain Dead (1990)
17231                  The Count of Monte Cristo (1998)
17235                               Class of 1999 (1990)
17397  Godzilla vs. SpaceGodzilla (Gojira VS Supesugo...
17409                             Inherit the Wind (1999)
17475                 Misérables in Concert, Les (1996)
17572                                      Cats (1998)
17647                                Cowboy Bebop (1998)
17967  Old Lady and the Pigeons, The (La vieille dame...
18012                                   Aladdin (1992)
18068  Swan Princess: Escape from Castle Mountain, Th...
18119  The Land Before Time IV: Journey Through the M...
18120  The Land Before Time VI: The Secret of Saurus ...
```

```
18175                 Alien Nation: Body and Soul (1995)
18184                            La Belle Verte (1996)
18221                      Bill Hicks: Relentless (1992)
18231           Scooby-Doo! and the Witch's Ghost (1999)
18326                  Chris Rock: Bring the Pain (1996)

                                          genres  year  Action  Adventure  \
0      Adventure|Animation|Children|Comedy|Fantasy  1995   False       True
1                        Adventure|Children|Fantasy  1995   False       True
2                                  Comedy|Romance  1995   False      False
4                                         Comedy  1995   False      False
5                           Action|Crime|Thriller  1995    True      False
6                                  Comedy|Romance  1995   False      False
7                               Adventure|Children  1995   False       True
8                                         Action  1995    True      False
9                         Action|Adventure|Thriller  1995    True       True
10                             Comedy|Drama|Romance  1995   False      False
12                    Adventure|Animation|Children  1995   False       True
13                                         Drama  1995   False      False
15                                   Crime|Drama  1995   False      False
16                                  Drama|Romance  1995   False      False
17                                        Comedy  1995   False      False
20                            Comedy|Crime|Thriller  1995   False      False
21               Crime|Drama|Horror|Mystery|Thriller  1995   False      False
22                            Action|Crime|Thriller  1995    True      False
23                                    Drama|Sci-Fi  1995   False      False
24                                  Drama|Romance  1995   False      False
25                                         Drama  1995   False      False
26                                 Children|Drama  1995   False      False
27                                  Drama|Romance  1995   False      False
28           Adventure|Drama|Fantasy|Mystery|Sci-Fi  1995   False       True
29                                   Crime|Drama  1995   False      False
30                                         Drama  1995   False      False
31                          Mystery|Sci-Fi|Thriller  1995   False      False
32                           Adventure|Romance|IMAX  1995   False       True
33                                 Children|Drama  1995   False      False
34                                  Drama|Romance  1995   False      False
...                                           ...   ...     ...        ...
16425                               Drama|Mystery  1995   False      False
16440                      Animation|Comedy|Sci-Fi  1995   False      False
16575                                      Drama  1990   False      False
16676                     Action|Adventure|Western  1997    True       True
16687                                     Comedy  1995   False      False
16715                                     Horror  1997   False      False
16730                        Drama|Mystery|Sci-Fi  1995   False      False
16757                    Adventure|Animation|Comedy  1992   False       True
16758                                     Horror  1994   False      False
```

```
16824                           Crime|Documentary  1992   False      False
16958                                     Comedy  1992   False      False
17036                                     Comedy  1993   False      False
17184                                Horror|Sci-Fi  1990   False      False
17231                     Adventure|Drama|Romance  1998   False       True
17235                        Action|Horror|Sci-Fi  1990    True      False
17397                               Action|Sci-Fi  1994    True      False
17409                                      Drama  1999   False      False
17475                               Drama|Musical  1996   False      False
17572                                    Musical  1998   False      False
17647     Action|Adventure|Animation|Crime|Sci-Fi  1998    True       True
17967                           Animation|Comedy  1997   False      False
18012  Adventure|Animation|Children|Comedy|Fantasy  1992   False       True
18068           Animation|Children|Fantasy|Romance  1997   False      False
18119                 Adventure|Animation|Children  1996   False       True
18120                          Animation|Children  1998   False      False
18175                                     Sci-Fi  1995   False      False
18184                                     Comedy  1996   False      False
18221                                     Comedy  1992   False      False
18231                    Animation|Comedy|Mystery  1999   False      False
18326                                     Comedy  1996   False      False

       Animation  Children  ...  Fantasy  Film-Noir  Horror  Musical  Mystery  \
0           True      True  ...     True      False   False    False    False
1          False      True  ...     True      False   False    False    False
2          False     False  ...    False      False   False    False    False
4          False     False  ...    False      False   False    False    False
5          False     False  ...    False      False   False    False    False
6          False     False  ...    False      False   False    False    False
7          False      True  ...    False      False   False    False    False
8          False     False  ...    False      False   False    False    False
9          False     False  ...    False      False   False    False    False
10         False     False  ...    False      False   False    False    False
12          True      True  ...    False      False   False    False    False
13         False     False  ...    False      False   False    False    False
15         False     False  ...    False      False   False    False    False
16         False     False  ...    False      False   False    False    False
17         False     False  ...    False      False   False    False    False
20         False     False  ...    False      False   False    False    False
21         False     False  ...    False      False    True    False     True
22         False     False  ...    False      False   False    False    False
23         False     False  ...    False      False   False    False    False
24         False     False  ...    False      False   False    False    False
25         False     False  ...    False      False   False    False    False
26         False      True  ...    False      False   False    False    False
27         False     False  ...    False      False   False    False    False
28         False     False  ...     True      False   False    False     True
```

29	False	False	...	False	False	False	False	False
30	False	False	...	False	False	False	False	False
31	False	False	...	False	False	False	False	True
32	False	False	...	False	False	False	False	False
33	False	True	...	False	False	False	False	False
34	False	False	...	False	False	False	False	False
...	...	...	...	...	...	...	...	...
16425	False	False	...	False	False	False	False	True
16440	True	False	...	False	False	False	False	False
16575	False	False	...	False	False	False	False	False
16676	False	False	...	False	False	False	False	False
16687	False	False	...	False	False	False	False	False
16715	False	False	...	False	False	True	False	False
16730	False	False	...	False	False	False	False	True
16757	True	False	...	False	False	False	False	False
16758	False	False	...	False	False	True	False	False
16824	False	False	...	False	False	False	False	False
16958	False	False	...	False	False	False	False	False
17036	False	False	...	False	False	False	False	False
17184	False	False	...	False	False	True	False	False
17231	False	False	...	False	False	False	False	False
17235	False	False	...	False	False	True	False	False
17397	False	False	...	False	False	False	False	False
17409	False	False	...	False	False	False	False	False
17475	False	False	...	False	False	False	True	False
17572	False	False	...	False	False	False	True	False
17647	True	False	...	False	False	False	False	False
17967	True	False	...	False	False	False	False	False
18012	True	True	...	True	False	False	False	False
18068	True	True	...	True	False	False	False	False
18119	True	True	...	False	False	False	False	False
18120	True	True	...	False	False	False	False	False
18175	False	False	...	False	False	False	False	False
18184	False	False	...	False	False	False	False	False
18221	False	False	...	False	False	False	False	False
18231	True	False	...	False	False	False	False	True
18326	False	False	...	False	False	False	False	False

	Romance	Sci-Fi	Thriller	War	Western
0	False	False	False	False	False
1	False	False	False	False	False
2	True	False	False	False	False
4	False	False	False	False	False
5	False	False	True	False	False
6	True	False	False	False	False
7	False	False	False	False	False
8	False	False	False	False	False

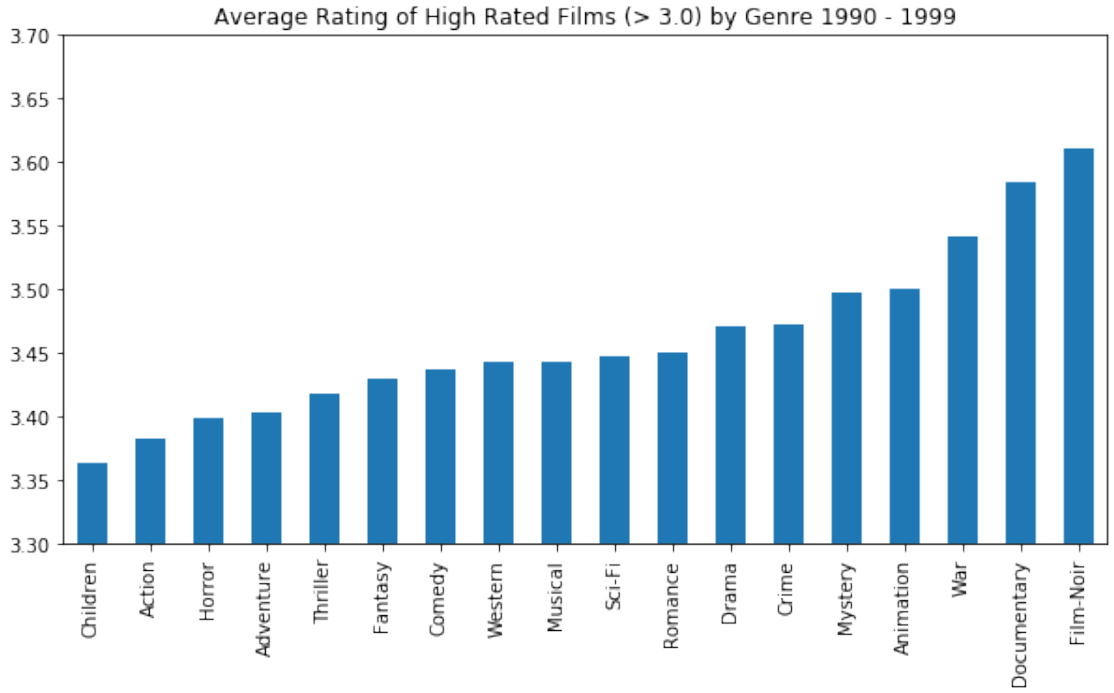
9	False	False	True	False	False
10	True	False	False	False	False
12	False	False	False	False	False
13	False	False	False	False	False
15	False	False	False	False	False
16	True	False	False	False	False
17	False	False	False	False	False
20	False	False	True	False	False
21	False	False	True	False	False
22	False	False	True	False	False
23	False	True	False	False	False
24	True	False	False	False	False
25	False	False	False	False	False
26	False	False	False	False	False
27	True	False	False	False	False
28	False	True	False	False	False
29	False	False	False	False	False
30	False	False	False	False	False
31	False	True	True	False	False
32	True	False	False	False	False
33	False	False	False	False	False
34	True	False	False	False	False
...	...	...	...	...	...
16425	False	False	False	False	False
16440	False	True	False	False	False
16575	False	False	False	False	False
16676	False	False	False	False	True
16687	False	False	False	False	False
16715	False	False	False	False	False
16730	False	True	False	False	False
16757	False	False	False	False	False
16758	False	False	False	False	False
16824	False	False	False	False	False
16958	False	False	False	False	False
17036	False	False	False	False	False
17184	False	True	False	False	False
17231	True	False	False	False	False
17235	False	True	False	False	False
17397	False	True	False	False	False
17409	False	False	False	False	False
17475	False	False	False	False	False
17572	False	False	False	False	False
17647	False	True	False	False	False
17967	False	False	False	False	False
18012	False	False	False	False	False
18068	True	False	False	False	False
18119	False	False	False	False	False

```
18120    False   False     False  False    False
18175    False    True     False  False    False
18184    False   False     False  False    False
18221    False   False     False  False    False
18231    False   False     False  False    False
18326    False   False     False  False    False

[2192 rows x 24 columns]
```

[155]:
```
avg_highest90s = {genre : highest90s[highest90s[genre]]['rating'].mean() for␣
 ↪genre in genres}
avg_highest90s = pd.Series(avg_highest90s)
ax = avg_highest90s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average Rating of High Rated Films (> 3.0) by Genre 1990 - 1999")
ax.set_ylim(3.3,3.7)
```

[155]:
```
(3.3, 3.7)
```



[156]:
```
avg_highest90s.sort_values(ascending=False)
```

[156]:
```
Film-Noir      3.610844
Documentary    3.583650
War            3.541929
Animation      3.499576
Mystery        3.497531
Crime          3.472777
```

```
Drama           3.471517
Romance         3.449746
Sci-Fi          3.447432
Musical         3.443505
Western         3.443069
Comedy          3.436717
Fantasy         3.430076
Thriller        3.417238
Adventure       3.403671
Horror          3.399161
Action          3.382302
Children        3.363895
dtype: float64
```

[157]:
```
highest90s[genres].sum().sort_values(ascending=False)
```

[157]:
```
Drama           1359
Comedy           698
Romance          425
Thriller         337
Crime            258
Action           250
Adventure        173
Documentary      156
Mystery          120
Fantasy          110
Sci-Fi           102
Animation         90
Children          87
Horror            77
War               74
Musical           58
Western           26
Film-Noir         13
dtype: int64
```

[158]:
```
high90s[genres].sum().sort_values(ascending=False)
```

[158]:
```
Drama           1682
Comedy          1079
Romance          562
Thriller         508
Action           422
Crime            359
Adventure        257
Sci-Fi           174
Documentary      173
Horror           162
Fantasy          157
```

```
Children        154
Mystery         152
Animation       115
War              86
Musical          75
Western          36
Film-Noir        15
dtype: int64
```

[159]:
```
avg_high90s.sort_values(ascending=False)
```

[159]:
```
Documentary    3.506184
Film-Noir      3.494227
War            3.435419
Mystery        3.348599
Animation      3.345774
Drama          3.343659
Musical        3.301245
Romance        3.291515
Crime          3.284914
Western        3.262589
Fantasy        3.237577
Thriller       3.209105
Comedy         3.204293
Adventure      3.201902
Sci-Fi         3.166805
Action         3.135262
Children       3.111927
Horror         3.062158
dtype: float64
```

[160]:
```
avg_ratings90s.sort_values(ascending=False)
```

[160]:
```
Documentary    3.401072
War            3.336950
Film-Noir      3.314351
Mystery        3.277577
Drama          3.273500
Animation      3.236963
Romance        3.222790
Musical        3.209885
Crime          3.195565
Western        3.186490
Thriller       3.064593
Fantasy        3.050661
Comedy         3.033601
Adventure      3.033521
Action         2.953227
Sci-Fi         2.920764
```

```
Children       2.828015
Horror         2.718391
dtype: float64
```

Which Genre had the most highest rated (>= 4.0) films, and average highest rating for Highest Rated Films?

[161]:
```
top_rated = genres_list90s['rating'] >= 4.0


top90s = genres_list90s[top_rated]
top90s
```

[161]:

	movieId	rating	count
27	28	4.057546	3154
46	47	4.053493	43249
49	50	4.334372	47006
81	82	4.004925	2538
108	110	4.042534	53769
160	162	4.009925	5995
211	213	4.038462	1872
212	214	4.047240	942
229	232	4.035610	6150
243	246	4.042897	10432
290	293	4.050574	25804
293	296	4.174231	67310
303	306	4.089562	7252
315	318	4.446990	63366
322	326	4.081020	1333
352	356	4.029000	66172
523	527	4.310175	50054
587	593	4.177057	63299
596	602	4.010294	340
602	608	4.112359	43272
668	678	4.093388	2677
708	720	4.109473	8171
732	745	4.167315	12073
765	778	4.011234	23589
787	800	4.074903	7196
976	994	4.012172	5299
1022	1041	4.058044	5625
1067	1089	4.089361	27635
1124	1147	4.158416	3737
1125	1148	4.181068	15022
...	...	...	...
2772	2858	4.155934	44987
2873	2959	4.227123	40106
2914	3000	4.096299	9564
2990	3077	4.070089	1120

```
2996      3083  4.012235   4332
3577      3677  4.051042   1440
7373      7669  4.015859   1734
8840     26674  4.112500     40
8891     26756  4.153846     13
8910     26793  4.300000      5
8991     27002  4.013636    330
9043     27163  4.083333     12
9365     30854  4.071429     14
9657     32497  4.000000      7
9871     33779  4.033654    208
10501    44421  4.100000     15
10846    48045  4.026316     38
10908    48647  4.200000      5
11232    52104  4.000000     13
12826    68175  4.250000      6
13166    70722  4.166667      6
14301    79469  4.150000     10
14873    83457  4.250000      6
15916    92079  4.000000      5
16025    93040  4.113281    256
16121    93916  4.125000      8
16415    96473  4.000000      8
16425    96520  4.083333      6
16440    96608  4.142857      7
17647   108979  4.042373    177

                                                    title  \
27                                       Persuasion (1995)
46                             Seven (a.k.a. Se7en) (1995)
49                              Usual Suspects, The (1995)
81                          Antonia's Line (Antonia) (1995)
108                                      Braveheart (1995)
160                                           Crumb (1994)
211       Burnt by the Sun (Utomlyonnye solntsem) (1994)
212                 Before the Rain (Pred dozhdot) (1994)
229          Eat Drink Man Woman (Yin shi nan nu) (1994)
243                                      Hoop Dreams (1994)
290    Léon: The Professional (a.k.a. The Professiona...
293                                    Pulp Fiction (1994)
303     Three Colors: Red (Trois couleurs: Rouge) (1994)
315                      Shawshank Redemption, The (1994)
322                                To Live (Huozhe) (1994)
352                                    Forrest Gump (1994)
523                                Schindler's List (1993)
587                      Silence of the Lambs, The (1991)
596                         Great Day in Harlem, A (1994)
```

```
602                                        Fargo (1996)
668                 Some Folks Call It a Sling Blade (1993)
708    Wallace & Gromit: The Best of Aardman Animatio...
732                  Wallace & Gromit: A Close Shave (1995)
765                                Trainspotting (1996)
787                                    Lone Star (1996)
976                                    Big Night (1996)
1022                               Secrets & Lies (1996)
1067                               Reservoir Dogs (1992)
1124                            When We Were Kings (1996)
1125          Wallace & Gromit: The Wrong Trousers (1993)
...                                                   ...
2772                               American Beauty (1999)
2873                                   Fight Club (1999)
2914             Princess Mononoke (Mononoke-hime) (1997)
2990                                        42 Up (1998)
2996     All About My Mother (Todo sobre mi madre) (1999)
3577                                       Baraka (1992)
7373                            Pride and Prejudice (1995)
8840                                  Prime Suspect (1991)
8891                     Strangers in Good Company (1990)
8910                       Tito and Me (Tito i ja) (1992)
8991                    From the Earth to the Moon (1998)
9043   Something Is Happening (Kuch Kuch Hota Hai) (1...
9365                            River, The (He liu) (1997)
9657                                 Love Letter (1995)
9871                   Eddie Izzard: Dress to Kill (1999)
10501  Personal Journey with Martin Scorsese Through ...
10846  Fear City: A Family-Style Comedy (La cité de l...
10908  Last Bolshevik, The (Tombeau d'Alexandre, Le) ...
11232     Moment of Innocence, A (Nun va Goldoon) (1996)
12826     Magic of Méliès, The (magie Méliès, La) (1997)
13166       Good Men, Good Women (Hao nan hao nu) (1995)
14301         Northerners, The (De noorderlingen) (1992)
14873                      Hum Aapke Hain Koun...! (1994)
15916          Nazis: A Warning from History, The (1997)
16025                               Civil War, The (1990)
16121                                     Genesis (1998)
16415                 Prime Suspect: Inner Circles (1995)
16425                Prime Suspect: The Lost Child (1995)
16440                               Runaway Brain (1995)
17647                                 Cowboy Bebop (1998)

                                       genres  year  Action  Adventure  \
27                               Drama|Romance  1995   False      False
46                             Mystery|Thriller  1995   False      False
49                     Crime|Mystery|Thriller  1995   False      False
```

81	Comedy|Drama	1995	False	False
108	Action|Drama|War	1995	True	False
160	Documentary	1994	False	False
211	Drama	1994	False	False
212	Drama|War	1994	False	False
229	Comedy|Drama|Romance	1994	False	False
243	Documentary	1994	False	False
290	Action|Crime|Drama|Thriller	1994	True	False
293	Comedy|Crime|Drama|Thriller	1994	False	False
303	Drama	1994	False	False
315	Crime|Drama	1994	False	False
322	Drama	1994	False	False
352	Comedy|Drama|Romance|War	1994	False	False
523	Drama|War	1993	False	False
587	Crime|Horror|Thriller	1991	False	False
596	Documentary	1994	False	False
602	Comedy|Crime|Drama|Thriller	1996	False	False
668	Drama|Thriller	1993	False	False
708	Adventure|Animation|Comedy	1996	False	True
732	Animation|Children|Comedy	1995	False	False
765	Comedy|Crime|Drama	1996	False	False
787	Drama|Mystery|Western	1996	False	False
976	Comedy|Drama	1996	False	False
1022	Drama	1996	False	False
1067	Crime|Mystery|Thriller	1992	False	False
1124	Documentary	1996	False	False
1125	Animation|Children|Comedy|Crime	1993	False	False
...	...	...	...	...
2772	Comedy|Drama	1999	False	False
2873	Action|Crime|Drama|Thriller	1999	True	False
2914	Action|Adventure|Animation|Drama|Fantasy	1997	True	True
2990	Documentary	1998	False	False
2996	Drama	1999	False	False
3577	Documentary	1992	False	False
7373	Drama|Romance	1995	False	False
8840	Crime|Drama|Mystery|Thriller	1991	False	False
8891	Drama	1990	False	False
8910	Comedy	1992	False	False
8991	Action|Documentary|Drama|Thriller	1998	True	False
9043	Comedy|Musical|Romance	1998	False	False
9365	Drama	1997	False	False
9657	Drama|Romance	1995	False	False
9871	Comedy	1999	False	False
10501	Documentary	1995	False	False
10846	Comedy	1994	False	False
10908	Documentary	1993	False	False
11232	Drama	1996	False	False

```
12826                                Documentary  1997   False      False
13166                              Drama|Romance  1995   False      False
14301                                     Comedy  1992   False      False
14873                       Comedy|Drama|Musical  1994   False      False
15916                            Documentary|War  1997   False      False
16025                            Documentary|War  1990   False      False
16121                               Drama|Horror  1998   False      False
16415                              Drama|Mystery  1995   False      False
16425                              Drama|Mystery  1995   False      False
16440                     Animation|Comedy|Sci-Fi  1995   False      False
17647   Action|Adventure|Animation|Crime|Sci-Fi  1998    True       True

       Animation  Children  ...  Fantasy  Film-Noir  Horror  Musical  Mystery  \
27         False     False  ...    False      False   False    False    False
46         False     False  ...    False      False   False    False     True
49         False     False  ...    False      False   False    False     True
81         False     False  ...    False      False   False    False    False
108        False     False  ...    False      False   False    False    False
160        False     False  ...    False      False   False    False    False
211        False     False  ...    False      False   False    False    False
212        False     False  ...    False      False   False    False    False
229        False     False  ...    False      False   False    False    False
243        False     False  ...    False      False   False    False    False
290        False     False  ...    False      False   False    False    False
293        False     False  ...    False      False   False    False    False
303        False     False  ...    False      False   False    False    False
315        False     False  ...    False      False   False    False    False
322        False     False  ...    False      False   False    False    False
352        False     False  ...    False      False   False    False    False
523        False     False  ...    False      False   False    False    False
587        False     False  ...    False      False    True    False    False
596        False     False  ...    False      False   False    False    False
602        False     False  ...    False      False   False    False    False
668        False     False  ...    False      False   False    False    False
708         True     False  ...    False      False   False    False    False
732         True      True  ...    False      False   False    False    False
765        False     False  ...    False      False   False    False    False
787        False     False  ...    False      False   False    False     True
976        False     False  ...    False      False   False    False    False
1022       False     False  ...    False      False   False    False    False
1067       False     False  ...    False      False   False    False     True
1124       False     False  ...    False      False   False    False    False
1125        True      True  ...    False      False   False    False    False
...          ...       ...  ...      ...        ...     ...      ...      ...
2772       False     False  ...    False      False   False    False    False
2873       False     False  ...    False      False   False    False    False
2914        True     False  ...     True      False   False    False    False
```

2990	False	False	...	False	False	False	False	False
2996	False	False	...	False	False	False	False	False
3577	False	False	...	False	False	False	False	False
7373	False	False	...	False	False	False	False	False
8840	False	False	...	False	False	False	False	True
8891	False	False	...	False	False	False	False	False
8910	False	False	...	False	False	False	False	False
8991	False	False	...	False	False	False	False	False
9043	False	False	...	False	False	False	True	False
9365	False	False	...	False	False	False	False	False
9657	False	False	...	False	False	False	False	False
9871	False	False	...	False	False	False	False	False
10501	False	False	...	False	False	False	False	False
10846	False	False	...	False	False	False	False	False
10908	False	False	...	False	False	False	False	False
11232	False	False	...	False	False	False	False	False
12826	False	False	...	False	False	False	False	False
13166	False	False	...	False	False	False	False	False
14301	False	False	...	False	False	False	False	False
14873	False	False	...	False	False	False	True	False
15916	False	False	...	False	False	False	False	False
16025	False	False	...	False	False	False	False	False
16121	False	False	...	False	False	True	False	False
16415	False	False	...	False	False	False	False	True
16425	False	False	...	False	False	False	False	True
16440	True	False	...	False	False	False	False	False
17647	True	False	...	False	False	False	False	False

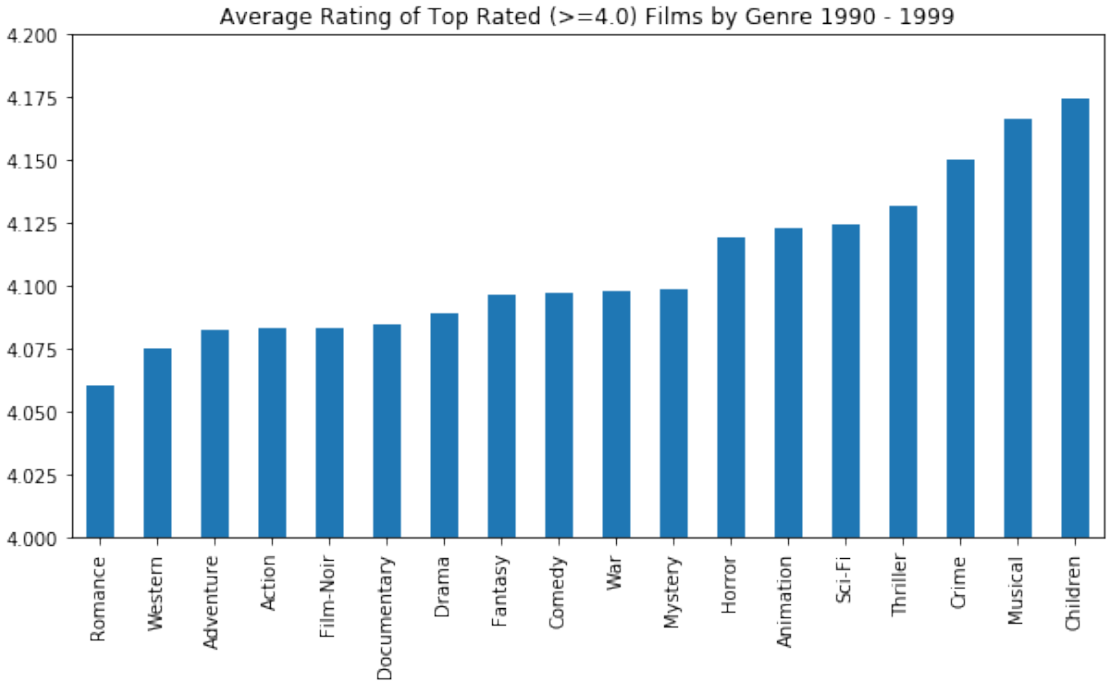
	Romance	Sci-Fi	Thriller	War	Western
27	True	False	False	False	False
46	False	False	True	False	False
49	False	False	True	False	False
81	False	False	False	False	False
108	False	False	False	True	False
160	False	False	False	False	False
211	False	False	False	False	False
212	False	False	False	True	False
229	True	False	False	False	False
243	False	False	False	False	False
290	False	False	True	False	False
293	False	False	True	False	False
303	False	False	False	False	False
315	False	False	False	False	False
322	False	False	False	False	False
352	True	False	False	True	False
523	False	False	False	True	False
587	False	False	True	False	False

```
596      False   False     False  False    False
602      False   False      True  False    False
668      False   False      True  False    False
708      False   False     False  False    False
732      False   False     False  False    False
765      False   False     False  False    False
787      False   False     False  False     True
976      False   False     False  False    False
1022     False   False     False  False    False
1067     False   False      True  False    False
1124     False   False     False  False    False
1125     False   False     False  False    False
...        ...     ...       ...    ...      ...
2772     False   False     False  False    False
2873     False   False      True  False    False
2914     False   False     False  False    False
2990     False   False     False  False    False
2996     False   False     False  False    False
3577     False   False     False  False    False
7373      True   False     False  False    False
8840     False   False      True  False    False
8891     False   False     False  False    False
8910     False   False     False  False    False
8991     False   False      True  False    False
9043      True   False     False  False    False
9365     False   False     False  False    False
9657      True   False     False  False    False
9871     False   False     False  False    False
10501    False   False     False  False    False
10846    False   False     False  False    False
10908    False   False     False  False    False
11232    False   False     False  False    False
12826    False   False     False  False    False
13166     True   False     False  False    False
14301    False   False     False  False    False
14873    False   False     False  False    False
15916    False   False     False   True    False
16025    False   False     False   True    False
16121    False   False     False  False    False
16415    False   False     False  False    False
16425    False   False     False  False    False
16440    False    True     False  False    False
17647    False    True     False  False    False

[80 rows x 24 columns]
```

[162]:
```
avg_top90s = {genre : top90s[top90s[genre]]['rating'].mean() for genre in␣
 ↪genres}
avg_top90s = pd.Series(avg_top90s)
ax = avg_top90s.sort_values().plot(kind='bar', figsize=(10,5), title = "Average␣
 ↪Rating of Top Rated (>=4.0) Films by Genre 1990 - 1999")
ax.set_ylim(4.0,4.2)
```

[162]:
```
(4.0, 4.2)
```



[163]:
```
avg_top90s.sort_values(ascending=False)
```

[163]:
```
Children       4.174192
Musical        4.166667
Crime          4.150173
Thriller       4.131435
Sci-Fi         4.124139
Animation      4.123231
Horror         4.119018
Mystery        4.098482
War            4.097810
Comedy         4.097163
Fantasy        4.096299
Drama          4.089270
Documentary    4.084568
Film-Noir      4.083377
Action         4.083272
```

```
Adventure      4.082715
Western        4.074903
Romance        4.060541
dtype: float64
```

[164]:
```
top90s[genres].sum().sort_values(ascending=False)
```

[164]:
```
Drama          49
Comedy         24
Crime          16
Documentary    14
Thriller       13
Romance        11
Action          9
Mystery         9
War             8
Animation       6
Sci-Fi          3
Horror          3
Adventure       3
Musical         2
Children        2
Western         1
Film-Noir       1
Fantasy         1
dtype: int64
```

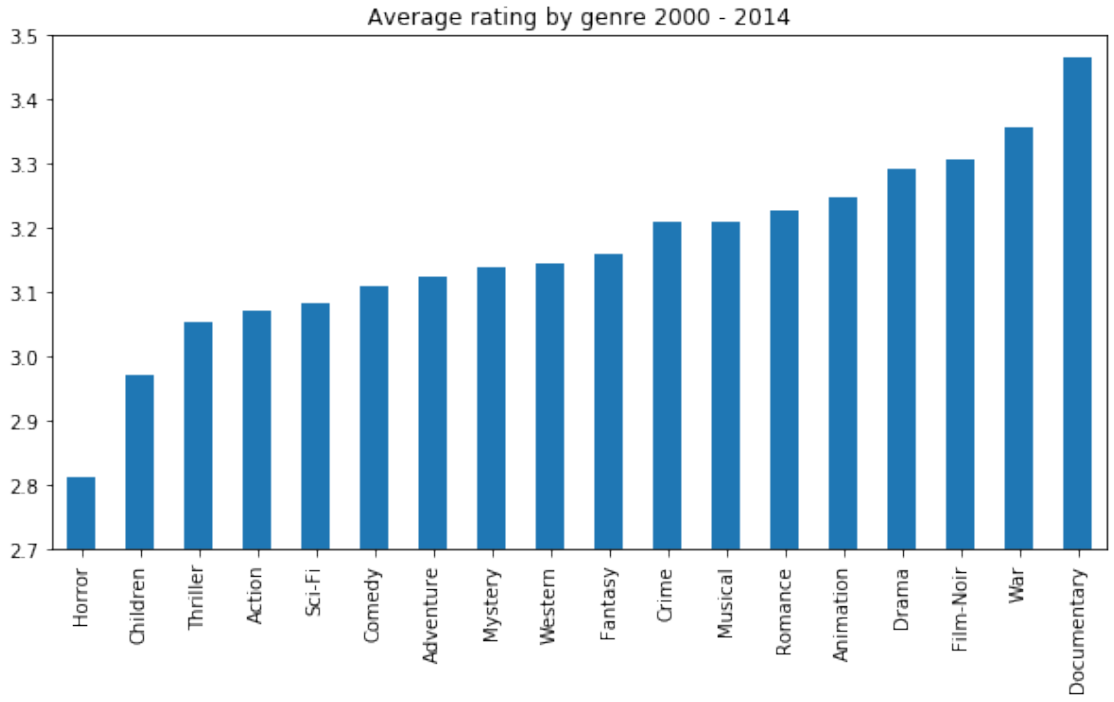
[ ]:
```

```

Let's take a look at the same analysis for films released in the 2000s (2000 - 2014)

[165]:
```
avg_ratings2000s = {genre : genres_list2000s[genres_list2000s[genre]]['rating'].
 ↪mean() for genre in genres}
avg_ratings2000s = pd.Series(avg_ratings2000s)
ax = avg_ratings2000s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average rating by genre 2000 - 2014")
ax.set_ylim(2.7,3.5)
```

[165]:
```
(2.7, 3.5)
```



[166]:
```
avg_ratings2000s.sort_values(ascending=False)
```

[166]:
```
Documentary    3.466128
War            3.356064
Film-Noir      3.306858
Drama          3.290303
Animation      3.246555
Romance        3.226703
Musical        3.210710
Crime          3.208344
Fantasy        3.158915
Western        3.145165
Mystery        3.138727
Adventure      3.125399
Comedy         3.108409
Sci-Fi         3.083934
Action         3.072349
Thriller       3.054528
Children       2.972014
Horror         2.812326
dtype: float64
```

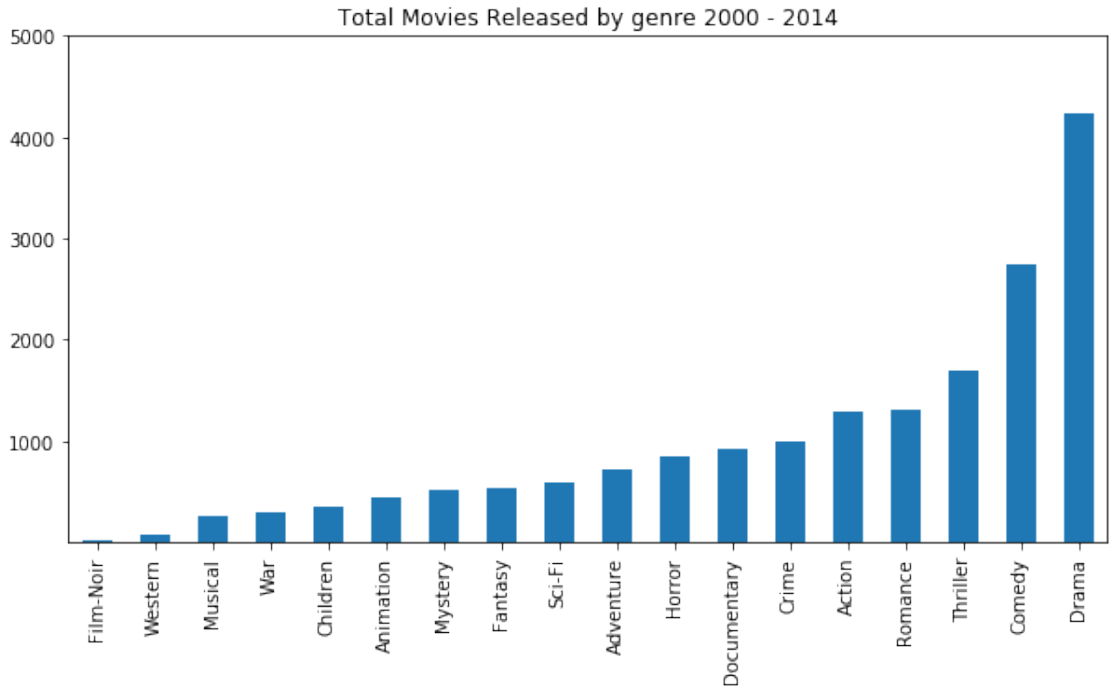
[167]:
```
genres_list2000s[genres].sum().sort_values(ascending=False)
```

[167]:
```
Drama          4241
Comedy         2738
```

```
Thriller       1690
Romance        1316
Action         1295
Crime          1002
Documentary     927
Horror          857
Adventure       724
Sci-Fi          598
Fantasy         535
Mystery         521
Animation       451
Children        350
War             292
Musical         253
Western          67
Film-Noir        19
dtype: int64
```

[233]:
```
ax = genres_list2000s[genres].sum().sort_values().plot(kind='bar',␣
↪figsize=(10,5), title = "Total Movies Released by genre 2000 - 2014")
ax.set_ylim(1,5000)
```

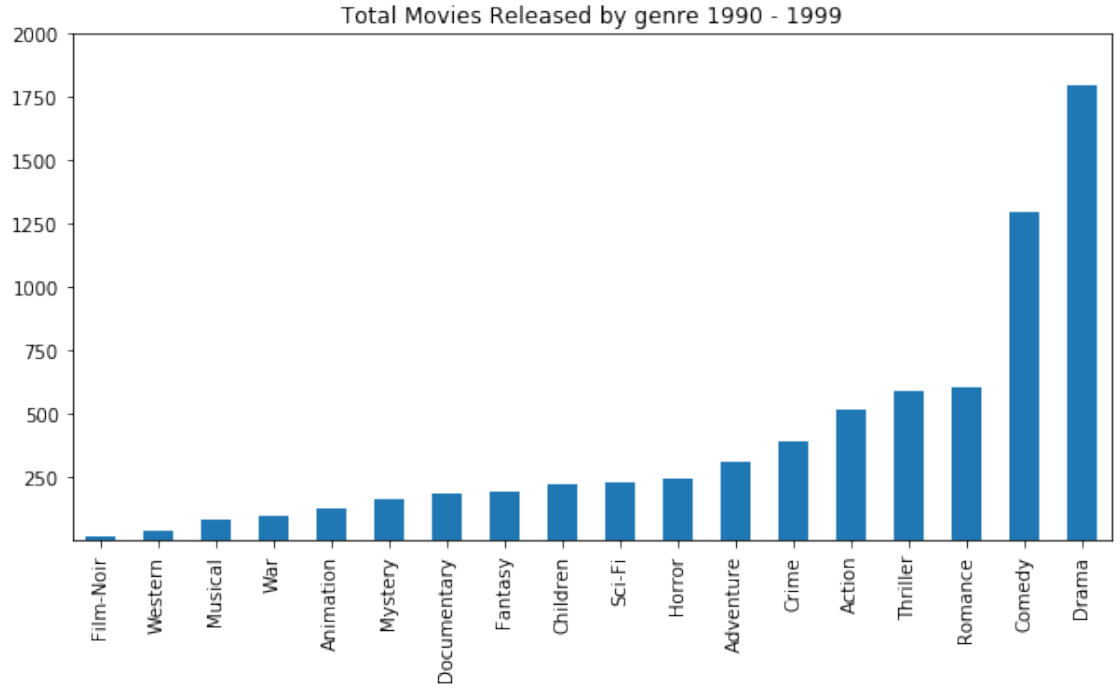
[233]:
```
(1, 5000)
```



[234]:
```
ax = genres_list90s[genres].sum().sort_values().plot(kind='bar',␣
↪figsize=(10,5), title = "Total Movies Released by genre 1990 - 1999")
```

```
ax.set_ylim(1,2000)
```

[234]: (1, 2000)



[170]:
```
genres_list90s[genres].sum().sort_values(ascending=False)
```

[170]:
```
Drama          1796
Comedy         1299
Romance         602
Thriller        592
Action          516
Crime           391
Adventure       308
Horror          245
Sci-Fi          227
Children        221
Fantasy         191
Documentary     185
Mystery         163
Animation       128
War              94
Musical          82
Western          39
Film-Noir        17
dtype: int64
```

[174]:
```
genre_list = list(genres)
```

[175]:
```
genres_rating_list2 = list(avg_ratings2000s)
```

[176]:
```
dfg2 = {'Genre':genres, 'Genres Mean Rating':genres_rating_list2}
```

[177]:
```
genres_rating2 = pd.DataFrame(dfg2)
```

[178]:
```
genres_rating2
```

[178]:

	Genre	Genres Mean Rating
0	Action	3.072349
1	Adventure	3.125399
2	Animation	3.246555
3	Children	2.972014
4	Comedy	3.108409
5	Crime	3.208344
6	Documentary	3.466128
7	Drama	3.290303
8	Fantasy	3.158915
9	Film-Noir	3.306858
10	Horror	2.812326
11	Musical	3.210710
12	Mystery	3.138727
13	Romance	3.226703
14	Sci-Fi	3.083934
15	Thriller	3.054528
16	War	3.356064
17	Western	3.145165

[179]:
```
genres_rating2['Mean'] = genres_rating2['Genres Mean Rating'].mean()
```

[180]:
```
genre_mean2 = round(genres_rating2['Genres Mean Rating'], 2)
```

[181]:
```
genres_rating2['Genre Mean'] = genre_mean2
```

[182]:
```
genres_rating2
```

[182]:

	Genre	Genres Mean Rating	Mean	Genre Mean
0	Action	3.072349	3.165746	3.07
1	Adventure	3.125399	3.165746	3.13
2	Animation	3.246555	3.165746	3.25
3	Children	2.972014	3.165746	2.97
4	Comedy	3.108409	3.165746	3.11
5	Crime	3.208344	3.165746	3.21
6	Documentary	3.466128	3.165746	3.47
7	Drama	3.290303	3.165746	3.29
8	Fantasy	3.158915	3.165746	3.16
9	Film-Noir	3.306858	3.165746	3.31
10	Horror	2.812326	3.165746	2.81
11	Musical	3.210710	3.165746	3.21
12	Mystery	3.138727	3.165746	3.14

```
13      Romance            3.226703  3.165746        3.23
14       Sci-Fi            3.083934  3.165746        3.08
15     Thriller            3.054528  3.165746        3.05
16          War            3.356064  3.165746        3.36
17      Western            3.145165  3.165746        3.15
```

[183]:
```
my_rating_list2 = [round(genres_rating_list2, 2) for genres_rating_list2 in␣
↪genres_rating_list2]
```

[184]:
```
my_rating_list2
```

[184]:
```
[3.07,
 3.13,
 3.25,
 2.97,
 3.11,
 3.21,
 3.47,
 3.29,
 3.16,
 3.31,
 2.81,
 3.21,
 3.14,
 3.23,
 3.08,
 3.05,
 3.36,
 3.15]
```

[185]:
```
overall_mean = round(avg_ratings2000s.mean(), 6)

print(overall_mean)
```

```
3.165746
```

[186]:
```
plt.figure(figsize=(20, 10))

ax1 = plt.subplot(2,1,1)
x = [x for x in range(0, 18)]
xticks_genre_list = genre_list
y = my_rating_list2
plt.xticks(range(len(x)), xticks_genre_list)
plt.scatter(x,y, color='g')
plt.plot(x, genres_rating2['Mean'], color="red")
plt.autoscale(tight=False)
#plt.rcParams["figure.figsize"] = (10,2)
plt.title('Movie Ratings by Genre from 2000 - 2014')
plt.xlabel('Genre')
```

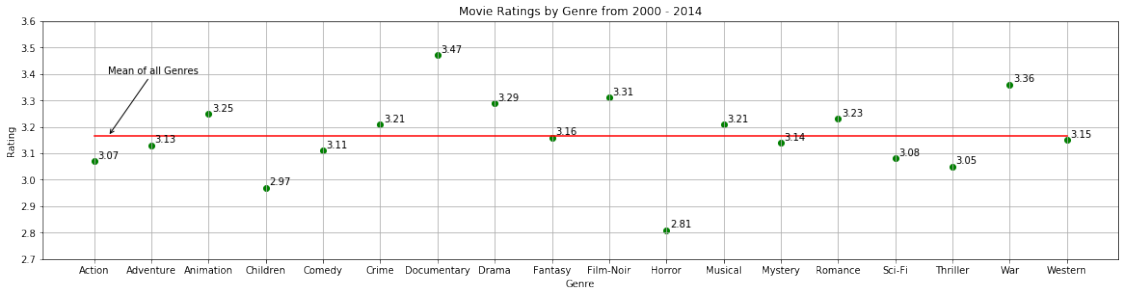
```
plt.ylabel('Rating')
plt.ylim(ymax = 3.6, ymin = 2.7)
plt.grid(True)


plt.annotate("Mean of all Genres",
             xy=(0.25,3.166), xycoords='data',
             xytext=(0.25, 3.4), textcoords='data',
             arrowprops=dict(arrowstyle="->",
                             connectionstyle="arc3"),
             )

for i,j in enumerate( y ):
    ax1.annotate( j, ( x[i] + 0.06, y[i] + 0.01))

plt.savefig(r'2000smovie-ratings-by-genre2.png')

plt.show()
```



Now let's see how the results change if we remove all movies rated 2.5 and below:

[187]:
```
highly_rated2 = genres_list2000s['rating'] > 2.5


high2000s = genres_list2000s[highly_rated2]
high2000s
```

[187]:

	movieId	rating	count	\
2683	2769	3.129956	681	
3090	3177	2.810680	1236	
3138	3225	2.644370	897	
3186	3275	3.947365	8027	
3187	3276	2.925926	297	
3195	3285	3.002591	5404	
3197	3287	2.883117	847	
3207	3298	3.492586	4451	
3209	3300	3.396981	7154	
3210	3301	3.342265	6606	

3212	3303	3.544304	79
3225	3316	2.650063	2369
3226	3317	3.746887	6586
3232	3323	3.067901	81
3233	3324	2.697230	1047
3235	3326	2.750000	962
3262	3353	3.114286	35
3263	3354	2.625766	6365
3314	3408	3.590389	15909
3315	3409	3.121659	5088
3357	3452	2.991702	4037
3358	3453	2.570962	613
3359	3454	2.764624	359
3362	3457	3.143847	577
3386	3481	3.837635	15887
3387	3483	3.181137	1935
3388	3484	2.754047	2224
3414	3510	3.572741	7836
3416	3512	3.559735	2645
3417	3513	3.291599	2464
...	...	...	...
18277	121308	3.083333	6
18278	121366	3.200000	5
18279	121372	3.750000	12
18280	121374	3.666667	9
18281	121483	3.285714	7
18282	122104	4.000000	5
18283	122569	3.000000	6
18284	122940	3.083333	6
18285	123288	3.500000	6
18286	123571	3.350000	10
18287	123947	3.333333	21
18288	124859	2.750000	18
18292	125926	3.166667	6
18297	126430	3.500000	8
18299	126599	3.500000	15
18300	126921	3.083333	6
18301	127021	4.000000	5
18307	127298	4.166667	6
18308	127315	3.250000	6
18309	127319	3.250000	8
18310	127321	2.750000	6
18312	127390	3.531250	16
18313	127441	4.071429	7
18314	128320	3.892857	14
18315	128366	4.000000	5
18322	128671	3.428571	7

```
18327   128914  3.100000      5
18329   128968  2.642857      7
18334   129397  3.300000      5
18336   129514  3.857143      7

                                                    title  \
2683                                  Yards, The (2000)
3090                                Next Friday (2000)
3138                                Down to You (2000)
3186                          Boondock Saints, The (2000)
3187                                     Gun Shy (2000)
3195                                 Beach, The (2000)
3197                            Tigger Movie, The (2000)
3207                                 Boiler Room (2000)
3209                                 Pitch Black (2000)
3210                          Whole Nine Yards, The (2000)
3212   Black Tar Heroin: The Dark End of the Street (...
3225                               Reindeer Games (2000)
3226                                  Wonder Boys (2000)
3232                               Chain of Fools (2000)
3233                                Drowning Mona (2000)
3235                    What Planet Are You From? (2000)
3262                          Closer You Get, The (2000)
3263                              Mission to Mars (2000)
3314                              Erin Brockovich (2000)
3315                            Final Destination (2000)
3357                               Romeo Must Die (2000)
3358                                Here on Earth (2000)
3359                            Whatever It Takes (2000)
3362                              Waking the Dead (2000)
3386                                High Fidelity (2000)
3387                         Road to El Dorado, The (2000)
3388                                   Skulls, The (2000)
3414                                     Frequency (2000)
3416                                  Return to Me (2000)
3417                            Rules of Engagement (2000)
...                                                   ...
18277                         Goodbye to Language 3D (2014)
18278                                   Get a Horse! (2013)
18279                           Bill Burr: Let It Go (2010)
18280                 Bill Burr: Why Do I Do This? (2008)
18281                           At the Devil's Door (2014)
18282                  Kevin Hart: Seriously Funny (2010)
18283                                       Non-Stop (2013)
18284                                 Clear History (2013)
18285                                        Taken (2002)
18286                 Jim Jefferies: Alcoholocaust (2010)
```

```
18287                                      Cake (2014)
18288                                The Gambler (2014)
18292                                     Kiwi! (2006)
18297                                The Pacific (2010)
18299                            The Little Death (2014)
18300                    The Fox and the Hound 2 (2006)
18301                                 Rewind This! (2013)
18307  A Pigeon Sat on a Branch Reflecting on Existen...
18308                                Alien Outpost (2014)
18309                                     The Loft (2014)
18310                           [REC] 4: Apocalypse (2014)
18312          Family Guy Presents: Blue Harvest (2007)
18313                         Last Days in Vietnam (2014)
18314  Monty Python: Almost the Truth - Lawyers Cut (...
18315  Patton Oswalt: Tragedy Plus Comedy Equals Time...
18322                                     Timbuktu (2014)
18327              Tom Segura: Completely Normal (2014)
18329                            Stitch! The Movie (2003)
18334                   Marvel One-Shot: Item 47 (2012)
18336            George Carlin: It's Bad for Ya! (2008)

                                    genres  year  Action  Adventure  \
2683                          Crime|Drama  2000   False      False
3090                               Comedy  2000   False      False
3138                        Comedy|Romance  2000   False      False
3186          Action|Crime|Drama|Thriller  2000    True      False
3187                               Comedy  2000   False      False
3195                      Adventure|Drama  2000   False       True
3197                    Animation|Children  2000   False      False
3207                  Crime|Drama|Thriller  2000   False      False
3209                Horror|Sci-Fi|Thriller  2000   False      False
3210                          Comedy|Crime  2000   False      False
3212                           Documentary  2000   False      False
3225                        Action|Thriller  2000    True      False
3226                          Comedy|Drama  2000   False      False
3232                          Comedy|Crime  2000   False      False
3233                               Comedy  2000   False      False
3235                         Comedy|Sci-Fi  2000   False      False
3262                        Comedy|Romance  2000   False      False
3263                                Sci-Fi  2000   False      False
3314                                 Drama  2000   False      False
3315                         Drama|Thriller  2000   False      False
3357        Action|Crime|Romance|Thriller  2000    True      False
3358                         Drama|Romance  2000   False      False
3359                        Comedy|Romance  2000   False      False
3362                         Drama|Thriller  2000   False      False
3386                  Comedy|Drama|Romance  2000   False      False
```

```
3387                    Animation|Children  2000   False      False
3388                              Thriller  2000   False      False
3414                        Drama|Thriller  2000   False      False
3416                         Drama|Romance  2000   False      False
3417                        Drama|Thriller  2000   False      False
...                                    ...   ...     ...        ...
18277                                Drama  2014   False      False
18278           Animation|Children|Comedy  2013   False      False
18279                               Comedy  2010   False      False
18280                               Comedy  2008   False      False
18281                               Horror  2014   False      False
18282                               Comedy  2010   False      False
18283              Drama|Mystery|Thriller  2013   False      False
18284                               Comedy  2013   False      False
18285                               Sci-Fi  2002   False      False
18286                               Comedy  2010   False      False
18287                                Drama  2014   False      False
18288                Crime|Drama|Thriller  2014   False      False
18292                    Action|Animation  2006    True      False
18297          Action|Adventure|Drama|War  2010    True       True
18299                               Comedy  2014   False      False
18300  Adventure|Animation|Children|Comedy  2006   False       True
18301                          Documentary  2013   False      False
18307                        Comedy|Drama  2014   False      False
18308             Action|Sci-Fi|Thriller  2014    True      False
18309                             Thriller  2014   False      False
18310                     Horror|Thriller  2014   False      False
18312                    Animation|Comedy  2007   False      False
18313                     Documentary|War  2014   False      False
18314                  Comedy|Documentary  2009   False      False
18315                               Comedy  2014   False      False
18322                                Drama  2014   False      False
18327                               Comedy  2014   False      False
18329           Animation|Children|Comedy  2003   False      False
18334               Action|Fantasy|Sci-Fi  2012    True      False
18336                               Comedy  2008   False      False

       Animation  Children  ...  Fantasy  Film-Noir  Horror  Musical  Mystery  \
2683       False     False  ...    False      False   False    False    False
3090       False     False  ...    False      False   False    False    False
3138       False     False  ...    False      False   False    False    False
3186       False     False  ...    False      False   False    False    False
3187       False     False  ...    False      False   False    False    False
3195       False     False  ...    False      False   False    False    False
3197        True      True  ...    False      False   False    False    False
3207       False     False  ...    False      False   False    False    False
3209       False     False  ...    False      False    True    False    False
```

3210	False	False	...	False	False	False	False	False
3212	False	False	...	False	False	False	False	False
3225	False	False	...	False	False	False	False	False
3226	False	False	...	False	False	False	False	False
3232	False	False	...	False	False	False	False	False
3233	False	False	...	False	False	False	False	False
3235	False	False	...	False	False	False	False	False
3262	False	False	...	False	False	False	False	False
3263	False	False	...	False	False	False	False	False
3314	False	False	...	False	False	False	False	False
3315	False	False	...	False	False	False	False	False
3357	False	False	...	False	False	False	False	False
3358	False	False	...	False	False	False	False	False
3359	False	False	...	False	False	False	False	False
3362	False	False	...	False	False	False	False	False
3386	False	False	...	False	False	False	False	False
3387	True	True	...	False	False	False	False	False
3388	False	False	...	False	False	False	False	False
3414	False	False	...	False	False	False	False	False
3416	False	False	...	False	False	False	False	False
3417	False	False	...	False	False	False	False	False
...	...	...	...	...	...	...	...	...
18277	False	False	...	False	False	False	False	False
18278	True	True	...	False	False	False	False	False
18279	False	False	...	False	False	False	False	False
18280	False	False	...	False	False	False	False	False
18281	False	False	...	False	False	True	False	False
18282	False	False	...	False	False	False	False	False
18283	False	False	...	False	False	False	False	True
18284	False	False	...	False	False	False	False	False
18285	False	False	...	False	False	False	False	False
18286	False	False	...	False	False	False	False	False
18287	False	False	...	False	False	False	False	False
18288	False	False	...	False	False	False	False	False
18292	True	False	...	False	False	False	False	False
18297	False	False	...	False	False	False	False	False
18299	False	False	...	False	False	False	False	False
18300	True	True	...	False	False	False	False	False
18301	False	False	...	False	False	False	False	False
18307	False	False	...	False	False	False	False	False
18308	False	False	...	False	False	False	False	False
18309	False	False	...	False	False	False	False	False
18310	False	False	...	False	False	True	False	False
18312	True	False	...	False	False	False	False	False
18313	False	False	...	False	False	False	False	False
18314	False	False	...	False	False	False	False	False
18315	False	False	...	False	False	False	False	False

18322	False	False	...	False	False	False	False	False
18327	False	False	...	False	False	False	False	False
18329	True	True	...	False	False	False	False	False
18334	False	False	...	True	False	False	False	False
18336	False	False	...	False	False	False	False	False

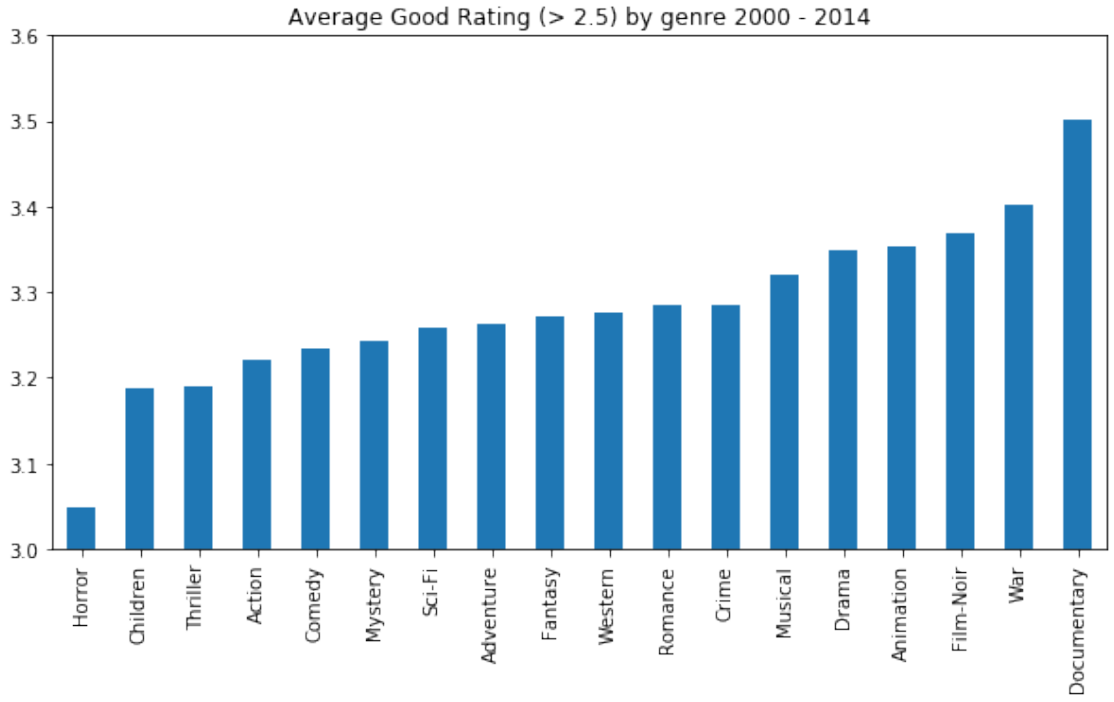
	Romance	Sci-Fi	Thriller	War	Western
2683	False	False	False	False	False
3090	False	False	False	False	False
3138	True	False	False	False	False
3186	False	False	True	False	False
3187	False	False	False	False	False
3195	False	False	False	False	False
3197	False	False	False	False	False
3207	False	False	True	False	False
3209	False	True	True	False	False
3210	False	False	False	False	False
3212	False	False	False	False	False
3225	False	False	True	False	False
3226	False	False	False	False	False
3232	False	False	False	False	False
3233	False	False	False	False	False
3235	False	True	False	False	False
3262	True	False	False	False	False
3263	False	True	False	False	False
3314	False	False	False	False	False
3315	False	False	True	False	False
3357	True	False	True	False	False
3358	True	False	False	False	False
3359	True	False	False	False	False
3362	False	False	True	False	False
3386	True	False	False	False	False
3387	False	False	False	False	False
3388	False	False	True	False	False
3414	False	False	True	False	False
3416	True	False	False	False	False
3417	False	False	True	False	False
...	...	...	...	...	...
18277	False	False	False	False	False
18278	False	False	False	False	False
18279	False	False	False	False	False
18280	False	False	False	False	False
18281	False	False	False	False	False
18282	False	False	False	False	False
18283	False	False	True	False	False
18284	False	False	False	False	False
18285	False	True	False	False	False

```
18286    False   False     False  False    False
18287    False   False     False  False    False
18288    False   False      True  False    False
18292    False   False     False  False    False
18297    False   False     False   True    False
18299    False   False     False  False    False
18300    False   False     False  False    False
18301    False   False     False  False    False
18307    False   False     False  False    False
18308    False    True      True  False    False
18309    False   False      True  False    False
18310    False   False      True  False    False
18312    False   False     False  False    False
18313    False   False     False   True    False
18314    False   False     False  False    False
18315    False   False     False  False    False
18322    False   False     False  False    False
18327    False   False     False  False    False
18329    False   False     False  False    False
18334    False    True     False  False    False
18336    False   False     False  False    False

[7553 rows x 24 columns]
```

[188]:
```
avg_high2000s = {genre : high2000s[high2000s[genre]]['rating'].mean() for genre␣
 ↪in genres}
avg_high2000s = pd.Series(avg_high2000s)
ax = avg_high2000s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average Good Rating (> 2.5) by genre 2000 - 2014")
ax.set_ylim(3.0,3.6)
```

[188]:
```
(3.0, 3.6)
```



[189]:
```
avg_high2000s.sort_values(ascending=False)
```

[189]:
```
Documentary    3.501485
War            3.402021
Film-Noir      3.368350
Animation      3.352675
Drama          3.347927
Musical        3.321282
Crime          3.285026
Romance        3.284519
Western        3.275129
Fantasy        3.270979
Adventure      3.262988
Sci-Fi         3.257791
Mystery        3.243585
Comedy         3.234644
Action         3.220599
Thriller       3.188978
Children       3.188679
Horror         3.048131
dtype: float64
```

[190]:
```
high2000s[genres].sum().sort_values(ascending=False)
```

[190]:
```
Drama          4020
Comedy         2419
```

```
Thriller       1456
Romance        1252
Action         1124
Crime           933
Documentary     903
Adventure       636
Horror          634
Sci-Fi          507
Fantasy         480
Mystery         466
Animation       412
War             281
Children        281
Musical         231
Western          59
Film-Noir        18
dtype: int64
```

[191]:
```
avg_ratings2000s.sort_values(ascending=False)
```

[191]:
```
Documentary    3.466128
War            3.356064
Film-Noir      3.306858
Drama          3.290303
Animation      3.246555
Romance        3.226703
Musical        3.210710
Crime          3.208344
Fantasy        3.158915
Western        3.145165
Mystery        3.138727
Adventure      3.125399
Comedy         3.108409
Sci-Fi         3.083934
Action         3.072349
Thriller       3.054528
Children       2.972014
Horror         2.812326
dtype: float64
```

[192]:
```
genres_list2000s[genres].sum().sort_values(ascending=False)
```

[192]:
```
Drama          4241
Comedy         2738
Thriller       1690
Romance        1316
Action         1295
Crime          1002
Documentary     927
```

```
Horror          857
Adventure       724
Sci-Fi          598
Fantasy         535
Mystery         521
Animation       451
Children        350
War             292
Musical         253
Western          67
Film-Noir        19
dtype: int64
```

Try with dropping <= 3.0

[193]:
```
highest_rated2 = genres_list2000s['rating'] > 3.0


highest2000s = genres_list2000s[highest_rated2]
highest2000s
```

[193]:
```
      movieId    rating  count  \
2683     2769  3.129956    681
3186     3275  3.947365   8027
3195     3285  3.002591   5404
3207     3298  3.492586   4451
3209     3300  3.396981   7154
3210     3301  3.342265   6606
3212     3303  3.544304     79
3226     3317  3.746887   6586
3232     3323  3.067901     81
3262     3353  3.114286     35
3314     3408  3.590389  15909
3315     3409  3.121659   5088
3362     3457  3.143847    577
3386     3481  3.837635  15887
3387     3483  3.181137   1935
3414     3510  3.572741   7836
3416     3512  3.559735   2645
3417     3513  3.291599   2464
3418     3514  3.290000    250
3419     3515  3.134866   1153
3437     3534  3.092077   4670
3438     3535  3.503782   8593
3439     3536  3.459459   4033
3440     3537  3.106618    272
3442     3539  3.752847    439
3457     3554  3.431170   1017
3458     3555  3.340377   6791
```

```
3467      3565  3.285597   1826
3468      3566  3.286811   1433
3469      3567  3.452778    180
...        ...       ...    ...
18266   121035  3.444444      9
18272   121171  3.600000      5
18273   121227  4.000000      6
18274   121231  3.733333     15
18277   121308  3.083333      6
18278   121366  3.200000      5
18279   121372  3.750000     12
18280   121374  3.666667      9
18281   121483  3.285714      7
18282   122104  4.000000      5
18284   122940  3.083333      6
18285   123288  3.500000      6
18286   123571  3.350000     10
18287   123947  3.333333     21
18292   125926  3.166667      6
18297   126430  3.500000      8
18299   126599  3.500000     15
18300   126921  3.083333      6
18301   127021  4.000000      5
18307   127298  4.166667      6
18308   127315  3.250000      6
18309   127319  3.250000      8
18312   127390  3.531250     16
18313   127441  4.071429      7
18314   128320  3.892857     14
18315   128366  4.000000      5
18322   128671  3.428571      7
18327   128914  3.100000      5
18334   129397  3.300000      5
18336   129514  3.857143      7

                                                    title  \
2683                                    Yards, The (2000)
3186                           Boondock Saints, The (2000)
3195                                    Beach, The (2000)
3207                                   Boiler Room (2000)
3209                                   Pitch Black (2000)
3210                          Whole Nine Yards, The (2000)
3212   Black Tar Heroin: The Dark End of the Street (...
3226                                   Wonder Boys (2000)
3232                                Chain of Fools (2000)
3262                            Closer You Get, The (2000)
3314                                Erin Brockovich (2000)
```

3315	Final Destination (2000)
3362	Waking the Dead (2000)
3386	High Fidelity (2000)
3387	Road to El Dorado, The (2000)
3414	Frequency (2000)
3416	Return to Me (2000)
3417	Rules of Engagement (2000)
3418	Joe Gould's Secret (2000)
3419	Me Myself I (2000)
3437	28 Days (2000)
3438	American Psycho (2000)
3439	Keeping the Faith (2000)
3440	Where the Money Is (2000)
3442	Filth and the Fury, The (2000)
3457	Love and Basketball (2000)
3458	U-571 (2000)
3467	Where the Heart Is (2000)
3468	Big Kahuna, The (2000)
3469	Bossa Nova (2000)
...	...
18266	Houdini (2014)
18272	Red Army (2014)
18273	Supermensch: The Legend of Shep Gordon (2013)
18274	It Follows (2014)
18277	Goodbye to Language 3D (2014)
18278	Get a Horse! (2013)
18279	Bill Burr: Let It Go (2010)
18280	Bill Burr: Why Do I Do This? (2008)
18281	At the Devil's Door (2014)
18282	Kevin Hart: Seriously Funny (2010)
18284	Clear History (2013)
18285	Taken (2002)
18286	Jim Jefferies: Alcoholocaust (2010)
18287	Cake (2014)
18292	Kiwi! (2006)
18297	The Pacific (2010)
18299	The Little Death (2014)
18300	The Fox and the Hound 2 (2006)
18301	Rewind This! (2013)
18307	A Pigeon Sat on a Branch Reflecting on Existen...
18308	Alien Outpost (2014)
18309	The Loft (2014)
18312	Family Guy Presents: Blue Harvest (2007)
18313	Last Days in Vietnam (2014)
18314	Monty Python: Almost the Truth - Lawyers Cut (...
18315	Patton Oswalt: Tragedy Plus Comedy Equals Time...
18322	Timbuktu (2014)

```
18327              Tom Segura: Completely Normal (2014)
18334                   Marvel One-Shot: Item 47 (2012)
18336            George Carlin: It's Bad for Ya! (2008)

                                  genres  year  Action  Adventure  \
2683                         Crime|Drama  2000   False      False
3186           Action|Crime|Drama|Thriller  2000    True      False
3195                      Adventure|Drama  2000   False       True
3207                Crime|Drama|Thriller  2000   False      False
3209               Horror|Sci-Fi|Thriller  2000   False      False
3210                        Comedy|Crime  2000   False      False
3212                         Documentary  2000   False      False
3226                        Comedy|Drama  2000   False      False
3232                        Comedy|Crime  2000   False      False
3262                      Comedy|Romance  2000   False      False
3314                               Drama  2000   False      False
3315                       Drama|Thriller  2000   False      False
3362                       Drama|Thriller  2000   False      False
3386                 Comedy|Drama|Romance  2000   False      False
3387                   Animation|Children  2000   False      False
3414                       Drama|Thriller  2000   False      False
3416                        Drama|Romance  2000   False      False
3417                       Drama|Thriller  2000   False      False
3418                               Drama  2000   False      False
3419                      Comedy|Romance  2000   False      False
3437                               Drama  2000   False      False
3438         Crime|Horror|Mystery|Thriller  2000   False      False
3439                  Comedy|Drama|Romance  2000   False      False
3440                         Comedy|Drama  2000   False      False
3442                         Documentary  2000   False      False
3457                        Drama|Romance  2000   False      False
3458                 Action|Thriller|War  2000    True      False
3467                         Comedy|Drama  2000   False      False
3468                         Comedy|Drama  2000   False      False
3469                  Comedy|Drama|Romance  2000   False      False
...                                   ...   ...     ...        ...
18266                              Drama  2014   False      False
18272                        Documentary  2014   False      False
18273                        Documentary  2013   False      False
18274                             Horror  2014   False      False
18277                              Drama  2014   False      False
18278            Animation|Children|Comedy  2013   False      False
18279                             Comedy  2010   False      False
18280                             Comedy  2008   False      False
18281                             Horror  2014   False      False
18282                             Comedy  2010   False      False
18284                             Comedy  2013   False      False
```

18285	Sci-Fi	2002	False	False	
18286	Comedy	2010	False	False	
18287	Drama	2014	False	False	
18292	Action|Animation	2006	True	False	
18297	Action|Adventure|Drama|War	2010	True	True	
18299	Comedy	2014	False	False	
18300	Adventure|Animation|Children|Comedy	2006	False	True	
18301	Documentary	2013	False	False	
18307	Comedy|Drama	2014	False	False	
18308	Action|Sci-Fi|Thriller	2014	True	False	
18309	Thriller	2014	False	False	
18312	Animation|Comedy	2007	False	False	
18313	Documentary|War	2014	False	False	
18314	Comedy|Documentary	2009	False	False	
18315	Comedy	2014	False	False	
18322	Drama	2014	False	False	
18327	Comedy	2014	False	False	
18334	Action|Fantasy|Sci-Fi	2012	True	False	
18336	Comedy	2008	False	False	

	Animation	Children	...	Fantasy	Film-Noir	Horror	Musical	Mystery	\
2683	False	False	...	False	False	False	False	False	
3186	False	False	...	False	False	False	False	False	
3195	False	False	...	False	False	False	False	False	
3207	False	False	...	False	False	False	False	False	
3209	False	False	...	False	False	True	False	False	
3210	False	False	...	False	False	False	False	False	
3212	False	False	...	False	False	False	False	False	
3226	False	False	...	False	False	False	False	False	
3232	False	False	...	False	False	False	False	False	
3262	False	False	...	False	False	False	False	False	
3314	False	False	...	False	False	False	False	False	
3315	False	False	...	False	False	False	False	False	
3362	False	False	...	False	False	False	False	False	
3386	False	False	...	False	False	False	False	False	
3387	True	True	...	False	False	False	False	False	
3414	False	False	...	False	False	False	False	False	
3416	False	False	...	False	False	False	False	False	
3417	False	False	...	False	False	False	False	False	
3418	False	False	...	False	False	False	False	False	
3419	False	False	...	False	False	False	False	False	
3437	False	False	...	False	False	False	False	False	
3438	False	False	...	False	False	True	False	True	
3439	False	False	...	False	False	False	False	False	
3440	False	False	...	False	False	False	False	False	
3442	False	False	...	False	False	False	False	False	
3457	False	False	...	False	False	False	False	False	

3458	False	False	...	False	False	False	False	False
3467	False	False	...	False	False	False	False	False
3468	False	False	...	False	False	False	False	False
3469	False	False	...	False	False	False	False	False
...	...	...	...	...	...	...	...	...
18266	False	False	...	False	False	False	False	False
18272	False	False	...	False	False	False	False	False
18273	False	False	...	False	False	False	False	False
18274	False	False	...	False	False	True	False	False
18277	False	False	...	False	False	False	False	False
18278	True	True	...	False	False	False	False	False
18279	False	False	...	False	False	False	False	False
18280	False	False	...	False	False	False	False	False
18281	False	False	...	False	False	True	False	False
18282	False	False	...	False	False	False	False	False
18284	False	False	...	False	False	False	False	False
18285	False	False	...	False	False	False	False	False
18286	False	False	...	False	False	False	False	False
18287	False	False	...	False	False	False	False	False
18292	True	False	...	False	False	False	False	False
18297	False	False	...	False	False	False	False	False
18299	False	False	...	False	False	False	False	False
18300	True	True	...	False	False	False	False	False
18301	False	False	...	False	False	False	False	False
18307	False	False	...	False	False	False	False	False
18308	False	False	...	False	False	False	False	False
18309	False	False	...	False	False	False	False	False
18312	True	False	...	False	False	False	False	False
18313	False	False	...	False	False	False	False	False
18314	False	False	...	False	False	False	False	False
18315	False	False	...	False	False	False	False	False
18322	False	False	...	False	False	False	False	False
18327	False	False	...	False	False	False	False	False
18334	False	False	...	True	False	False	False	False
18336	False	False	...	False	False	False	False	False

	Romance	Sci-Fi	Thriller	War	Western
2683	False	False	False	False	False
3186	False	False	True	False	False
3195	False	False	False	False	False
3207	False	False	True	False	False
3209	False	True	True	False	False
3210	False	False	False	False	False
3212	False	False	False	False	False
3226	False	False	False	False	False
3232	False	False	False	False	False
3262	True	False	False	False	False

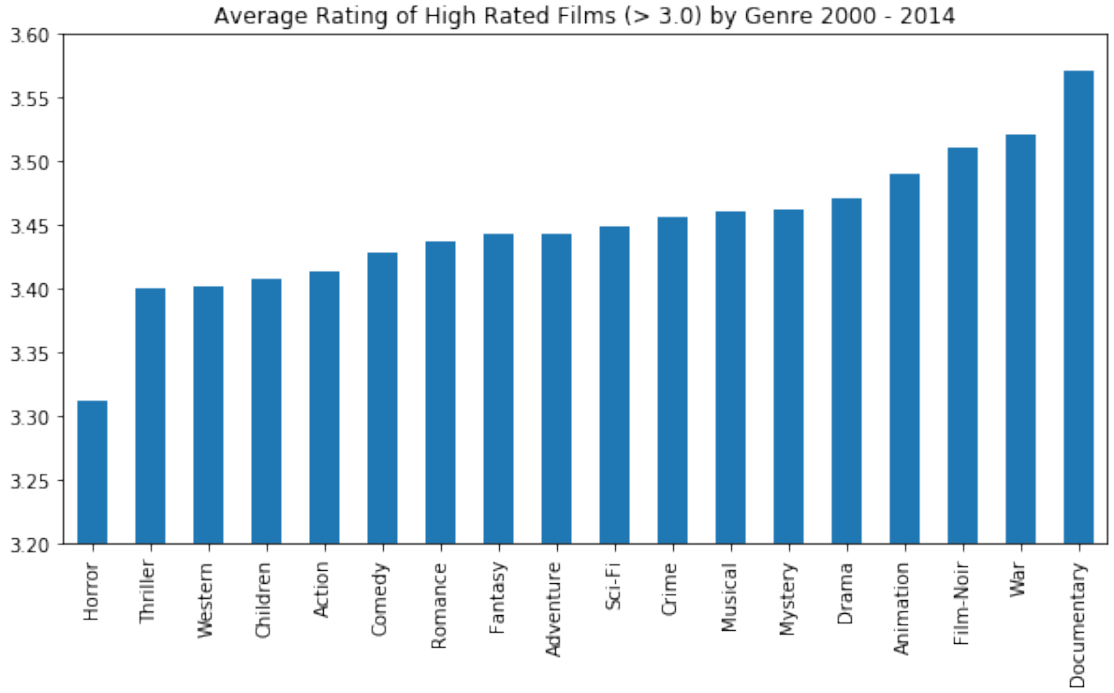
3314	False	False	False	False	False
3315	False	False	True	False	False
3362	False	False	True	False	False
3386	True	False	False	False	False
3387	False	False	False	False	False
3414	False	False	True	False	False
3416	True	False	False	False	False
3417	False	False	True	False	False
3418	False	False	False	False	False
3419	True	False	False	False	False
3437	False	False	False	False	False
3438	False	False	True	False	False
3439	True	False	False	False	False
3440	False	False	False	False	False
3442	False	False	False	False	False
3457	True	False	False	False	False
3458	False	False	True	True	False
3467	False	False	False	False	False
3468	False	False	False	False	False
3469	True	False	False	False	False
...	...	...	...	...	...
18266	False	False	False	False	False
18272	False	False	False	False	False
18273	False	False	False	False	False
18274	False	False	False	False	False
18277	False	False	False	False	False
18278	False	False	False	False	False
18279	False	False	False	False	False
18280	False	False	False	False	False
18281	False	False	False	False	False
18282	False	False	False	False	False
18284	False	False	False	False	False
18285	False	True	False	False	False
18286	False	False	False	False	False
18287	False	False	False	False	False
18292	False	False	False	False	False
18297	False	False	False	True	False
18299	False	False	False	False	False
18300	False	False	False	False	False
18301	False	False	False	False	False
18307	False	False	False	False	False
18308	False	True	True	False	False
18309	False	False	True	False	False
18312	False	False	False	False	False
18313	False	False	False	True	False
18314	False	False	False	False	False
18315	False	False	False	False	False

```
18322    False   False     False  False    False
18327    False   False     False  False    False
18334    False    True     False  False    False
18336    False   False     False  False    False

[5720 rows x 24 columns]
```

[194]:
```
avg_highest2000s = {genre : highest2000s[highest2000s[genre]]['rating'].mean()␣
 ↪for genre in genres}
avg_highest2000s = pd.Series(avg_highest2000s)
ax = avg_highest2000s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average Rating of High Rated Films (> 3.0) by Genre 2000 - 2014")
ax.set_ylim(3.2,3.6)
```

[194]: (3.2, 3.6)



[195]:
```
avg_highest2000s.sort_values(ascending=False)
```

[195]:
```
Documentary    3.571069
War            3.520386
Film-Noir      3.510992
Animation      3.490625
Drama          3.470775
Mystery        3.462157
Musical        3.460665
Crime          3.455896
```

```
Sci-Fi         3.448534
Adventure      3.443347
Fantasy        3.443187
Romance        3.437627
Comedy         3.427827
Action         3.412829
Children       3.406900
Western        3.401198
Thriller       3.399684
Horror         3.312025
dtype: float64
```

[196]:
```
highest2000s[genres].sum().sort_values(ascending=False)
```

[196]:
```
Drama          3267
Comedy         1684
Thriller        953
Romance         950
Documentary     818
Action          774
Crime           686
Adventure       462
Sci-Fi          360
Fantasy         355
Animation       327
Horror          325
Mystery         316
War             233
Children        186
Musical         180
Western          45
Film-Noir        14
dtype: int64
```

[197]:
```
high2000s[genres].sum().sort_values(ascending=False)
```

[197]:
```
Drama          4020
Comedy         2419
Thriller       1456
Romance        1252
Action         1124
Crime           933
Documentary     903
Adventure       636
Horror          634
Sci-Fi          507
Fantasy         480
Mystery         466
Animation       412
```

```
War             281
Children        281
Musical         231
Western          59
Film-Noir        18
dtype: int64
```

[198]:
```
avg_high2000s.sort_values(ascending=False)
```

[198]:
```
Documentary    3.501485
War            3.402021
Film-Noir      3.368350
Animation      3.352675
Drama          3.347927
Musical        3.321282
Crime          3.285026
Romance        3.284519
Western        3.275129
Fantasy        3.270979
Adventure      3.262988
Sci-Fi         3.257791
Mystery        3.243585
Comedy         3.234644
Action         3.220599
Thriller       3.188978
Children       3.188679
Horror         3.048131
dtype: float64
```

[199]:
```
avg_ratings2000s.sort_values(ascending=False)
```

[199]:
```
Documentary    3.466128
War            3.356064
Film-Noir      3.306858
Drama          3.290303
Animation      3.246555
Romance        3.226703
Musical        3.210710
Crime          3.208344
Fantasy        3.158915
Western        3.145165
Mystery        3.138727
Adventure      3.125399
Comedy         3.108409
Sci-Fi         3.083934
Action         3.072349
Thriller       3.054528
Children       2.972014
Horror         2.812326
```

```
dtype: float64
```

Which Genre had the most highest rated (>= 4.0) films, and average highest rating for Highest Rated Films?

[200]:
```
top_rated2 = genres_list2000s['rating'] >= 4.0


top2000s = genres_list2000s[top_rated2]
top2000s
```

[200]:

	movieId	rating	count	\
3846	3949	4.033586	14515	
3880	3983	4.054771	2903	
3908	4011	4.042147	17617	
4040	4144	4.026479	2096	
4122	4226	4.178547	30443	
4131	4235	4.016875	5511	
4770	4878	4.015990	18731	
4865	4973	4.197072	24349	
4885	4993	4.137925	37553	
5503	5618	4.203810	13466	
5831	5952	4.107521	33947	
5874	5995	4.053923	10515	
5895	6016	4.235410	12937	
6948	7096	4.001825	274	
6992	7140	4.000000	5	
7004	7153	4.142382	31577	
7007	7156	4.103515	2589	
7106	7256	4.048281	2123	
7211	7361	4.105628	22352	
7315	7502	4.263182	4305	
7420	7767	4.032941	425	
7573	8014	4.021911	1643	
9126	27423	4.269231	13	
9183	27611	4.025659	2884	
9256	27773	4.091026	6207	
9345	30749	4.040221	8416	
9353	30803	4.012054	1037	
9452	31410	4.022386	3998	
9496	31658	4.066078	5607	
10397	43267	4.000000	13	
...	...	...	...	
17230	104069	4.040493	284	
17290	104636	4.233333	15	
17305	104829	4.083333	6	
17443	106334	4.000000	11	
17547	107555	4.100000	5	
17566	107725	4.000000	6	

```
17613   108514  4.000000      8
17692   109487  4.023864   1739
17855   111778  4.000000     26
17856   111783  4.214286      7
17877   112165  4.000000      9
17889   112293  4.000000      6
17901   112454  4.100000      5
17912   112552  4.074751    602
17962   113315  4.500000     11
18018   114263  4.000000      5
18035   114635  4.000000      8
18061   114933  4.200000      5
18124   115998  4.500000      5
18130   116155  4.000000      7
18219   118880  4.000000     16
18239   119565  4.200000      5
18252   120478  4.125000      8
18260   120823  4.000000      5
18273   121227  4.000000      6
18282   122104  4.000000      5
18301   127021  4.000000      5
18307   127298  4.166667      6
18313   127441  4.071429      7
18315   128366  4.000000      5

                                                    title  \
3846                          Requiem for a Dream (2000)
3880                          You Can Count on Me (2000)
3908                                       Snatch (2000)
4040       In the Mood For Love (Fa yeung nin wa) (2000)
4122                                     Memento (2000)
4131               Amores Perros (Love's a Bitch) (2000)
4770                                  Donnie Darko (2001)
4865   Amelie (Fabuleux destin d'Amélie Poulain, Le) ...
4885   Lord of the Rings: The Fellowship of the Ring,...
5503   Spirited Away (Sen to Chihiro no kamikakushi) ...
5831       Lord of the Rings: The Two Towers, The (2002)
5874                                  Pianist, The (2002)
5895                City of God (Cidade de Deus) (2002)
6948                             Rivers and Tides (2001)
6992                 Legend of Leigh Bowery, The (2002)
7004   Lord of the Rings: The Return of the King, The...
7007   Fog of War: Eleven Lessons from the Life of Ro...
7106                            Touching the Void (2003)
7211        Eternal Sunshine of the Spotless Mind (2004)
7315                             Band of Brothers (2001)
7420      Best of Youth, The (La meglio gioventù) (2003)
```

```
7573   Spring, Summer, Fall, Winter... and Spring (Bo...
9126        O Auto da Compadecida (Dog's Will, A) (2000)
9183                          Battlestar Galactica (2003)
9256                                       Old Boy (2003)
9345                                  Hotel Rwanda (2004)
9353                               3-Iron (Bin-jip) (2004)
9452                     Downfall (Untergang, Der) (2004)
9496   Howl's Moving Castle (Hauru no ugoku shiro) (2...
10397          On Probation (Tiempo de Valientes) (2005)
...                                                  ...
17230                         Louis C.K.: Oh My God (2013)
17290                     TT3D: Closer to the Edge (2011)
17305                           Story of Luke, The (2012)
17443                            Hollow Crown, The (2012)
17547    Fireworks Wednesday (Chaharshanbe-soori) (2006)
17566                         Botany of Desire, The (2009)
17613                      Yeh Jawaani Hai Deewani (2013)
17692                                  Interstellar (2014)
17855                                        Tracks (2013)
17856                                     Neverland (2011)
17877           Human Capital (Il capitale umano) (2013)
17889                  Trials of Cate McCall, The (2013)
17901                                Honey (Miele) (2013)
17912                                     Whiplash (2014)
17962      Zero Motivation (Efes beyahasei enosh) (2014)
18018                                   700 Sundays (2014)
18035                         Look of Silence, The (2014)
18061                                       Ilo Ilo (2013)
18124                                The Guardians (2012)
18130                                   Still Life (2013)
18219            A Girl Walks Home Alone at Night (2014)
18239                                   The Missing (2014)
18252                         The Salt of the Earth (2014)
18260                    One Bright Shining Moment (2005)
18273      Supermensch: The Legend of Shep Gordon (2013)
18282                  Kevin Hart: Seriously Funny (2010)
18301                                Rewind This! (2013)
18307  A Pigeon Sat on a Branch Reflecting on Existen...
18313                          Last Days in Vietnam (2014)
18315  Patton Oswalt: Tragedy Plus Comedy Equals Time...

                                    genres  year  Action  Adventure  \
3846                                 Drama  2000   False      False
3880                         Drama|Romance  2000   False      False
3908                 Comedy|Crime|Thriller  2000   False      False
4040                         Drama|Romance  2000   False      False
4122                       Mystery|Thriller  2000   False      False
```

4131	Drama|Thriller	2000	False	False
4770	Drama|Mystery|Sci-Fi|Thriller	2001	False	False
4865	Comedy|Romance	2001	False	False
4885	Adventure|Fantasy	2001	False	True
5503	Adventure|Animation|Fantasy	2001	False	True
5831	Adventure|Fantasy	2002	False	True
5874	Drama|War	2002	False	False
5895	Action|Adventure|Crime|Drama|Thriller	2002	True	True
6948	Documentary	2001	False	False
6992	Documentary	2002	False	False
7004	Action|Adventure|Drama|Fantasy	2003	True	True
7007	Documentary|War	2003	False	False
7106	Adventure|Documentary	2003	False	True
7211	Drama|Romance|Sci-Fi	2004	False	False
7315	Action|Drama|War	2001	True	False
7420	Drama	2003	False	False
7573	Drama	2003	False	False
9126	Adventure|Comedy	2000	False	True
9183	Drama|Sci-Fi|War	2003	False	False
9256	Mystery|Thriller	2003	False	False
9345	Drama|War	2004	False	False
9353	Drama|Romance	2004	False	False
9452	Drama|War	2004	False	False
9496	Adventure|Animation|Fantasy|Romance	2004	False	True
10397	Action|Comedy	2005	True	False
...	...	...	...	...
17230	Comedy	2013	False	False
17290	Documentary	2011	False	False
17305	Comedy|Drama	2012	False	False
17443	Drama	2012	False	False
17547	Drama|Mystery|Romance	2006	False	False
17566	Documentary	2009	False	False
17613	Comedy|Drama|Musical|Romance	2013	False	False
17692	Sci-Fi|IMAX	2014	False	False
17855	Adventure|Drama	2013	False	True
17856	Adventure|Fantasy	2011	False	True
17877	Drama	2013	False	False
17889	Crime|Drama	2013	False	False
17901	Drama	2013	False	False
17912	Drama	2014	False	False
17962	Comedy|Drama	2014	False	False
18018	Comedy	2014	False	False
18035	Documentary	2014	False	False
18061	Drama	2013	False	False
18124	Action|Thriller	2012	True	False
18130	Drama	2013	False	False
18219	Horror|Romance|Thriller	2014	False	False

```
18239                  Crime|Drama|Mystery  2014   False      False
18252                          Documentary  2014   False      False
18260                          Documentary  2005   False      False
18273                          Documentary  2013   False      False
18282                               Comedy  2010   False      False
18301                          Documentary  2013   False      False
18307                         Comedy|Drama  2014   False      False
18313                      Documentary|War  2014   False      False
18315                               Comedy  2014   False      False

       Animation  Children  ...  Fantasy  Film-Noir  Horror  Musical  Mystery  \
3846       False     False  ...    False      False   False    False    False
3880       False     False  ...    False      False   False    False    False
3908       False     False  ...    False      False   False    False    False
4040       False     False  ...    False      False   False    False    False
4122       False     False  ...    False      False   False    False     True
4131       False     False  ...    False      False   False    False    False
4770       False     False  ...    False      False   False    False     True
4865       False     False  ...    False      False   False    False    False
4885       False     False  ...     True      False   False    False    False
5503        True     False  ...     True      False   False    False    False
5831       False     False  ...     True      False   False    False    False
5874       False     False  ...    False      False   False    False    False
5895       False     False  ...    False      False   False    False    False
6948       False     False  ...    False      False   False    False    False
6992       False     False  ...    False      False   False    False    False
7004       False     False  ...     True      False   False    False    False
7007       False     False  ...    False      False   False    False    False
7106       False     False  ...    False      False   False    False    False
7211       False     False  ...    False      False   False    False    False
7315       False     False  ...    False      False   False    False    False
7420       False     False  ...    False      False   False    False    False
7573       False     False  ...    False      False   False    False    False
9126       False     False  ...    False      False   False    False    False
9183       False     False  ...    False      False   False    False    False
9256       False     False  ...    False      False   False    False     True
9345       False     False  ...    False      False   False    False    False
9353       False     False  ...    False      False   False    False    False
9452       False     False  ...    False      False   False    False    False
9496        True     False  ...     True      False   False    False    False
10397      False     False  ...    False      False   False    False    False
...          ...       ...  ...      ...        ...     ...      ...      ...
17230      False     False  ...    False      False   False    False    False
17290      False     False  ...    False      False   False    False    False
17305      False     False  ...    False      False   False    False    False
17443      False     False  ...    False      False   False    False    False
17547      False     False  ...    False      False   False    False     True
```

17566	False	False	...	False	False	False	False	False
17613	False	False	...	False	False	False	True	False
17692	False	False	...	False	False	False	False	False
17855	False	False	...	False	False	False	False	False
17856	False	False	...	True	False	False	False	False
17877	False	False	...	False	False	False	False	False
17889	False	False	...	False	False	False	False	False
17901	False	False	...	False	False	False	False	False
17912	False	False	...	False	False	False	False	False
17962	False	False	...	False	False	False	False	False
18018	False	False	...	False	False	False	False	False
18035	False	False	...	False	False	False	False	False
18061	False	False	...	False	False	False	False	False
18124	False	False	...	False	False	False	False	False
18130	False	False	...	False	False	False	False	False
18219	False	False	...	False	False	True	False	False
18239	False	False	...	False	False	False	False	True
18252	False	False	...	False	False	False	False	False
18260	False	False	...	False	False	False	False	False
18273	False	False	...	False	False	False	False	False
18282	False	False	...	False	False	False	False	False
18301	False	False	...	False	False	False	False	False
18307	False	False	...	False	False	False	False	False
18313	False	False	...	False	False	False	False	False
18315	False	False	...	False	False	False	False	False

	Romance	Sci-Fi	Thriller	War	Western
3846	False	False	False	False	False
3880	True	False	False	False	False
3908	False	False	True	False	False
4040	True	False	False	False	False
4122	False	False	True	False	False
4131	False	False	True	False	False
4770	False	True	True	False	False
4865	True	False	False	False	False
4885	False	False	False	False	False
5503	False	False	False	False	False
5831	False	False	False	False	False
5874	False	False	False	True	False
5895	False	False	True	False	False
6948	False	False	False	False	False
6992	False	False	False	False	False
7004	False	False	False	False	False
7007	False	False	False	True	False
7106	False	False	False	False	False
7211	True	True	False	False	False
7315	False	False	False	True	False

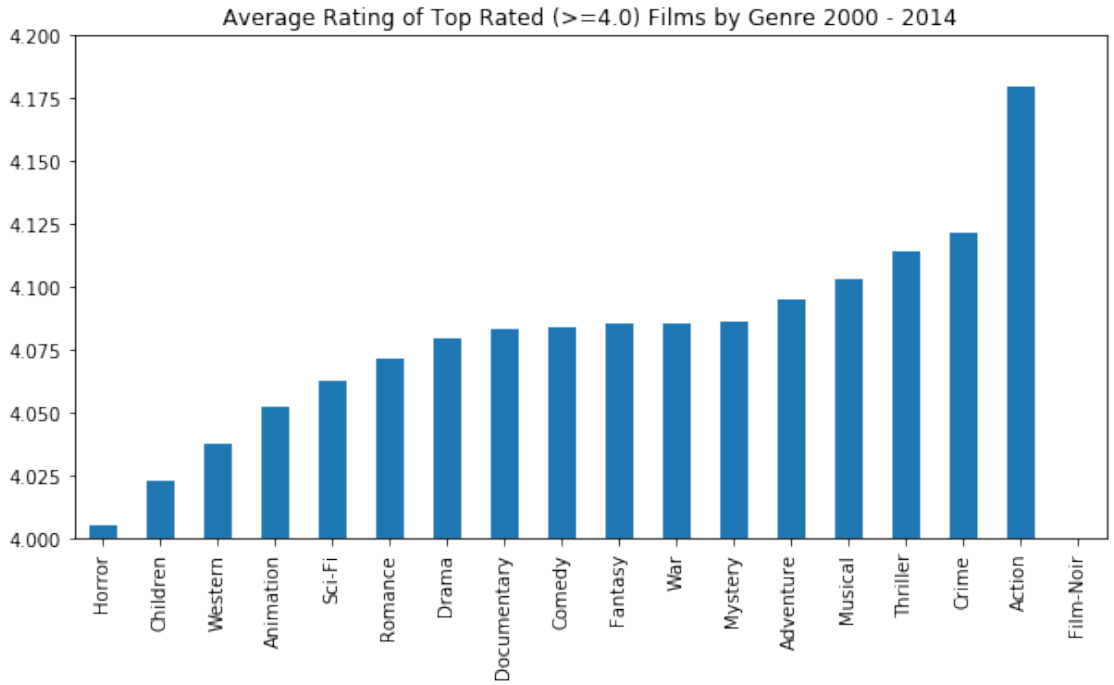
```
7420     False   False     False  False    False
7573     False   False     False  False    False
9126     False   False     False  False    False
9183     False    True     False   True    False
9256     False   False      True  False    False
9345     False   False     False   True    False
9353      True   False     False  False    False
9452     False   False     False   True    False
9496      True   False     False  False    False
10397    False   False     False  False    False
...        ...     ...       ...    ...      ...
17230    False   False     False  False    False
17290    False   False     False  False    False
17305    False   False     False  False    False
17443    False   False     False  False    False
17547     True   False     False  False    False
17566    False   False     False  False    False
17613     True   False     False  False    False
17692    False    True     False  False    False
17855    False   False     False  False    False
17856    False   False     False  False    False
17877    False   False     False  False    False
17889    False   False     False  False    False
17901    False   False     False  False    False
17912    False   False     False  False    False
17962    False   False     False  False    False
18018    False   False     False  False    False
18035    False   False     False  False    False
18061    False   False     False  False    False
18124    False   False      True  False    False
18130    False   False     False  False    False
18219     True   False      True  False    False
18239    False   False     False  False    False
18252    False   False     False  False    False
18260    False   False     False  False    False
18273    False   False     False  False    False
18282    False   False     False  False    False
18301    False   False     False  False    False
18307    False   False     False  False    False
18313    False   False     False   True    False
18315    False   False     False  False    False

[131 rows x 24 columns]
```

[201]:
```
avg_top2000s = {genre : top2000s[top2000s[genre]]['rating'].mean() for genre in␣
 ↪genres}
avg_top2000s = pd.Series(avg_top2000s)
```

```
ax = avg_top2000s.sort_values().plot(kind='bar', figsize=(10,5), title =␣
 ↪"Average Rating of Top Rated (>=4.0) Films by Genre 2000 - 2014")
ax.set_ylim(4.0,4.2)
```

[201]: (4.0, 4.2)



[202]:
```
avg_top2000s.sort_values(ascending=False)
```

[202]:
```
Action         4.179547
Crime          4.121568
Thriller       4.114290
Musical        4.102807
Adventure      4.094733
Mystery        4.085835
War            4.085671
Fantasy        4.085495
Comedy         4.084036
Documentary    4.083096
Drama          4.079552
Romance        4.071072
Sci-Fi         4.062499
Animation      4.052443
Western        4.037893
Children       4.022647
Horror         4.005263
Film-Noir           NaN
```

```
dtype: float64
```

[203]:
```
top2000s[genres].sum().sort_values(ascending=False)
```

[203]:
```
Drama          60
Documentary    38
Comedy         26
Thriller       16
Adventure      16
Romance        16
Crime          12
Fantasy        11
Action         11
Sci-Fi         11
War            10
Mystery        10
Animation       7
Musical         4
Children        4
Horror          2
Western         1
Film-Noir       0
dtype: int64
```

[204]:
```
dfc = {'Genre':genres, '90s Mean Rating':genres_rating_list, '2000s Mean␣
↪Rating':genres_rating_list2}
```

[205]:
```
comparison = pd.DataFrame(dfc)
```

[206]:
```
comparison
```

[206]:

	Genre	90s Mean Rating	2000s Mean Rating
0	Action	2.953227	3.072349
1	Adventure	3.033521	3.125399
2	Animation	3.236963	3.246555
3	Children	2.828015	2.972014
4	Comedy	3.033601	3.108409
5	Crime	3.195565	3.208344
6	Documentary	3.401072	3.466128
7	Drama	3.273500	3.290303
8	Fantasy	3.050661	3.158915
9	Film-Noir	3.314351	3.306858
10	Horror	2.718391	2.812326
11	Musical	3.209885	3.210710
12	Mystery	3.277577	3.138727
13	Romance	3.222790	3.226703
14	Sci-Fi	2.920764	3.083934
15	Thriller	3.064593	3.054528
16	War	3.336950	3.356064
17	Western	3.186490	3.145165

[207]:
```
comparison['Difference'] = comparison['2000s Mean Rating'] - comparison['90s␣
↪Mean Rating']
```

[208]:
```
comparison
```

[208]:

	Genre	90s Mean Rating	2000s Mean Rating	Difference
0	Action	2.953227	3.072349	0.119122
1	Adventure	3.033521	3.125399	0.091878
2	Animation	3.236963	3.246555	0.009592
3	Children	2.828015	2.972014	0.143999
4	Comedy	3.033601	3.108409	0.074808
5	Crime	3.195565	3.208344	0.012779
6	Documentary	3.401072	3.466128	0.065056
7	Drama	3.273500	3.290303	0.016803
8	Fantasy	3.050661	3.158915	0.108254
9	Film-Noir	3.314351	3.306858	-0.007493
10	Horror	2.718391	2.812326	0.093935
11	Musical	3.209885	3.210710	0.000825
12	Mystery	3.277577	3.138727	-0.138849
13	Romance	3.222790	3.226703	0.003914
14	Sci-Fi	2.920764	3.083934	0.163170
15	Thriller	3.064593	3.054528	-0.010065
16	War	3.336950	3.356064	0.019114
17	Western	3.186490	3.145165	-0.041325

[209]:
```
comparison.set_index('Genre', inplace=True)
```

[210]:
```
comparison['Difference'].sort_values(ascending=False)
```

[210]:
```
Genre
Sci-Fi         0.163170
Children       0.143999
Action         0.119122
Fantasy        0.108254
Horror         0.093935
Adventure      0.091878
Comedy         0.074808
Documentary    0.065056
War            0.019114
Drama          0.016803
Crime          0.012779
Animation      0.009592
Romance        0.003914
Musical        0.000825
Film-Noir     -0.007493
Thriller      -0.010065
Western       -0.041325
Mystery       -0.138849
Name: Difference, dtype: float64
```

[211]:
```
comparison['Difference'].sum()
```

[211]:
```
0.7255164563414915
```

[212]:
```
comparison
```

[212]:

Genre	90s Mean Rating	2000s Mean Rating	Difference
Action	2.953227	3.072349	0.119122
Adventure	3.033521	3.125399	0.091878
Animation	3.236963	3.246555	0.009592
Children	2.828015	2.972014	0.143999
Comedy	3.033601	3.108409	0.074808
Crime	3.195565	3.208344	0.012779
Documentary	3.401072	3.466128	0.065056
Drama	3.273500	3.290303	0.016803
Fantasy	3.050661	3.158915	0.108254
Film-Noir	3.314351	3.306858	-0.007493
Horror	2.718391	2.812326	0.093935
Musical	3.209885	3.210710	0.000825
Mystery	3.277577	3.138727	-0.138849
Romance	3.222790	3.226703	0.003914
Sci-Fi	2.920764	3.083934	0.163170
Thriller	3.064593	3.054528	-0.010065
War	3.336950	3.356064	0.019114
Western	3.186490	3.145165	-0.041325

[213]:
```
comparison['Percentage Change'] = round(comparison['Difference'] /␣
↪comparison['90s Mean Rating'] * 100, 2)
```

[214]:
```
comparison
```

[214]:

Genre	90s Mean Rating	2000s Mean Rating	Difference	Percentage Change
Action	2.953227	3.072349	0.119122	4.03
Adventure	3.033521	3.125399	0.091878	3.03
Animation	3.236963	3.246555	0.009592	0.30
Children	2.828015	2.972014	0.143999	5.09
Comedy	3.033601	3.108409	0.074808	2.47
Crime	3.195565	3.208344	0.012779	0.40
Documentary	3.401072	3.466128	0.065056	1.91
Drama	3.273500	3.290303	0.016803	0.51
Fantasy	3.050661	3.158915	0.108254	3.55
Film-Noir	3.314351	3.306858	-0.007493	-0.23
Horror	2.718391	2.812326	0.093935	3.46
Musical	3.209885	3.210710	0.000825	0.03
Mystery	3.277577	3.138727	-0.138849	-4.24
Romance	3.222790	3.226703	0.003914	0.12
Sci-Fi	2.920764	3.083934	0.163170	5.59
Thriller	3.064593	3.054528	-0.010065	-0.33

```
War                 3.336950          3.356064    0.019114               0.57
Western             3.186490          3.145165   -0.041325              -1.30
```

[215]:
```
comparison['Percentage Change'].sort_values(ascending=False)
```

[215]:
```
Genre
Sci-Fi         5.59
Children       5.09
Action         4.03
Fantasy        3.55
Horror         3.46
Adventure      3.03
Comedy         2.47
Documentary    1.91
War            0.57
Drama          0.51
Crime          0.40
Animation      0.30
Romance        0.12
Musical        0.03
Film-Noir     -0.23
Thriller      -0.33
Western       -1.30
Mystery       -4.24
Name: Percentage Change, dtype: float64
```

[ ]:
```

```

90s Films Mean Raw Rating (equal weighted by film)

[216]:
```
movies_90s['rating'].mean()
```

[216]:
```
3.114858534754956
```

2000s Films Mean Raw Rating (equal weighted by film)

[217]:
```
movies_2000s['rating'].mean()
```

[217]:
```
3.1872314712443846
```

[218]:
```
difference = movies_2000s['rating'].mean() - movies_90s['rating'].mean()
difference
```

[218]:
```
0.07237293648942833
```

[219]:
```
percent_change = round(difference / movies_90s['rating'].mean() * 100, 2)
print('Percent Change = '+ str(percent_change) +' Percent')
```

```
Percent Change = 2.32 Percent
```

90s Mean Ratings (equal weighted by genre)

[220]:
```
nineties_mean = round(avg_ratings90s.mean(), 6)
nineties_mean
```

[220]:
```
3.12544
```

2000s Mean Ratings (equal weighted by genre)

[221]:
```
overall_mean
```

[221]:
```
3.165746
```

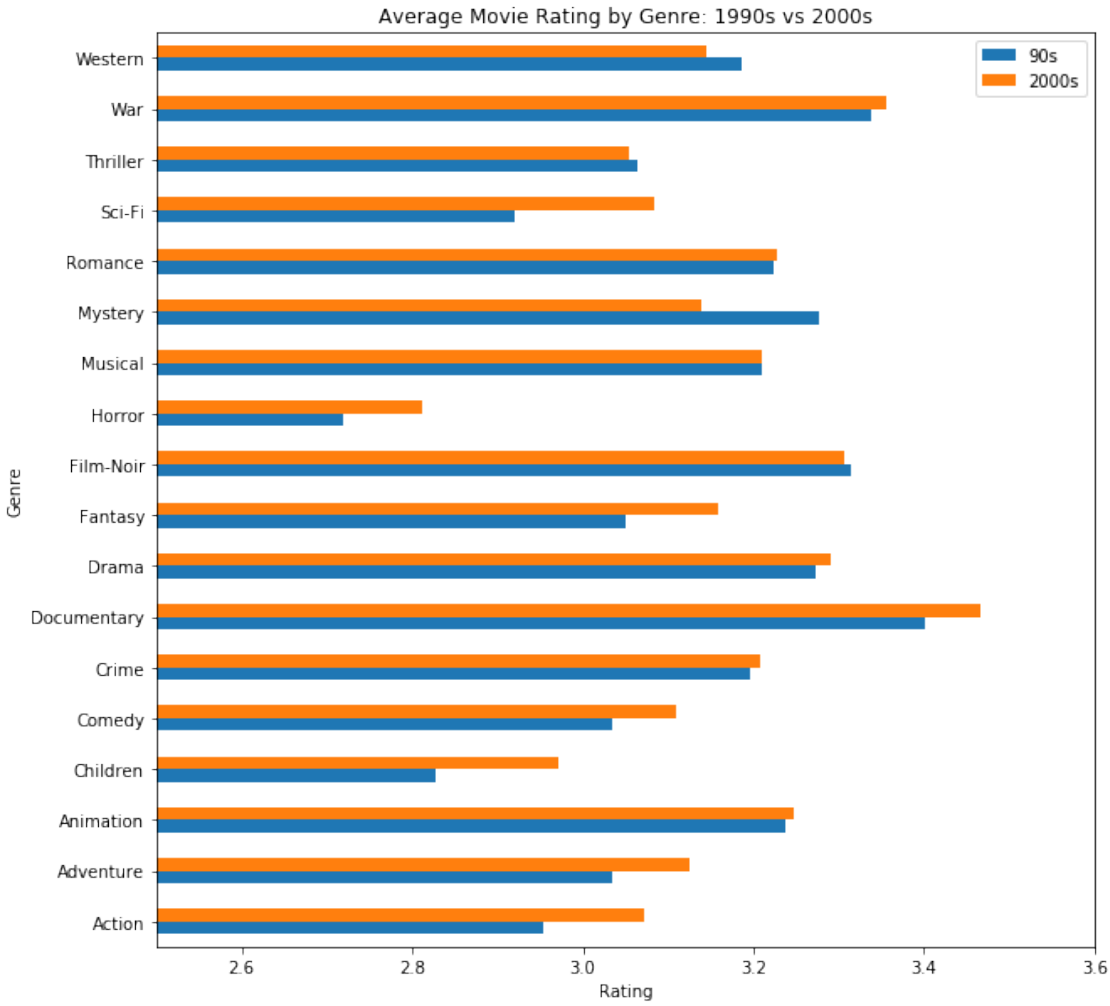
[222]:
```
difference2 = overall_mean - nineties_mean
difference2
```

[222]:
```
0.04030599999999973
```

[223]:
```
percent_change2 = round(difference2 / nineties_mean * 100, 2)
print('Percent Change = '+ str(percent_change2) +' Percent')
```

```
Percent Change = 1.29 Percent
```

[225]:
```
index = genres_list2000s[genres]
dfz = pd.DataFrame({'90s': avg_ratings90s,
                    '2000s': avg_ratings2000s})
ax = dfz.plot.barh(figsize=(10,10))
plt.title('Average Movie Rating by Genre: 1990s vs 2000s')
plt.xlabel('Rating')
plt.ylabel('Genre')
plt.xlim(xmin=2.5,xmax=3.6)
plt.savefig(r'AverageRatingbyGenre90s2000s.png')
plt.show()
```


Average Movie Rating by Genre: 1990s vs 2000s
90s
2000s
Western
War
Thriller
Sci-Fi
Romance
Mystery
Musical
Horror
Film-Noir
Fantasy
Drama
Documentary
Crime
Comedy
Children
Animation
Adventure
Action
Genre
2.6
2.8
3.0
3.2
3.4
3.6
Rating