Microsoft Movie Analysis Project

Imported packages

In [48]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
import sqlite3
con = sqlite3.connect('Data/im.db')
cursor_obj = con.cursor()
```

Imported Data sets

In [49]:
```
mov_gross = pd.read_csv('Data/bom.movie_gross.csv.gz')
tn_movie_budgets = pd.read_csv('Data/tn.movie_budgets.csv.gz')
mov_info = pd.read_table('Data/rt.movie_info.tsv')
reviews = pd.read_table('Data/rt.reviews.tsv', encoding= 'unicode_escape')
rot_tom = pd.read_csv('Data/rotten_tomatoes_movies.csv')
db_mov = pd.read_csv('Data/tmdb.movies.csv.gz', delimiter = ",")
```

Looked at each dataset.info() to find the relevant information.

In [50]:
```
#Will use the below dataset because we want to look at popularity,genre_ids and release_date
db_mov.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 26517 entries, 0 to 26516
Data columns (total 10 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   Unnamed: 0         26517 non-null  int64  
 1   genre_ids          26517 non-null  object 
 2   id                 26517 non-null  int64  
 3   original_language  26517 non-null  object 
 4   original_title     26517 non-null  object 
 5   popularity         26517 non-null  float64
 6   release_date       26517 non-null  object 
 7   title              26517 non-null  object 
 8   vote_average       26517 non-null  float64
 9   vote_count         26517 non-null  int64  
dtypes: float64(2), int64(3), object(5)
memory usage: 2.0+ MB
```

Recommendation 1: Genres based on Popularity and Voter Average

Cleaned The Data

Exploding the genre column to be able to plot the genres based on its popularity.

In [51]:
```
#found the genre dictionary online for the genre ids
#created a dictionary so we can see what each movie's genre is.
genre_dic = {'Action'      :    28,
'Adventure'    :   12,
'Animation'     :  16,
'Comedy'         : 35,
'Crime'          : 80,
'Documentary'    : 99,
'Drama'          : 18,
'Family'         : 10751,
'Fantasy'        : 14,
'History'        : 36,
'Horror'         : 27,
'Music'          : 10402,
'Mystery'        : 9648,
'Romance'        : 10749,
'Science Fiction' : 878,
'TV Movie'       : 10770,
'Thriller'       : 53,
'War'            : 10752,
'Western'        : 37}
```

In [52]:
```
#Switched the keys and values for the dictionary so it was easier to access
#If we inserted the genre id, now we can recieve the genre name.
gd= {str(y): x for x,y in genre_dic.items()}

#any empty lists are replaces as NaN
gd[''] = np.nan

#did a check to see if the id corresponds to the genre value
gd['28']
```

Out[52]: 'Action'

In [53]:
```
#Deleted the single quotes between the genre id
db_mov['genre_ids'] = db_mov['genre_ids'].apply(lambda x: (x.replace("'", '')))
```

In [54]:
```
#Deleted the square brackets
db_mov['genre_ids'] =db_mov['genre_ids'].apply(lambda x: x.replace(']',''))
db_mov['genre_ids'] =db_mov['genre_ids'].apply(lambda x: x.replace('[',''))
```

In [55]:
```
#Deleted the commas
db_mov['genre_ids'] = db_mov['genre_ids'].apply(lambda x: x.split(','))
```

In [56]:
```
#Replaced the extra spaces with single spaces
db_mov['genre_ids'] =db_mov['genre_ids'].apply(lambda x: [i.replace(' ','') for i in x])
```

In [57]:
```
# for each genre dic item, make i in x (the genre_ids) the same.
db_mov['genre_names']= db_mov['genre_ids'].apply(lambda x: [gd[i]  for i in x])
```

In [58]:
```
#explode the genre_names in the dataframe
#added a new column and new rows for each genre per movie
exploded_genre_df = db_mov.explode('genre_names')
```

In [59]:
```
#print top 5 rows of updated dataframe
exploded_genre_df.head()
```

Out[59]:

	Unnamed: 0	genre_ids	id	original_language	original_title	popularity	release_date	title	vote_average	vote_count	genre_names
0	0	[12, 14, 10751]	12444	en	Harry Potter and the Deathly Hallows: Part 1	33.533	2010-11-19	Harry Potter and the Deathly Hallows: Part 1	7.7	10788	Adventure
0	0	[12, 14, 10751]	12444	en	Harry Potter and the Deathly Hallows: Part 1	33.533	2010-11-19	Harry Potter and the Deathly Hallows: Part 1	7.7	10788	Fantasy
0	0	[12, 14, 10751]	12444	en	Harry Potter and the Deathly Hallows: Part 1	33.533	2010-11-19	Harry Potter and the Deathly Hallows: Part 1	7.7	10788	Family
1	1	[14, 12, 16, 10751]	10191	en	How to Train Your Dragon	28.734	2010-03-26	How to Train Your Dragon	7.7	7610	Fantasy
1	1	[14, 12, 16, 10751]	10191	en	How to Train Your Dragon	28.734	2010-03-26	How to Train Your Dragon	7.7	7610	Adventure

In [60]:
```
# Check if the data has any NaNs and how many in each column with a groupby
exploded_genre_df.isna().sum()
```

Out[60]:
```
Unnamed: 0              0
genre_ids               0
id                      0
original_language       0
original_title          0
popularity              0
release_date            0
title                   0
vote_average            0
vote_count              0
genre_names          2479
dtype: int64
```

In [61]:
```
#remove NaNs with dropna()
exploded_genre_df = exploded_genre_df.dropna()
```

In [62]:
```
#check shape of new data frame
exploded_genre_df.shape
```

Out[62]:
```
(45355, 11)
```

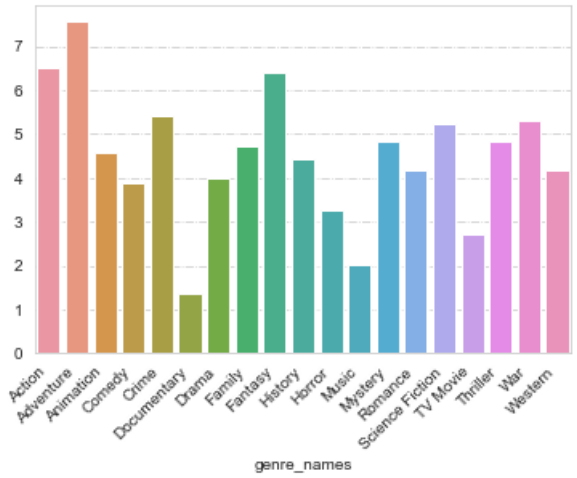
In [63]:
```
#sorted the table by popularity in descending order
exploded_genre_df = exploded_genre_df.sort_values(by = 'popularity', ascending = False)
```

Created a bar plot for genres grouped by average popularity

In [64]:
```
fix, ax = plt.subplots()
sns.barplot(exploded_genre_df.groupby('genre_names')['popularity'].mean().index,
            exploded_genre_df.groupby('genre_names')['popularity'].mean().values)
plt.xticks(rotation=45, ha='right')
```

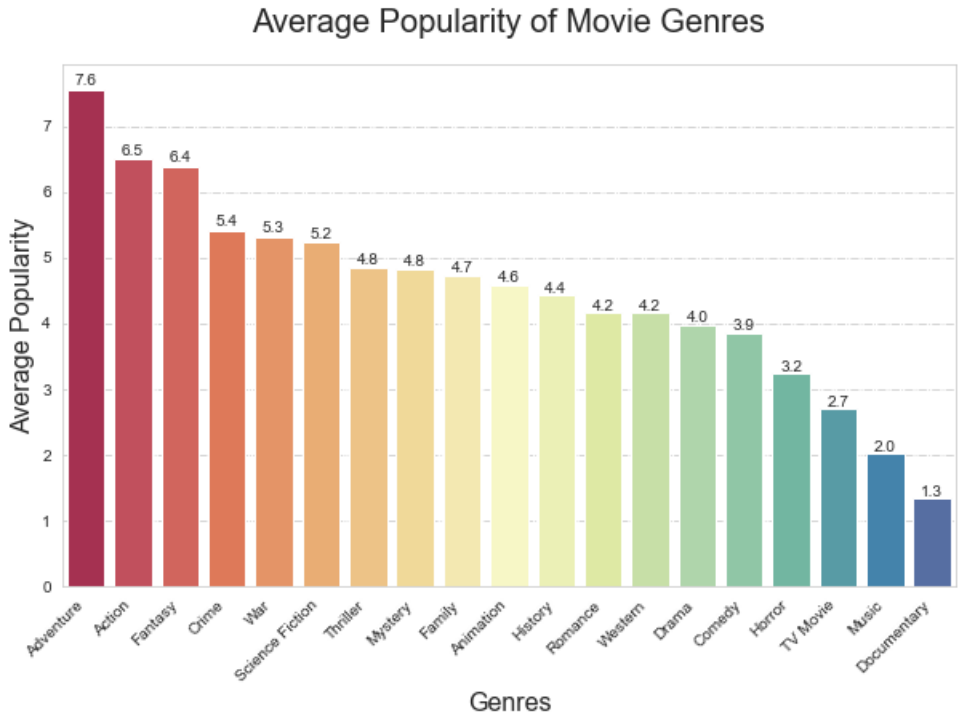
```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
```

Out[64]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18]),
 [Text(0, 0, 'Action'),
  Text(1, 0, 'Adventure'),
  Text(2, 0, 'Animation'),
  Text(3, 0, 'Comedy'),
  Text(4, 0, 'Crime'),
  Text(5, 0, 'Documentary'),
  Text(6, 0, 'Drama'),
  Text(7, 0, 'Family'),
  Text(8, 0, 'Fantasy'),
  Text(9, 0, 'History'),
  Text(10, 0, 'Horror'),
  Text(11, 0, 'Music'),
  Text(12, 0, 'Mystery'),
  Text(13, 0, 'Romance'),
  Text(14, 0, 'Science Fiction'),
  Text(15, 0, 'TV Movie'),
  Text(16, 0, 'Thriller'),
  Text(17, 0, 'War'),
  Text(18, 0, 'Western')])
```



In [65]:
```
#cleaned up bar plot
fix, ax = plt.subplots(1,1, figsize=(10,6))
sns.barplot(exploded_genre_df.groupby('genre_names')['popularity'].mean().sort_values(ascending = False).ind
            exploded_genre_df.groupby('genre_names')['popularity'].mean().sort_values(ascending = False).val
            palette = "Spectral")
#orient the ticks horizontally
plt.xticks(rotation=45, ha='right')

#add axis labels and change sizes
plt.xlabel('Genres', fontsize =16)
plt.ylabel('Average Popularity', fontsize =16)
ax.set_title('Average Popularity of Movie Genres', fontsize= 20, pad =20)

#add the y axis values as labels above each bar
for p in ax.patches:
    _x = p.get_x() + p.get_width() / 2
    _y = p.get_y() + p.get_height() + (p.get_height()*0.01)
    value = '{:.1f}'.format(p.get_height())
    ax.text(_x, _y, value, ha="center", fontsize=10)

#save figure as jpg
#plt.savefig("Average Popularity of Movie Genres.jpg", bbox_inches='tight')
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
```

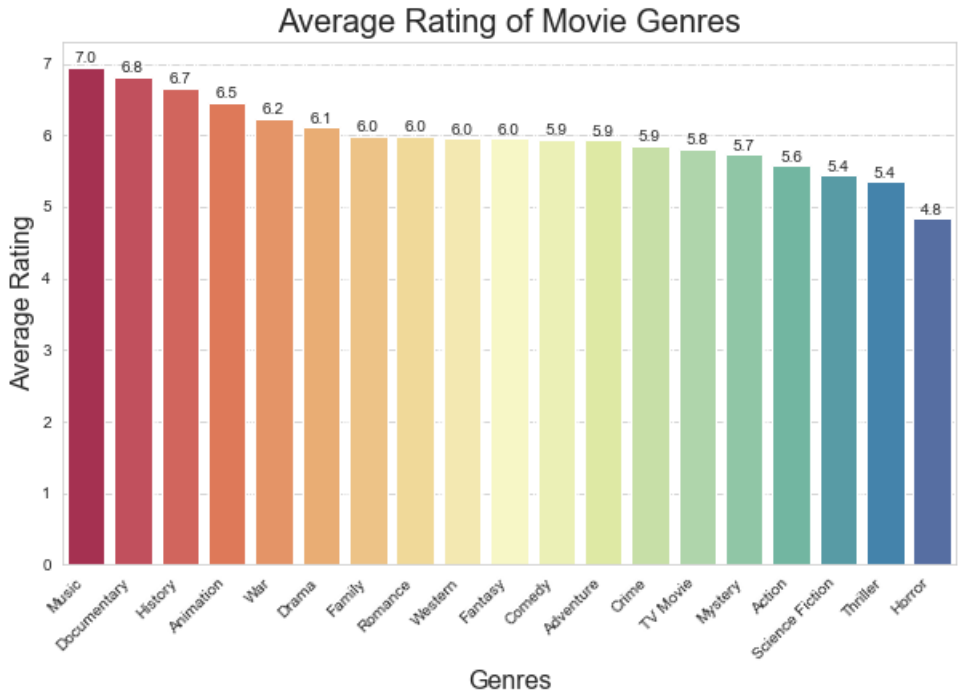


Create a bar plot for genres grouped by voter average to see any difference (not in presentation, just my investigation)

Music, Documentary, History and Animation have the highest voter average. but we will stick to popularity because the metric includes voter average and other metrics according to tmdb.

In [66]:
```
, ax = plt.subplots(1,1, figsize=(10,6))
rt1 = sns.barplot(exploded_genre_df.groupby('genre_names')['vote_average'].mean().sort_values(ascending = Fa
          exploded_genre_df.groupby('genre_names')['vote_average'].mean().sort_values(ascending = False).value
          palette = "Spectral")
ient the ticks horizontally
.xticks(rotation=45, ha='right')

d axis labels and change sizes
rt1.set_title('Average Rating of Movie Genres', fontsize= 25, pad = 20)
.xlabel('Genres', fontsize=16);
.ylabel('Average Rating', fontsize=16);
set_title('Average Rating of Movie Genres', fontsize = 20)

d the y axis values as labels above each bar
 p in ax.patches:
 _x = p.get_x() + p.get_width() / 2
 _y = p.get_y() + p.get_height() + (p.get_height()*0.01)
 value = '{:.1f}'.format(p.get_height())
 ax.text(_x, _y, value, ha="center", fontsize=10)

ve figure as jpg
t.savefig("Average Rating of Movie Genres.jpg", bbox_inches='tight')
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
```



Looked at when the most popular genres (Action & Adventure) should be released based month

In [67]:
```
#created a new column for the corresponding month numerical
exploded_genre_df['release_month'] = pd.to_datetime(exploded_genre_df['release_date']).dt.month
```

In [68]:
```
#checked to see if any Nan values
exploded_genre_df.isna().sum()
```

Out[68]:
```
Unnamed: 0           0
genre_ids            0
id                   0
original_language    0
original_title       0
popularity           0
release_date         0
title                0
vote_average         0
vote_count           0
genre_names          0
release_month        0
dtype: int64
```

In [69]:
```
#checked if new release monthcolumn was made
exploded_genre_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 45355 entries, 23811 to 26516
Data columns (total 12 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   Unnamed: 0         45355 non-null  int64  
 1   genre_ids          45355 non-null  object 
 2   id                 45355 non-null  int64  
 3   original_language  45355 non-null  object 
 4   original_title     45355 non-null  object 
 5   popularity         45355 non-null  float64
 6   release_date       45355 non-null  object 
 7   title              45355 non-null  object 
 8   vote_average       45355 non-null  float64
 9   vote_count         45355 non-null  int64  
 10  genre_names        45355 non-null  object 
 11  release_month      45355 non-null  int64  
dtypes: float64(2), int64(4), object(6)
memory usage: 4.5+ MB
```

In [70]:
```
#created a conditional statement to make a dataframe with only action and adventure and fantasy
exploded_genre = exploded_genre_df.loc[(exploded_genre_df['genre_names'] == "Adventure") | (exploded_genre_d
```

In [71]:
```
#checked the index fi it starts with 0
exploded_genre.head()
```

Out[71]:

	Unnamed: 0	genre_ids	id	original_language	original_title	popularity	release_date	title	vote_average	vote_count	genre_names
23811	23811	[12, 28, 14]	299536	en	Avengers: Infinity War	80.773	2018-04-27	Avengers: Infinity War	8.3	13948	Adventure
23811	23811	[12, 28, 14]	299536	en	Avengers: Infinity War	80.773	2018-04-27	Avengers: Infinity War	8.3	13948	Action
23811	23811	[12, 28, 14]	299536	en	Avengers: Infinity War	80.773	2018-04-27	Avengers: Infinity War	8.3	13948	Fantasy
11019	11019	[28, 53]	245891	en	John Wick	78.123	2014-10-24	John Wick	7.2	10081	Action
23812	23812	[28, 12, 16, 878, 35]	324857	en	Spider-Man: Into the Spider-Verse	60.534	2018-12-14	Spider-Man: Into the Spider-Verse	8.4	4048	Action

In [72]:
```
#reset the index of the dataframe after the conditional statement
genre_month_pop = exploded_genre.groupby(["release_month",'genre_names'])['popularity'].mean().reset_index()
```

In [73]:
```
#made labels for the corresponding months and also applied a function to reset the index
labels = ["Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"]
genre_month_pop['month'] = genre_month_pop['release_month'].apply(lambda x: labels[int(x) -1])
genre_month_pop.head()
```

Out[73]:

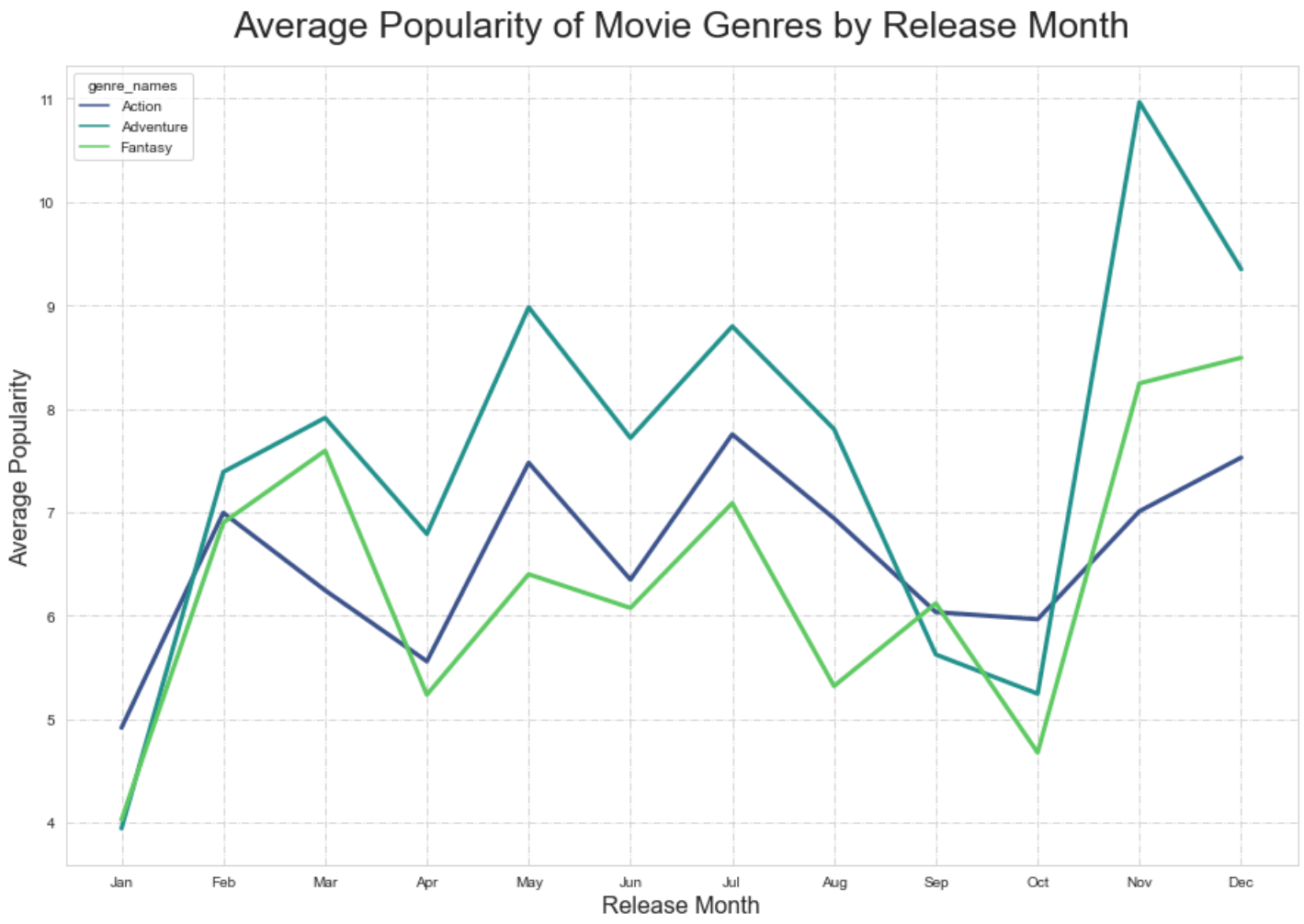
	release_month	genre_names	popularity	month
0	1	Action	4.914279	Jan
1	1	Adventure	3.941440	Jan
2	1	Fantasy	4.024784	Jan
3	2	Action	6.993472	Feb
4	2	Adventure	7.388725	Feb

Created a line plot to see when the most popular genre of movies should be releases

In [74]:
```
fix, ax = plt.subplots(figsize=(15,10))
sns.lineplot(x = "month", y = "popularity", data= genre_month_pop,
             hue = "genre_names",
             palette = "viridis",
             linewidth = 3)
plt.xlabel('Release Month', fontsize =16)
plt.ylabel('Average Popularity', fontsize =16)
ax.set_title('Average Popularity of Movie Genres by Release Month', fontsize= 25, pad =20)
ax.set_xticklabels(labels)

#save figure as jpg
#plt.savefig("Average popularity of movie by release month_horror.jpg", bbox_inches='tight')
```

```
<ipython-input-74-6883e61e1fed>:9: UserWarning: FixedFormatter should only be used together with FixedLoca
tor
  ax.set_xticklabels(labels)
```

Out[74]:
```
[Text(0, 0, 'Jan'),
 Text(1, 0, 'Feb'),
 Text(2, 0, 'Mar'),
 Text(3, 0, 'Apr'),
 Text(4, 0, 'May'),
 Text(5, 0, 'Jun'),
 Text(6, 0, 'Jul'),
 Text(7, 0, 'Aug'),
 Text(8, 0, 'Sep'),
 Text(9, 0, 'Oct'),
 Text(10, 0, 'Nov'),
 Text(11, 0, 'Dec')]
```



Created a scatter plot for when the most profitabe genres should be released

In [75]:
```
#created a conditional for most profitabe genre names to be in a seperate dataframe
exploded_genre_roi = exploded_genre_df.loc[(exploded_genre_df['genre_names'] == "Mystery") | (exploded_genre
```

In [76]:
```
#made labels for the corresponding months and also applied a function to reset the index
labels = ["Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"]
exploded_genre_roi['month'] = exploded_genre_roi['release_month'].apply(lambda x: labels[int(x) -1])
exploded_genre_roi.head()
```

```
<ipython-input-76-29b61da89505>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)
  exploded_genre_roi['month'] = exploded_genre_roi['release_month'].apply(lambda x: labels[int(x) -1])
```

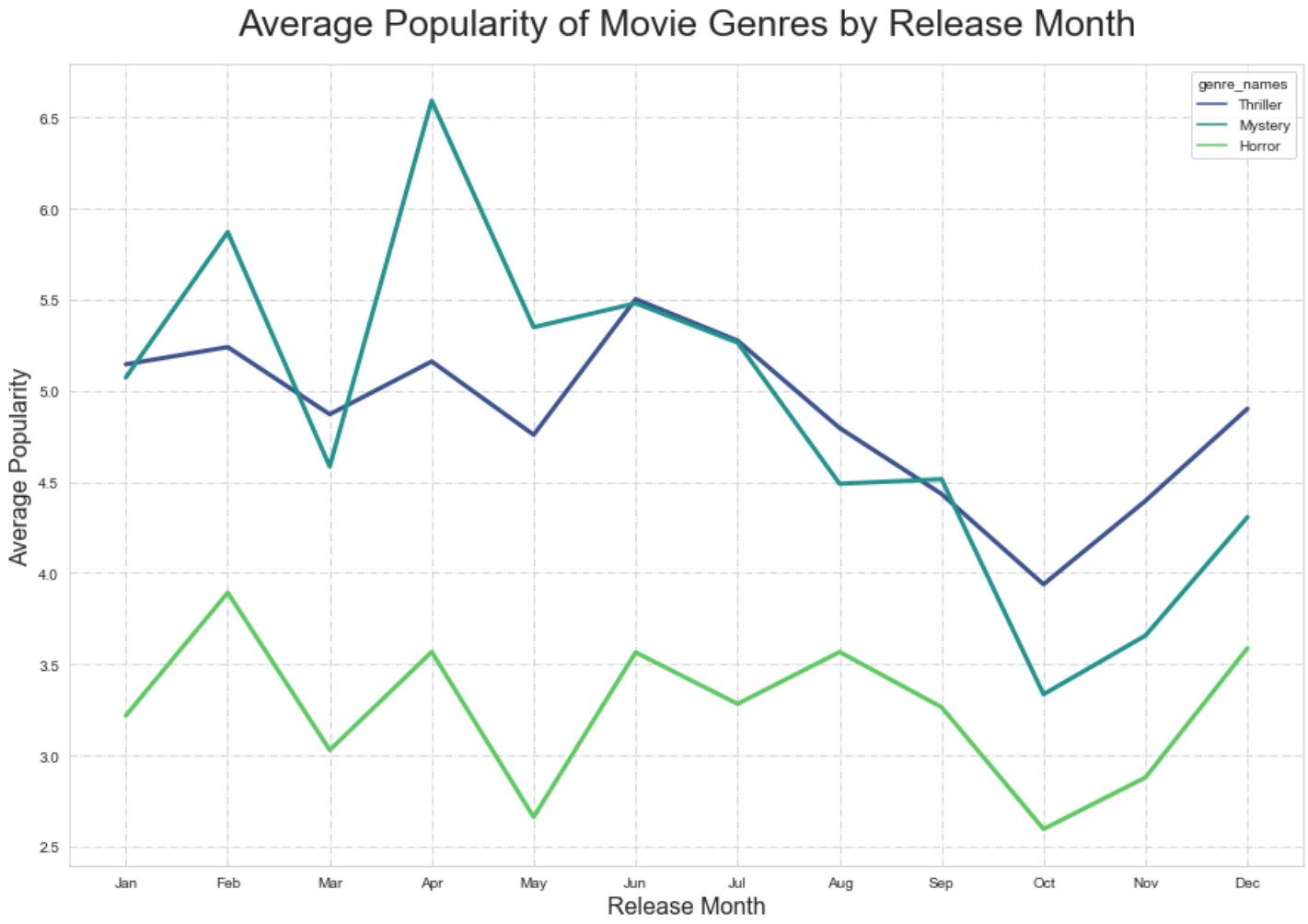
Out[76]:

	Unnamed: 0	genre_ids	id	original_language	original_title	popularity	release_date	title	vote_average	vote_count	genre_names	
11019	11019	[28, 53]	245891	en	John Wick	78.123	2014-10-24	John Wick	7.2	10081	Thriller	
20617	20617	[878, 28, 53]	335984	en	Blade Runner 2049	48.571	2017-10-06	Blade Runner 2049	7.4	6679	Thriller	
23813	23813	[878, 28, 53]	335984	en	Blade Runner 2049	48.571	2017-10-06	Blade Runner 2049	7.4	6679	Thriller	
20619	20619	[53, 28, 80]	324552	en	John Wick: Chapter 2	45.253	2017-02-10	John Wick: Chapter 2	7.0	5863	Thriller	
23822	23822	[12, 28, 53]	375588	en	Robin Hood	39.975	2018-11-21	Robin Hood	5.8	1194	Thriller	

In [77]:
```
fix, ax = plt.subplots(figsize=(15,10))
sns.lineplot(x = "month", y = "popularity", data= exploded_genre_roi,
             hue = "genre_names",
             palette = "viridis",
             linewidth = 3,
             ci=None)
plt.xlabel('Release Month', fontsize =16)
plt.ylabel('Average Popularity', fontsize =16)
ax.set_title('Average Popularity of Movie Genres by Release Month', fontsize= 25, pad =20)
ax.set_xticklabels(labels)

#save figure as jpg
#plt.savefig("Average popularity of movie by release month.jpg", bbox_inches='tight')
```

```
<ipython-input-77-e8a606e2d84b>:10: UserWarning: FixedFormatter should only be used together with FixedLoc
ator
  ax.set_xticklabels(labels)
```

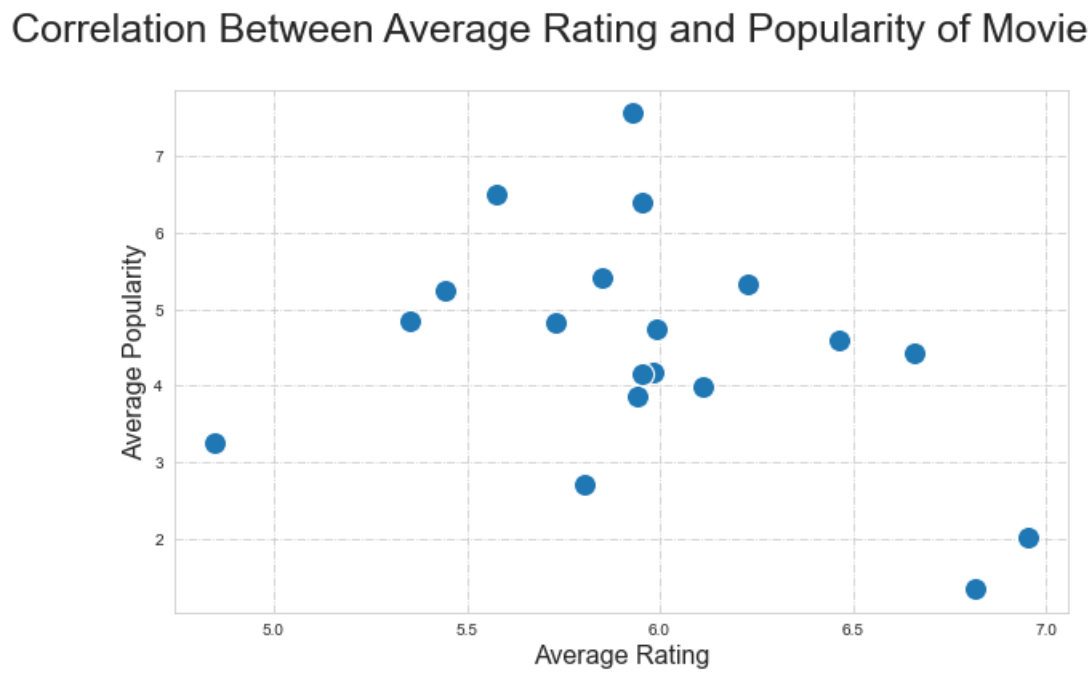
Out[77]:
```
[Text(0, 0, 'Jan'),
 Text(1, 0, 'Feb'),
 Text(2, 0, 'Mar'),
 Text(3, 0, 'Apr'),
 Text(4, 0, 'May'),
 Text(5, 0, 'Jun'),
 Text(6, 0, 'Jul'),
 Text(7, 0, 'Aug'),
 Text(8, 0, 'Sep'),
 Text(9, 0, 'Oct'),
 Text(10, 0, 'Nov'),
 Text(11, 0, 'Dec')]
```



Made a scatterplot to see if average rating and average popularity have a correlation - they dont (not in presentation)

In [78]:
```
fix, ax = plt.subplots(1,1, figsize=(10,6))
chart = sns.scatterplot(exploded_genre_df.groupby('genre_names')['vote_average'].mean().values,
            exploded_genre_df.groupby('genre_names')['popularity'].mean().values,
            palette = "Spectral",
            s = 200)
#added axis labels and changed size and color
chart.set_title('Correlation Between Average Rating and Popularity of Movie Genres', fontsize= 25, pad=30)
plt.xlabel('Average Rating', fontsize = 16)
plt.ylabel('Average Popularity', fontsize = 16)

#save figure as jpg
plt.savefig("average rating and average popularity.jpg", bbox_inches='tight')
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
```



In [79]:
```
#Sorted the exploded db_mov based on highest to lowest popularity, as a check
exploded_genre_df.sort_values(by = 'popularity', ascending = False)
```

10250	10250	[12, 16, 35, 10751, 14, 27, 10770]	213121	en	Toy Story of Terror!	0.600	2014-08-19	Toy Story of Terror!	7.1	413	Comedy
10250	10250	[12, 16, 35, 10751, 14, 27, 10770]	213121	en	Toy Story of Terror!	0.600	2014-08-19	Toy Story of Terror!	7.1	413	Animation
10250	10250	[12, 16, 35, 10751, 14, 27, 10770]	213121	en	Toy Story of Terror!	0.600	2014-08-19	Toy Story of Terror!	7.1	413	Adventure
26516	26516	[53, 27]	309885	en	The Church	0.600	2018-10-05	The Church	0.0	1	Horror

45355 rows × 12 columns

Looked at Rotten Tomato dataset, cleaned the data and exploded the genres

In [80]:
```
rot_tom.head()
```

Out[80]:

	rotten_tomatoes_link	movie_title	movie_info	critics_consensus	content_rating	genres	directors	authors	actors	original_re
0	m/0814255	Percy Jackson & the Olympians: The Lightning T...	Always trouble-prone, the life of teenager Per...	Though it may seem like just another Harry Pot...	PG	Action & Adventure, Comedy, Drama, Science Fic...	Chris Columbus	Craig Titley, Chris Columbus, Rick Riordan	Logan Lerman, Brandon T. Jackson, Alexandra Da...	2
1	m/0878835	Please Give	Kate (Catherine Keener) and her husband Alex (...	Nicole Holofcener's newest might seem slight i...	R	Comedy	Nicole Holofcener	Nicole Holofcener	Catherine Keener, Amanda Peet, Oliver Platt, R...	2
2	m/10	10	A successful, middle-aged Hollywood songwriter...	Blake Edwards' bawdy comedy may not score a pe...	R	Comedy, Romance	Blake Edwards	Blake Edwards	Dudley Moore, Bo Derek, Julie Andrews, Robert ...	
3	m/1000013-12_angry_men	12 Angry Men (Twelve Angry Men)	Following the closing arguments in a murder tr...	Sidney Lumet's feature debut is a superbly wri...	NR	Classics, Drama	Sidney Lumet	Reginald Rose	Martin Balsam, John Fiedler, Lee J. Cobb, E.G....	
4	m/1000079-20000_leagues_under_the_sea	20,000 Leagues Under The Sea	In 1866, Professor Pierre M. Aronnax (Paul Luk...	One of Disney's finest live-action adventures,...	G	Action & Adventure, Drama, Kids & Family	Richard Fleischer	Earl Felton	James Mason, Kirk Douglas, Paul Lukas, Peter L...	

5 rows × 22 columns

In [81]:
```
#check how many columns and rows the dataset has before cleaning
rot_tom.shape
```

Out[81]:
```
(17712, 22)
```

In [82]:
```
#Turned the genres which were a coninuous string into lists
rot_tom['genre_names'] = rot_tom['genres'].str.split(',')
```

In [83]:
```
#exploded the genre names as a new column and created a new variable for the dataframe
rt_explode = rot_tom.explode('genre_names')
```

In [84]:
```
#Check to see if new column is added
rt_explode.columns
```

Out[84]:
```
Index(['rotten_tomatoes_link', 'movie_title', 'movie_info',
       'critics_consensus', 'content_rating', 'genres', 'directors', 'authors',
       'actors', 'original_release_date', 'streaming_release_date', 'runtime',
       'production_company', 'tomatometer_status', 'tomatometer_rating',
       'tomatometer_count', 'audience_status', 'audience_rating',
       'audience_count', 'tomatometer_top_critics_count',
       'tomatometer_fresh_critics_count', 'tomatometer_rotten_critics_count',
       'genre_names'],
      dtype='object')
```

In [85]:
```
#check how many new rows it made, should be more than before. Columns should be the same, just more rows.
rt_explode.shape
```

Out[85]:
```
(39388, 23)
```

In [86]:
```
#explode the genre names column and groupby genre and its corresponding rotten tomato rating
#take the mean of that
rt_explode.groupby('genre_names')['tomatometer_rating'].mean().sort_values(ascending = False)
```

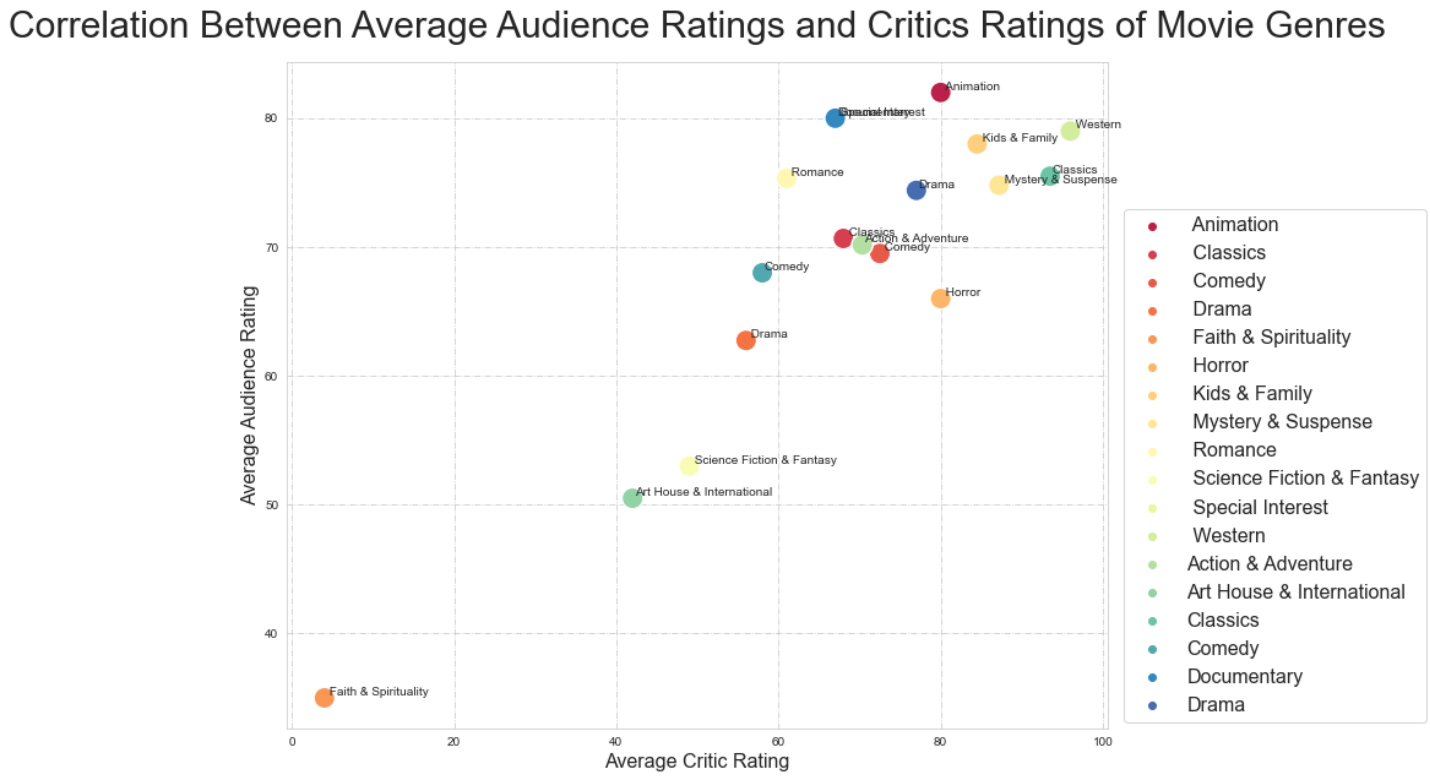
Out[86]:
```
genre_names
Special Interest                83.333333
Documentary                     81.679070
Classics                        79.120721
 Special Interest               77.463217
 Documentary                    77.208211
 Classics                       76.865922
 Anime & Manga                  75.368421
 Television                     72.574627
Art House & International       71.829450
 Musical & Performing Arts      71.010152
 Sports & Fitness               71.005618
Musical & Performing Arts       70.730769
 Western                        68.575342
 Art House & International      67.589099
 Drama                          65.517241
Western                         65.000000
 Animation                      64.400000
 Faith & Spirituality           63.886076
Animation                       63.882979
 Cult Movies                    63.573171
 Comedy                         61.928058
 Romance                        60.579031
Kids & Family                   59.891304
Drama                           59.766870
Science Fiction & Fantasy       58.075000
 Gay & Lesbian                  57.410256
 Mystery & Suspense             55.983632
 Science Fiction & Fantasy      55.866189
 Horror                         55.831512
 Kids & Family                  55.437676
Action & Adventure              54.184359
Comedy                          51.737692
Cult Movies                     49.000000
Romance                         47.928571
Mystery & Suspense              47.777003
Horror                          46.603191
Television                      36.000000
Name: tomatometer_rating, dtype: float64
```

In [87]:
```
rt_explode = rt_explode.head(50)
```

Made a scatterplot of the average audience rating and critic rating to see any discrepency (not in presentation)

In [88]:
```
fix, ax = plt.subplots(1,1, figsize=(12,10))
chart = sns.scatterplot(rt_explode.groupby('genre_names')['tomatometer_rating'].mean().values,
                rt_explode.groupby('genre_names')['audience_rating'].mean().values,
                hue = rt_explode.groupby('genre_names')['audience_rating'].mean().index,
                s=300,
                palette = "Spectral")
chart.set_title('Correlation Between Average Audience Ratings and Critics Ratings of Movie Genres', fontsize

#Create axis labels
plt.xlabel('Average Critic Rating', fontsize=16);
plt.ylabel('Average Audience Rating', fontsize=16);

#move the legend to the lower right side
plt.legend(bbox_to_anchor=(1.02, 0.78), loc='upper left', borderaxespad=0, fontsize = 16)
sns.set_style("whitegrid", {'grid.linestyle': '-.'})

#added labels to the points on the graph
for i in range(rt_explode.groupby('genre_names')['tomatometer_rating'].mean().size):
    plt.text(x=rt_explode.groupby('genre_names')['tomatometer_rating'].mean()[i]+0.2,
            y=rt_explode.groupby('genre_names')['audience_rating'].mean()[i]+0.2,
             s=rt_explode.groupby('genre_names')['tomatometer_rating'].mean().index[i])

#save figure as jpg
plt.savefig("output.jpg", bbox_inches='tight')
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
```



We made this plot to see if there is a discrepency between audience rating and critic ratings. this plot shows there is a clear correlation between the two

Recommendation 2: Highest ROI Genres and Months

SQL Query Data Pull

In [89]:
```
cursor_obj.execute("""SELECT name FROM sqlite_master WHERE type = 'table';""")
im_table_names = cursor_obj.fetchall()
im_table_names
#Fetching all SQL table names
```

Out[89]:
```
[('movie_basics',),
 ('directors',),
 ('known_for',),
 ('movie_akas',),
 ('movie_ratings',),
 ('persons',),
 ('principals',),
 ('writers',)]
```

In [90]:
```
movie_basics_query = pd.read_sql("""
SELECT primary_title,start_year,runtime_minutes,genres
    FROM movie_basics
;
""", con)
#Pulling specific columns from movie_basics SQL table
```

In [91]:
```
movie_basics = pd.DataFrame(movie_basics_query)
movie_basics
#Converting query to dataframe format
```

Out[91]:

	primary_title	start_year	runtime_minutes	genres
0	Sunghursh	2013	175.0	Action,Crime,Drama
1	One Day Before the Rainy Season	2019	114.0	Biography,Drama
2	The Other Side of the Wind	2018	122.0	Drama
3	Sabse Bada Sukh	2018	NaN	Comedy,Drama
4	The Wandering Soap Opera	2017	80.0	Comedy,Drama,Fantasy
...	...	...	...	...
146139	Kuambil Lagi Hatiku	2019	123.0	Drama
146140	Rodolpho Teóphilo - O Legado de um Pioneiro	2015	NaN	Documentary
146141	Dankyavar Danka	2013	NaN	Comedy
146142	6 Gunn	2017	116.0	None
146143	Chico Albuquerque - Revelações	2013	NaN	Documentary

146144 rows × 4 columns

Formatting CSV Data

In [92]:
```
tn_movie_budgets["production_budget"] = tn_movie_budgets["production_budget"].str.replace("$","").str.replac
#Stripping column of characters and converting to integers
```

In [93]:
```
tn_movie_budgets["domestic_gross"] = tn_movie_budgets["domestic_gross"].str.replace("$","").str.replace(",",
```

In [94]:
```
tn_movie_budgets["worldwide_gross"] = tn_movie_budgets["worldwide_gross"].str.replace("$","").str.replace(",
```

In [95]:
```
tn_movie_budgets["ROI"] = (tn_movie_budgets["worldwide_gross"] - tn_movie_budgets["production_budget"]) / tn
#Creating ROI column with ROI formula as the input
```

In [96]:
```
tn_movie_budgets["release_date"] = pd.to_datetime(tn_movie_budgets["release_date"])
#Converting release date column to date-time format
```

In [97]:
```
tn_movie_budgets['year'] = tn_movie_budgets['release_date'].dt.year
tn_movie_budgets
#Creating year column from release_date column
```

Out[97]:

	id	release_date	movie	production_budget	domestic_gross	worldwide_gross	ROI	year
0	1	2009-12-18	Avatar	425000000	760507625	2776345279	5.532577	2009
1	2	2011-05-20	Pirates of the Caribbean: On Stranger Tides	410600000	241063875	1045663875	1.546673	2011
2	3	2019-06-07	Dark Phoenix	350000000	42762350	149762350	-0.572108	2019
3	4	2015-05-01	Avengers: Age of Ultron	330600000	459005868	1403013963	3.243841	2015
4	5	2017-12-15	Star Wars Ep. VIII: The Last Jedi	317000000	620181382	1316721747	3.153696	2017
...	...	...	...	...	...	...	...	...
5777	78	2018-12-31	Red 11	7000	0	0	-1.000000	2018
5778	79	1999-04-02	Following	6000	48482	240495	39.082500	1999
5779	80	2005-07-13	Return to the Land of Wonders	5000	1338	1338	-0.732400	2005
5780	81	2015-09-29	A Plague So Pleasant	1400	0	0	-1.000000	2015
5781	82	2005-08-05	My Date With Drew	1100	181041	181041	163.582727	2005

5782 rows × 8 columns

Merging SQL Query With Budgets CSV

In [98]:
```
merged = movie_basics.merge(tn_movie_budgets , how = 'inner' ,right_on= ['movie', 'year'], left_on = ['prima
#Merging SQL movie_basics df with tn_movie_budgets df
```

In [99]:
```
budgets_and_genres = merged.sort_values(by = "ROI",ascending = False)
#Sorting by highest ROI
```

Dropping Null Values

In [100]:
```
budgets_and_genres.dropna(inplace = True)
#Dropping null values
```

Seperating Genres into Individual Rows to Get Mean ROI For Each

In [101]:
```
budgets_and_genres["genres"] = budgets_and_genres["genres"].str.split(",")
#Turning genre column rows into lists
```

In [102]:
```
budgets_and_genres_explode = budgets_and_genres[['primary_title', 'genres','ROI']].explode('genres')
#Exploding merged table based on genre to get individual rows of movies and their seperate genres with the s
```

In [103]:
```
budgets_and_genres_explode.groupby(by="genres").mean("ROI")
#Grouping results by genre along with their mean ROI
```

Out[103]:

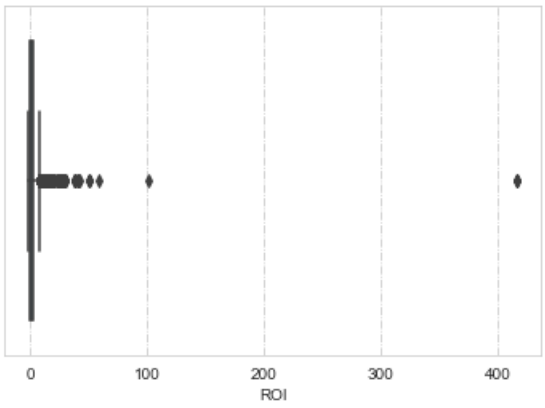
genres	ROI
Action	1.599989
Adventure	2.084312
Animation	2.674419
Biography	2.381621
Comedy	2.151968
Crime	1.149873
Documentary	1.935229
Drama	2.151777
Family	1.545830
Fantasy	2.142922
History	1.549244
Horror	7.818366
Music	2.477273
Musical	1.926543
Mystery	8.699248
Reality-TV	-1.000000
Romance	2.655629
Sci-Fi	2.608434
Sport	1.099875
Thriller	5.153911
War	0.411109
Western	0.534482

Finding and Removing Outliers within Merged Data

In [104]:
```
sns.boxplot(budgets_and_genres_explode['ROI'])
#Using boxplot to determine ROI outliers in the data
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument
will be `data`, and passing other arguments without an explicit keyword will result in an error or misinte
rpretation.
  warnings.warn(
```

Out[104]:
```
<AxesSubplot:xlabel='ROI'>
```



In [105]:
```
outliers_remove = budgets_and_genres_explode.drop(budgets_and_genres_explode[(budgets_and_genres_explode["RO
outliers_remove
#Removing outliers with ROI > 100 and ROI < 0
```

Out[105]:

	primary_title	genres	ROI
485	Paranormal Activity 2	Horror	58.170677
1431	Get Out	Horror	50.073590
1431	Get Out	Mystery	50.073590
1431	Get Out	Thriller	50.073590
1423	Moonlight	Drama	42.497008
...	...	...	...
634	Stoker	Drama	0.002909
634	Stoker	Thriller	0.002909
112	Hugo	Adventure	0.000265
112	Hugo	Drama	0.000265
112	Hugo	Family	0.000265

2741 rows × 3 columns

Determining Mean ROI Per Genre

In [106]:
```
mean_ROI = outliers_remove.groupby(by="genres").mean("ROI")
mean_ROI
#Creating mean ROI per movie genre table
```

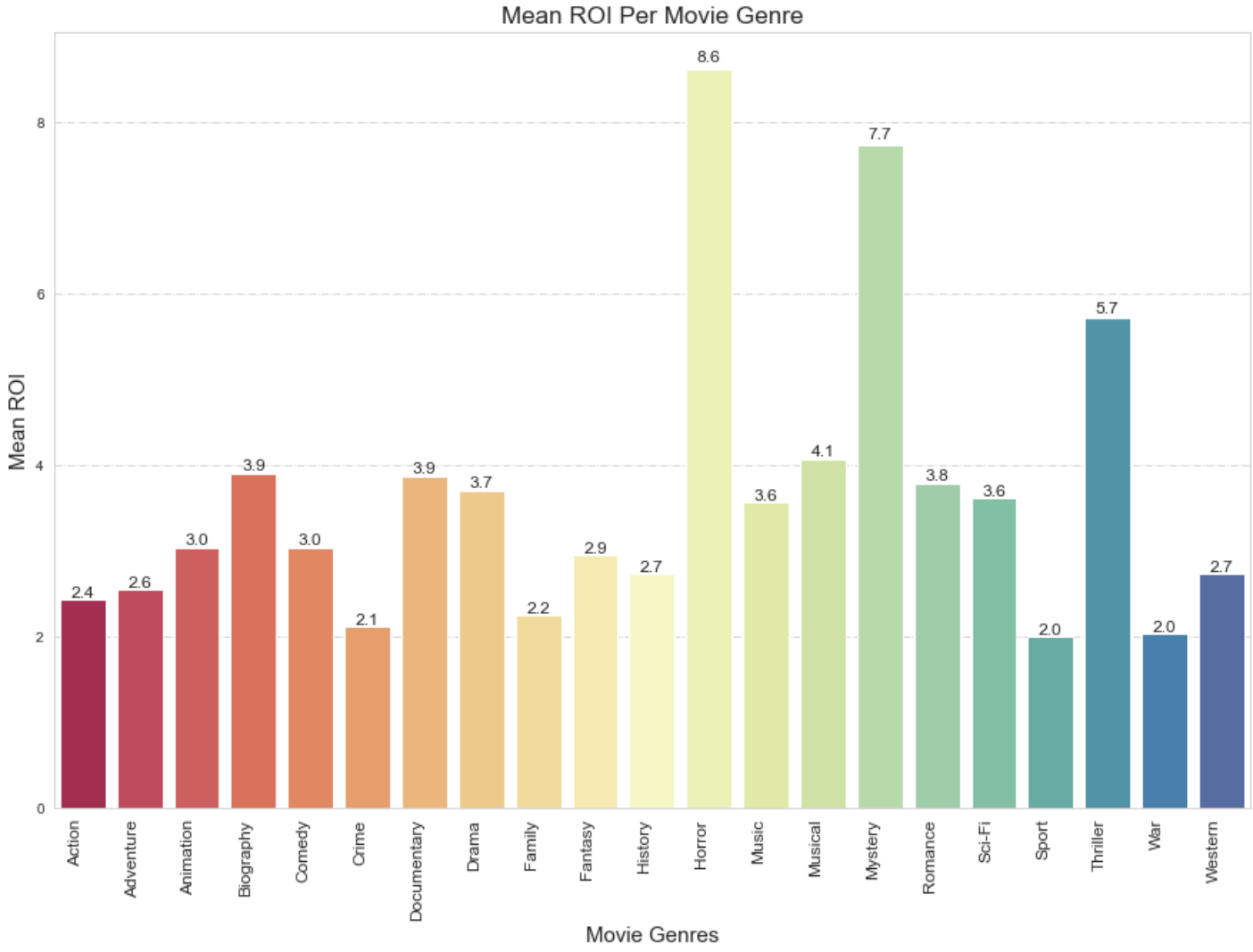
Out[106]:

	ROI
genres	
Action	2.441660
Adventure	2.559687
Animation	3.043752
Biography	3.908969
Comedy	3.038640
Crime	2.127588
Documentary	3.863989
Drama	3.705758
Family	2.248962
Fantasy	2.949825
History	2.729920
Horror	8.620773
Music	3.563154
Musical	4.074164
Mystery	7.731132
Romance	3.784353
Sci-Fi	3.613628
Sport	2.002306
Thriller	5.725473
War	2.035678
Western	2.730264

Graphing the Data for Mean ROI Per Genre

In [107]:
```
fix, ax = plt.subplots(figsize=(15,10))
sns.barplot(outliers_remove.groupby(by="genres")["ROI"].mean().index,
            outliers_remove.groupby(by="genres")["ROI"].mean().values,
           palette = "Spectral")
plt.xticks(rotation=90, ha='right', fontsize = 12)
plt.xlabel("Movie Genres",fontsize = 15)
plt.ylabel("Mean ROI",fontsize = 15)
ax.set_title("Mean ROI Per Movie Genre",fontsize = 17)

for p in ax.patches:
    _x = p.get_x() + p.get_width() / 2
    _y = p.get_y() + p.get_height() + (p.get_height()*0.01)
    value = '{:.1f}'.format(p.get_height())
    ax.text(_x, _y, value, ha="center",fontsize = 12)

#Grpahing Mean ROI per genre
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
```

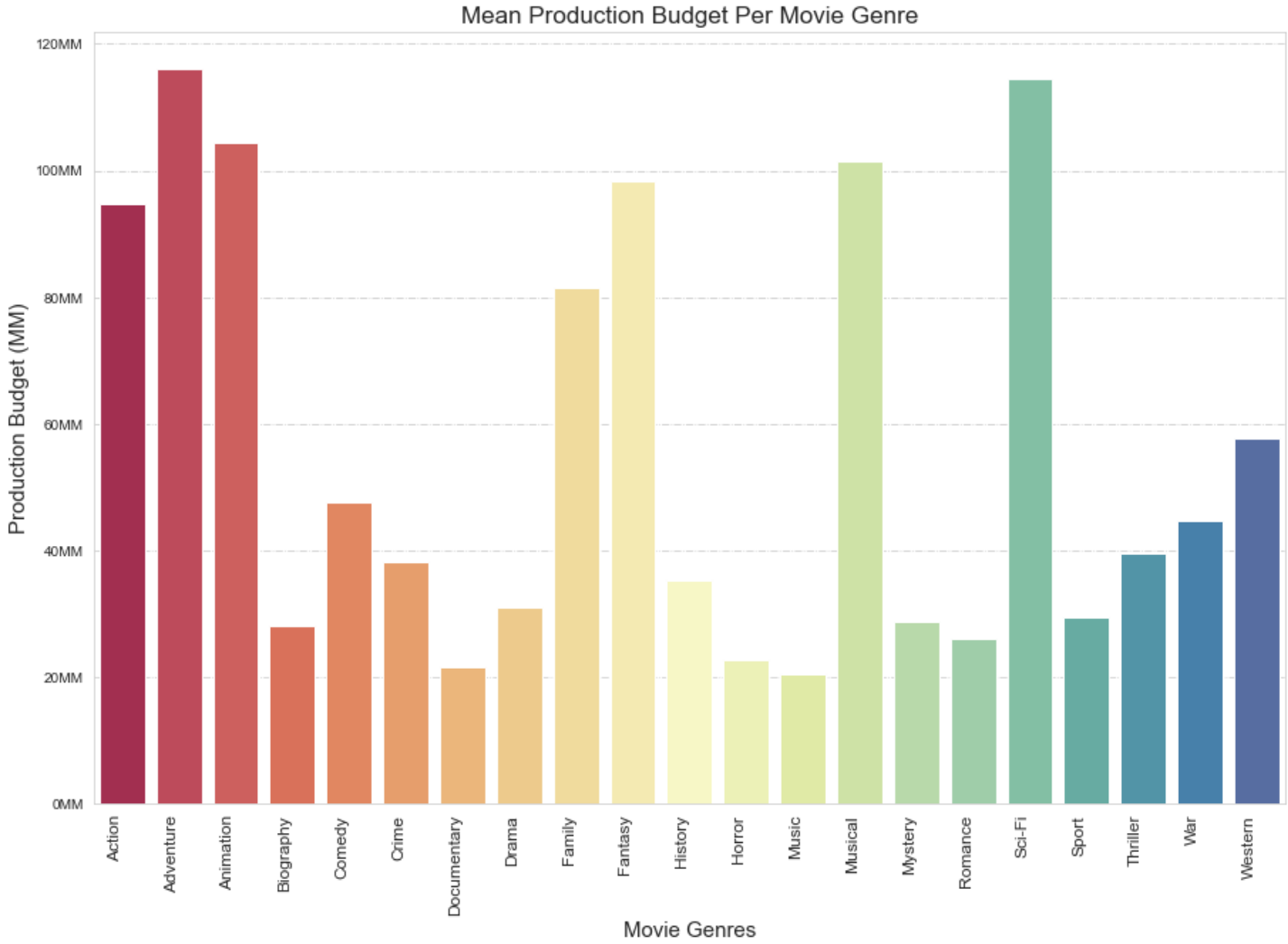


Adding Mean Production Budget Information

In [108]:
```
budgets_and_genres_prod = budgets_and_genres[['primary_title', 'genres','production_budget','ROI']].explode(
production = budgets_and_genres_prod.drop(budgets_and_genres_prod[(budgets_and_genres_prod["ROI"] > 100) | (
# Adding production data to table and removing outliers
```

In [109]:
```
labels = ["0MM","20MM","40MM","60MM","80MM","100MM","120MM"]
fix, ax = plt.subplots(figsize=(15,10))
sns.barplot(production.groupby(by="genres")["production_budget"].mean().index,
            production.groupby(by="genres")["production_budget"].mean().values,
           palette = "Spectral")
plt.xticks(rotation=90, ha='right', fontsize = 12)
plt.xlabel("Movie Genres",fontsize = 15)
plt.ylabel("Production Budget (MM)",fontsize = 15)
ax.set_yticklabels(labels)
ax.set_title("Mean Production Budget Per Movie Genre",fontsize = 17)

plt.savefig("Mean Production Budget Per Movie genre.jpg")

#Graphing mean production budget per movie genre
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
<ipython-input-109-aec19c58b08f>:9: UserWarning: FixedFormatter should only be used together with FixedLoc
ator
  ax.set_yticklabels(labels)
```



Adding Release Date to Data and Seperating by Month

In [110]:
```
months_genres_explode = budgets_and_genres[['primary_title', 'genres', 'ROI',"release_date"]].explode('genre
months_genres_explode = months_genres_explode.drop(budgets_and_genres[(budgets_and_genres["ROI"] > 100) | (b
#Exploding rows based on genres and removing outliers from ROI
```

In [111]:
```
months_genres_explode["month"] = months_genres_explode["release_date"].dt.strftime("%m")
months_genres_explode["month"].value_counts()
#Seperating month from release date
```

Out[111]:
```
11    285
12    273
07    259
10    259
09    240
08    239
03    235
06    227
05    200
04    196
02    190
01    138
Name: month, dtype: int64
```

Grouping Data by Month to Get Mean ROI

In [112]:
```
mean_ROI_months = months_genres_explode.groupby(by="month").mean("ROI")
mean_ROI_months
#Grouping mean ROI by month
```

Out[112]:

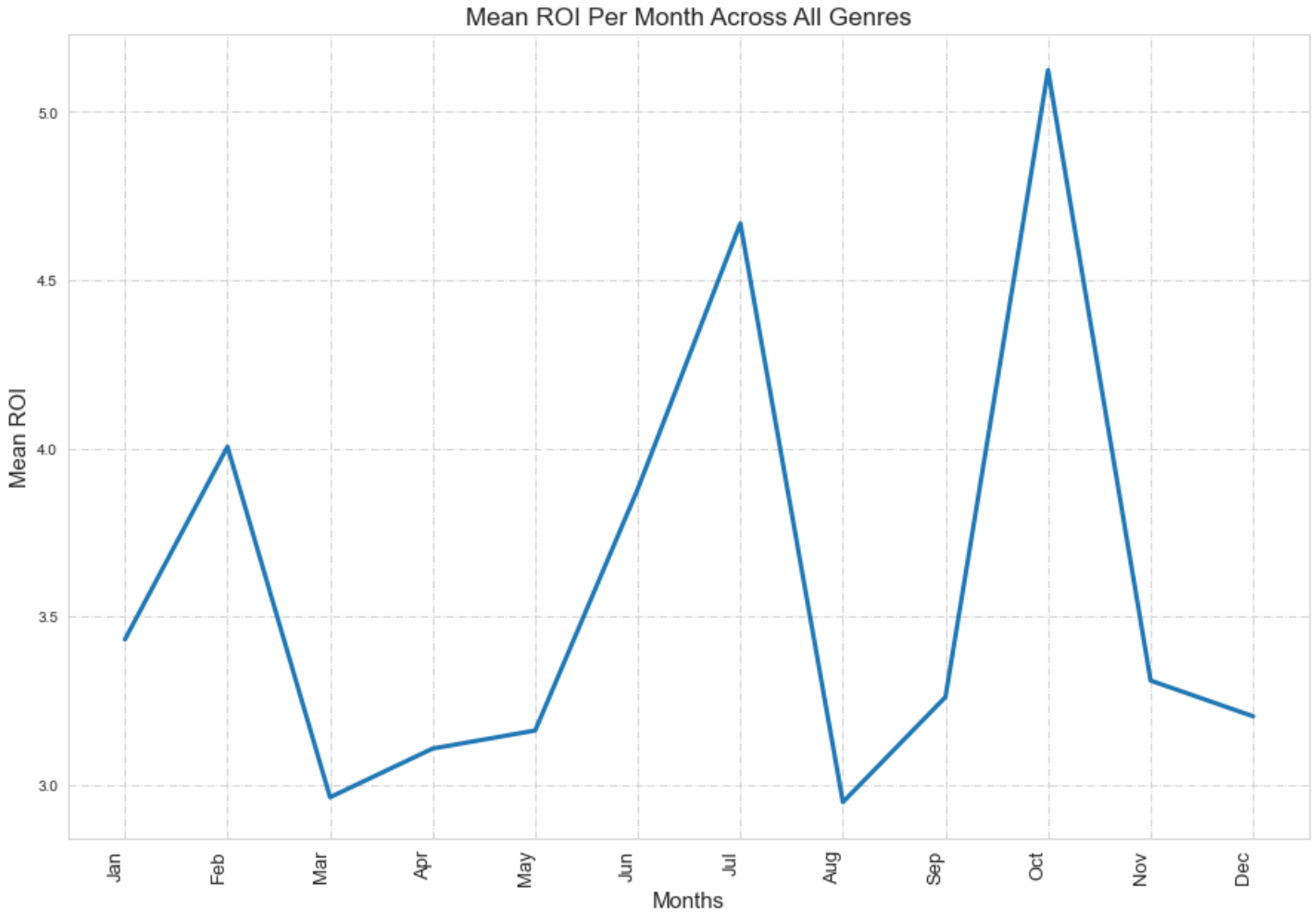
month	ROI
01	3.431729
02	4.004704
03	2.962870
04	3.107587
05	3.161290
06	3.879032
07	4.668562
08	2.948467
09	3.260842
10	5.123678
11	3.309643
12	3.203377

Graphing Mean ROI Across Months

In [113]:
```
labels = ["Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"]

fix, ax = plt.subplots(figsize=(15,10))
sns.lineplot(months_genres_explode.groupby(by="month")["ROI"].mean().index,
             months_genres_explode.groupby(by="month")["ROI"].mean().values,
             linewidth = 3)
plt.xticks(rotation=90, ha='right',fontsize = 13)
plt.xlabel("Months",fontsize = 15)
plt.ylabel("Mean ROI", fontsize = 15)
ax.set_title("Mean ROI Per Month Across All Genres",fontsize = 17)
ax.set_xticklabels(labels)

#Graphing Mean ROI Across Months
```

```
/Users/ashfa/miniconda3/envs/learn-env/lib/python3.8/site-packages/seaborn/_decorators.py:36: FutureWarnin
g: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argume
nt will be `data`, and passing other arguments without an explicit keyword will result in an error or misi
nterpretation.
  warnings.warn(
<ipython-input-113-73ac15feb87a>:11: UserWarning: FixedFormatter should only be used together with FixedLo
cator
  ax.set_xticklabels(labels)
```

Out[113]:
```
[Text(0, 0, 'Jan'),
 Text(1, 0, 'Feb'),
 Text(2, 0, 'Mar'),
 Text(3, 0, 'Apr'),
 Text(4, 0, 'May'),
 Text(5, 0, 'Jun'),
 Text(6, 0, 'Jul'),
 Text(7, 0, 'Aug'),
 Text(8, 0, 'Sep'),
 Text(9, 0, 'Oct'),
 Text(10, 0, 'Nov'),
 Text(11, 0, 'Dec')]
```



RECOMMENDATION 3: ACTORS BASED ON POPULARITY

CREATING A TABLE WITH ACTORS/ACTRESS AND THEIR NAMES

In [114]:
```
#loading and specifying columns in principals table
persons_ = pd.read_sql("""
SELECT movie_id, person_id, category
FROM principals
WHERE category = 'actor' OR category = 'actress';
""", con)
```

In [115]:
```
#loading and specifying columns in persons table
persons_name = pd.read_sql("""
SELECT person_id, primary_name, primary_profession
FROM persons
WHERE primary_profession = 'actor' OR primary_profession = 'actress'
""", con)
```

In [116]:
```
#converting tables to PD DataFrame
persons_df = pd.DataFrame(persons_)
persons_name_df = pd.DataFrame(persons_name)
```

In [117]:
```
#merging both DataFrames based on common column: person_id
merged_df = pd.merge(persons_, persons_name, on = 'person_id')
```

In [118]:
```
merged_df.drop(columns = 'primary_profession', inplace = True)
```

Adding Movie_basics table & ratings table to the dataframe

In [119]:
```
#adding movie basics to a dataframe
movie_info = pd.read_sql("""
SELECT * FROM movie_basics;
""", con)
```

In [120]:
```
movies = pd.DataFrame(movie_info)
```

In [121]:
```
#removing null values
movies.dropna(axis = 0, inplace = True)
```

In [122]:
```
#merging movie dataframe
movies_actors = pd.merge(merged_df, movies, on = 'movie_id')
```

In [123]:
```
#adding movie ratings to a dataframe
ratings = pd.read_sql("""
SELECT * FROM movie_ratings
""", con)
```

In [124]:
```
movie_ratings = pd.DataFrame(ratings)
```

In [125]:
```
#merging dataframes w. dataframe that was made with actors/actresses info
ratings_mov = pd.merge(movies_actors, movie_ratings, on = 'movie_id')
```

ADDING MOVIE GROSS VALUES TO THE TABLE

In [126]:
```
movie_full = pd.merge(ratings_mov, tn_movie_budgets, left_on = 'primary_title', right_on = 'movie')
movie_full
```

Out[126]:

	movie_id	person_id	category	primary_name	primary_title	original_title	start_year	runtime_minutes	genres	averagerati
0	tt1083452	nm8030441	actor	Tom Costello	Eddie the Eagle	Eddie the Eagle	2015	106.0	Biography,Comedy,Drama	
1	tt1124037	nm0991810	actor	Mahershala Ali	Free State of Jones	Free State of Jones	2016	139.0	Action,Biography,Drama	
2	tt0437086	nm0991810	actor	Mahershala Ali	Alita: Battle Angel	Alita: Battle Angel	2019	122.0	Action,Adventure,Sci-Fi	
3	tt0437086	nm0000124	actress	Jennifer Connelly	Alita: Battle Angel	Alita: Battle Angel	2019	122.0	Action,Adventure,Sci-Fi	
4	tt4975722	nm0991810	actor	Mahershala Ali	Moonlight	Moonlight	2016	111.0	Drama	
...	...	...	...	...	...	...	...	...	...	
2868	tt7535280	nm9358590	actor	Andrei Zagorodnii	Teeth	Dintii	2017	71.0	Drama	
2869	tt8662424	nm9953795	actress	Toni Allan	Never Again	Never Again	2017	106.0	Drama	
2870	tt8662424	nm9953794	actress	Kelly Baxter	Never Again	Never Again	2017	106.0	Drama	
2871	tt8662424	nm9953791	actor	Hawt Carl	Never Again	Never Again	2017	106.0	Drama	
2872	tt8662424	nm9953789	actress	Kristen Carletta	Never Again	Never Again	2017	106.0	Drama	

2873 rows × 19 columns

USING EXPLODE METHOD TO SEPARATE MULTIPLE GENRE VALUES FROM THE GENRE COLUMN

In [127]:
```
movie_full['genres'] = movie_full['genres'].apply(lambda x: x.split(','))
```

In [128]:
```
movie_info_ = movie_full.explode('genres')
```

In [129]:
```
#dropping columns that are not needed
movie_info_.drop(['original_title', 'runtime_minutes', 'id', 'movie'], axis=1)
```

Out[129]:

	movie_id	person_id	category	primary_name	primary_title	start_year	genres	averagerating	numvotes	release_date	production_budg
0	tt1083452	nm8030441	actor	Tom Costello	Eddie the Eagle	2015	Biography	7.4	75331	2016-02-26	230000
0	tt1083452	nm8030441	actor	Tom Costello	Eddie the Eagle	2015	Comedy	7.4	75331	2016-02-26	230000
0	tt1083452	nm8030441	actor	Tom Costello	Eddie the Eagle	2015	Drama	7.4	75331	2016-02-26	230000
1	tt1124037	nm0991810	actor	Mahershala Ali	Free State of Jones	2016	Action	6.9	45135	2016-06-24	500000
1	tt1124037	nm0991810	actor	Mahershala Ali	Free State of Jones	2016	Biography	6.9	45135	2016-06-24	500000
...	...	...	...	...	...	...	...	...	...	...	
2868	tt7535280	nm9358590	actor	Andrei Zagorodnii	Teeth	2017	Drama	8.8	25	2008-01-18	20000
2869	tt8662424	nm9953795	actress	Toni Allan	Never Again	2017	Drama	5.7	67	2002-07-12	5000
2870	tt8662424	nm9953794	actress	Kelly Baxter	Never Again	2017	Drama	5.7	67	2002-07-12	5000
2871	tt8662424	nm9953791	actor	Hawt Carl	Never Again	2017	Drama	5.7	67	2002-07-12	5000
2872	tt8662424	nm9953789	actress	Kristen Carletta	Never Again	2017	Drama	5.7	67	2002-07-12	5000

5920 rows × 15 columns

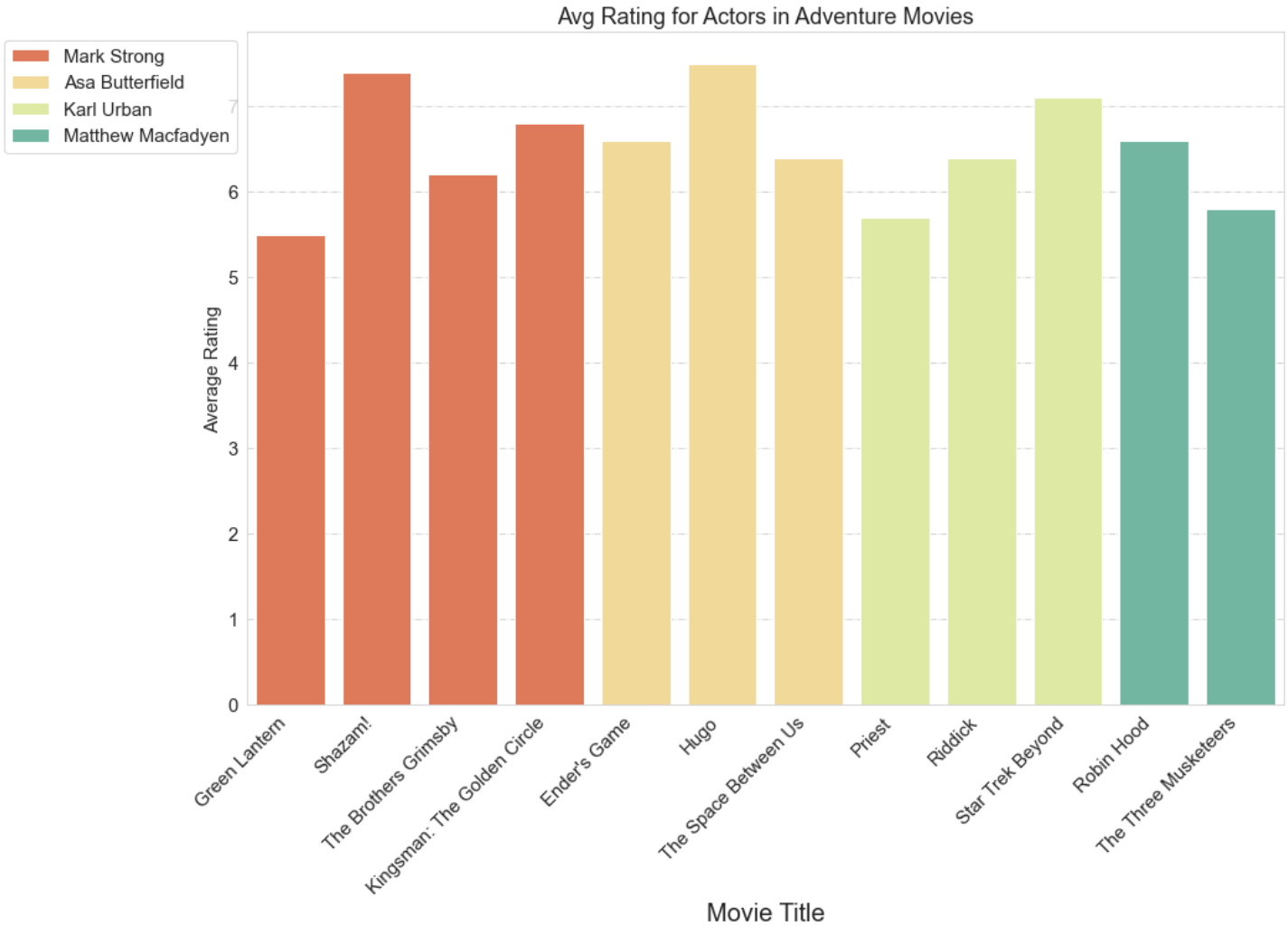
ADVENTURE MOVIES

In [130]:
```
#Grouping together all adventure movies and creating a list of actors who have the most
# data in the table.
adv_movies = movie_info_[(movie_info_['genres'] == 'Adventure')]
adv_counts = adv_movies['primary_name'].value_counts().sort_values(ascending = False, inplace = False).head(
adv_counts
```

Out[130]:
```
Mark Strong          4
Kodi Smit-McPhee     3
Karl Urban           3
Matthew Macfadyen    3
Asa Butterfield      3
Name: primary_name, dtype: int64
```

In [131]:
```
# Creating a new table from the list of actors to use for plotting
adv_1 = adv_movies[(adv_movies['primary_name'] == 'Mark Strong')]
adv_2 = adv_movies[(adv_movies['primary_name'] == 'Asa Butterfield')]
adv_3 = adv_movies[(adv_movies['primary_name'] == 'Karl Urban')]
adv_4 = adv_movies[(adv_movies['primary_name'] == 'Matthew Macfadyen')]
adv = pd.concat([adv_1.assign(dataset='adv_1'),adv_2.assign(dataset='adv_2'),
                 adv_3.assign(dataset='adv_3'), adv_4.assign(dataset='adv_4')])
```

In [132]:
```
rcParams.update({'font.size': 15})

 ax = plt.subplots(figsize = (15,10))

barplot(x = 'primary_title', y = 'averagerating', hue = 'primary_name',data = adv, palette = "Spectral", dodg
et_xlabel('Movie Title', fontdict={'fontsize':20} )
et_ylabel('Average Rating')
et_title('Avg Rating for Actors in Adventure Movies')

legend(loc='upper right', bbox_to_anchor = (0,1))

xticks(rotation=45, ha='right')

show()
```



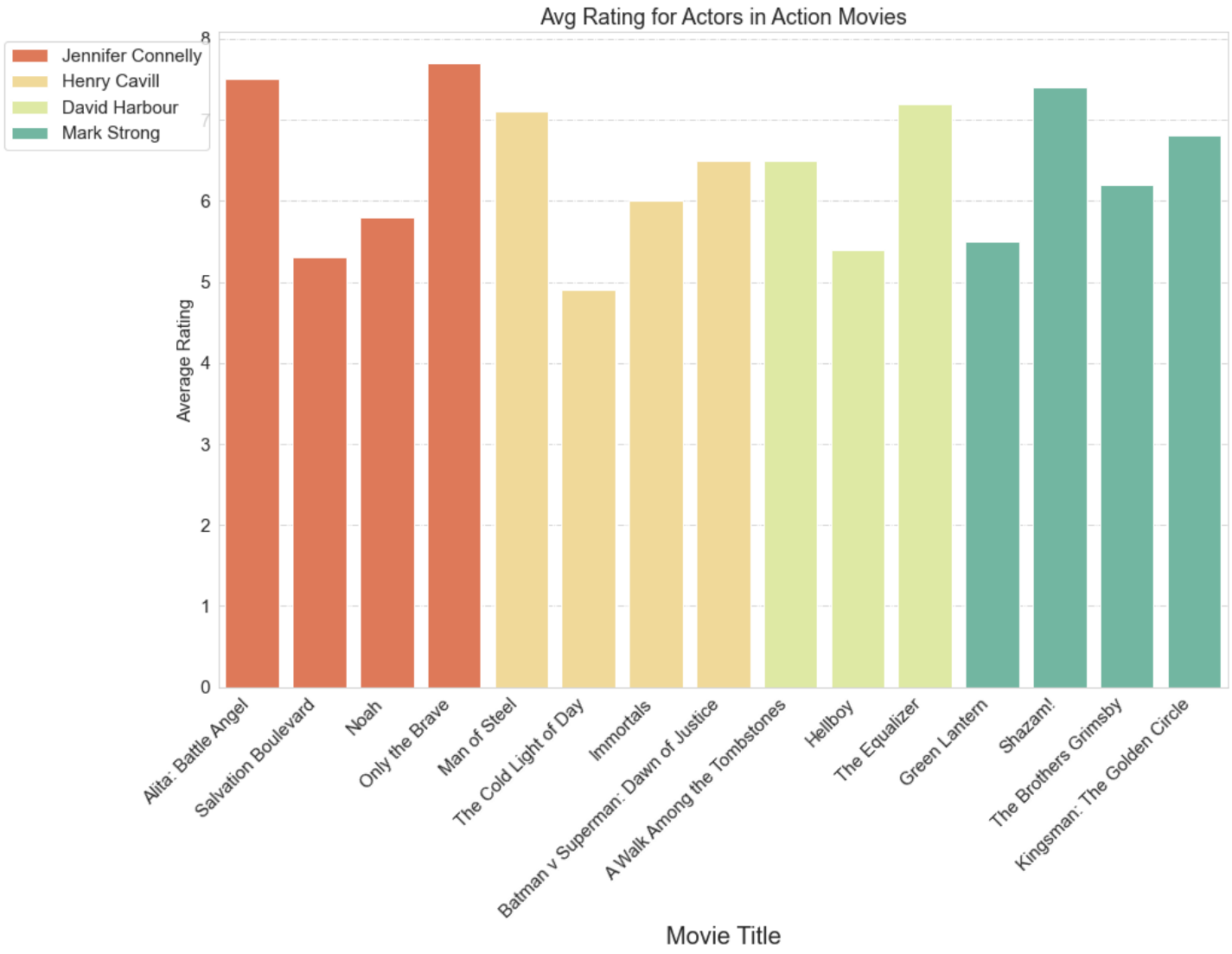
ACTION MOVIES

In [133]:
```
#Grouping together all adventure movies and creating a list of actors who have the most
# data in the table.
act_movies = movie_info_[(movie_info_['genres'] == 'Action')]
act_counts = act_movies['primary_name'].value_counts().sort_values(ascending = False, inplace = False).head(
act_counts
```

Out[133]:
```
Mark Strong          4
Henry Cavill         4
Karl Urban           4
David Harbour        4
Jennifer Connelly    4
Name: primary_name, dtype: int64
```

In [134]:
```
# Creating a new table from the list of actors to use for plotting
act_1 = act_movies[(act_movies['primary_name'] == 'Jennifer Connelly')]
act_2 = act_movies[(act_movies['primary_name'] == 'Henry Cavill')]
act_3 = act_movies[(act_movies['primary_name'] == 'David Harbour')]
act_4 = act_movies[(act_movies['primary_name'] == 'Mark Strong')]
act = pd.concat([act_1.assign(dataset='act_1'),act_2.assign(dataset='act_2'),
                 act_3.assign(dataset='act_3'), act_4.assign(dataset='act_4')])
```

In [135]:
```
plt.rcParams.update({'font.size': 15})
fig, ax = plt.subplots(figsize = (15,10))

sns.barplot(x = 'primary_title', y = 'averagerating', hue = 'primary_name',data = act, palette = "Spectral",
ax.set_xlabel('Movie Title', fontdict={'fontsize':20} )
ax.set_ylabel('Average Rating')
ax.set_title('Avg Rating for Actors in Action Movies')

plt.legend(loc='upper right', bbox_to_anchor = (0,1))

plt.xticks(rotation=45, ha='right')

plt.show()
```



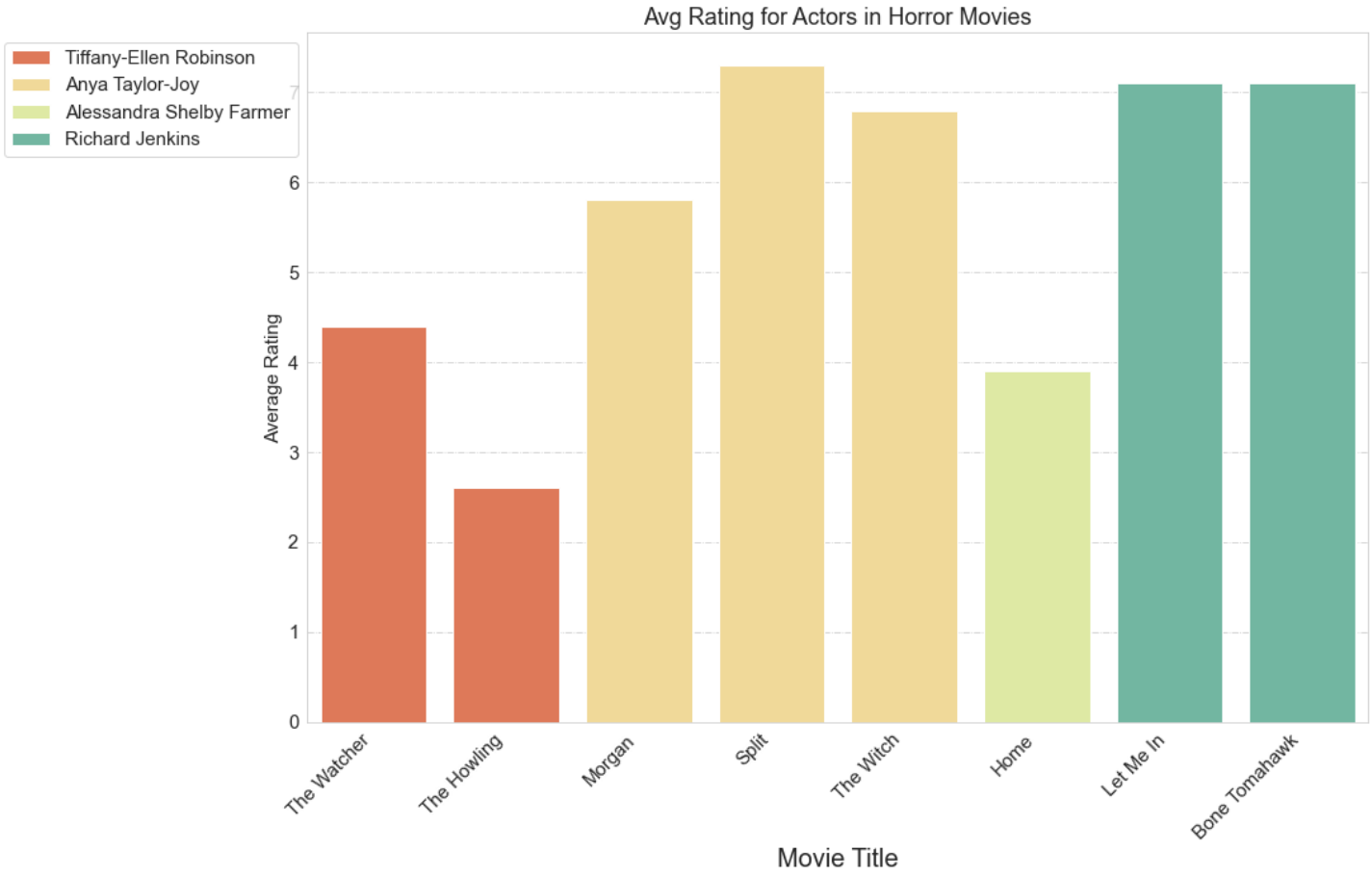
HORROR MOVIES

In [136]:
```
#Grouping together all adventure movies and creating a list of actors who have the most
# data in the table.
hor_movies = movie_info_[(movie_info_['genres'] == 'Horror')]
hor_counts = hor_movies['primary_name'].value_counts().sort_values(ascending = False, inplace = False).head(
hor_counts
```

Out[136]:
```
Kerry Knuppe                3
Alessandra Shelby Farmer    3
Anya Taylor-Joy             3
Catherine Badalyan          2
David Mazouz                2
Name: primary_name, dtype: int64
```

In [137]:
```
# Creating a new table from the list of actors to use for plotting
hor_1 = hor_movies[(hor_movies['primary_name'] == 'Tiffany-Ellen Robinson')]
hor_2 = hor_movies[(hor_movies['primary_name'] == 'Anya Taylor-Joy')]
hor_3 = hor_movies[(hor_movies['primary_name'] == 'Alessandra Shelby Farmer')]
hor_4 = hor_movies[(hor_movies['primary_name'] == 'Richard Jenkins')]
hor = pd.concat([hor_1.assign(dataset='hor_1'),hor_2.assign(dataset='hor_2'),
                 hor_3.assign(dataset='hor_3'), hor_4.assign(dataset='hor_4')])
```

In [138]:
```
plt.rcParams.update({'font.size': 15})
fig, ax = plt.subplots(figsize = (15,10))

sns.barplot(x = 'primary_title', y = 'averagerating', hue = 'primary_name',data = hor, palette = "Spectral",
ax.set_xlabel('Movie Title', fontdict={'fontsize':20} )
ax.set_ylabel('Average Rating')
ax.set_title('Avg Rating for Actors in Horror Movies')

plt.legend(loc='upper right', bbox_to_anchor = (0,1))

plt.xticks(rotation=45, ha='right')

plt.show()
```



In [ ]: