A Data Analysis of IMDB and Rotten Tomatoes

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Introduction

This project analyzes data from IMDB and Rotten Tomatoes to explore which genres and movie studios are the most successful in the movie industry. Microsoft is looking to create a new movie studio to produce original video content and wants to know what type of films are doing best at the box office. This analysis provides insights for the client to help decide what movies to create.

Questions

This project will address four questions about the movie industry:

1. What are the top grossing movie genres?
2. Does movie runtimes affect profitability?
3. What genre of movies are the most popular based on user ratings?
4. What movie content rating based on genre is the most popular?

Data

IMDB
The analysis examines a merged form of data from Box Office Mojo by IMDbPro and IMDB. BOM (Box Office Mojo) has data on domestic gross, and IMDB has data on movie genres.

Rotten Tomatoes
Rotten Tomatoes contains data on genres, user ratings and movie content rating that is used to address popular genres based on content rating and popular genres based on user ratings.

Data preparation

First, I imported the necessary packages to process the data. In this case, SQL and Pandas were used.

In [1]:
```
import sqlite3
import pandas as pd
```

IMDB Data

The IMDB dataset has two tables that were used in this data cleaning. Movie Basics and Movie Ratings includes data files that provide movie genres, title, start year and average votes.

In [2]:
```
#create connection to database
conn = sqlite3.connect('im.db')
```

```
cur = conn.cursor()
```

Pandas is used to format the IMDB data into the following dataframes. I opened the Box Office Mojo datafile to see the domestic gross and foreign gross of movies. This dataset also contains the movie studio of each film.

In [3]:
```
movie_gross = pd.read_csv ('bom.movie_gross.csv')

movie_gross.head()
```

Out[3]:

	title	studio	domestic_gross	foreign_gross	year
0	Toy Story 3	BV	415000000.0	652000000	2010
1	Alice in Wonderland (2010)	BV	334200000.0	691300000	2010
2	Harry Potter and the Deathly Hallows Part 1	WB	296000000.0	664300000	2010
3	Inception	WB	292600000.0	535700000	2010
4	Shrek Forever After	P/DW	238700000.0	513900000	2010

Movie_basics table:

In [4]:
```
movie_basics = pd.read_sql("""
    SELECT *
    FROM movie_basics;
    """, conn)
movie_basics.head()
```

Out[4]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres
0	tt0063540	Sunghursh	Sunghursh	2013	175.0	Action,Crime,Drama
1	tt0066787	One Day Before the Rainy Season	Ashad Ka Ek Din	2019	114.0	Biography,Drama
2	tt0069049	The Other Side of the Wind	The Other Side of the Wind	2018	122.0	Drama
3	tt0069204	Sabse Bada Sukh	Sabse Bada Sukh	2018	NaN	Comedy,Drama
4	tt0100275	The Wandering Soap Opera	La Telenovela Errante	2017	80.0	Comedy,Drama,Fantasy

Movie_ratings table:

In [5]:
```
movie_ratings = pd.read_sql("""
    SELECT *
    FROM movie_ratings;
    """, conn)
movie_ratings.head()
```

Out[5]:

	movie_id	averagerating	numvotes
0	tt10356526	8.3	31
1	tt10384606	8.9	559
2	tt1042974	6.4	20
3	tt1043726	4.2	50352
4	tt1060240	6.5	21

Movie Basics and Movie Gross both have a column for individual movie titles. I want to see if the two datasets share the same data under Title and Primary Title columns. I merged the datasets along the title and primary title columns will show movies that share the same title.

In [6]:
```
movie_basics = movie_gross.merge(movie_basics, how='inner', left_on='title', rig
movie_basics.head()
```

Out[6]:

	title_x	studio	domestic_gross_x	foreign_gross	year	movie_id	primary_title	original_ti
0	Toy Story 3	BV	415000000.0	652000000	2010	tt0435761	Toy Story 3	Toy Stor
1	Inception	WB	292600000.0	535700000	2010	tt1375666	Inception	Incept
2	Shrek Forever After	P/DW	238700000.0	513900000	2010	tt0892791	Shrek Forever After	Shr Fore Af
3	The Twilight Saga: Eclipse	Sum.	300500000.0	398000000	2010	tt1325004	The Twilight Saga: Eclipse	The Twili Sa Eclip
4	Iron Man 2	Par.	312400000.0	311500000	2010	tt1228705	Iron Man 2	Iron Ma

Rename columns title_x and domestic_gross_x to title and domestic gross.

In [7]:
```
movie_basics.rename(columns = {'title_x':'title', 'domestic_gross_x': 'domestic_
movie_basics
```

Out[7]:

	title	studio	domestic_gross	foreign_gross	year	movie_id	primary_title	original
0	Toy Story 3	BV	415000000.0	652000000	2010	tt0435761	Toy Story 3	Toy St
1	Inception	WB	292600000.0	535700000	2010	tt1375666	Inception	Ince
2	Shrek Forever After	P/DW	238700000.0	513900000	2010	tt0892791	Shrek Forever After	Fo
3	The Twilight Saga: Eclipse	Sum.	300500000.0	398000000	2010	tt1325004	The Twilight Saga: Eclipse	The Tw Ec

	title	studio	domestic_gross	foreign_gross	year	movie_id	primary_title	original
4	Iron Man 2	Par.	312400000.0	311500000	2010	tt1228705	Iron Man 2	Iron M
...	...	...	...	...	...	...	...	
3361	Souvenir	Strand	11400.0	NaN	2018	tt2389092	Souvenir	Sou
3362	Souvenir	Strand	11400.0	NaN	2018	tt3478898	Souvenir	Sou
3363	Beauty and the Dogs	Osci.	8900.0	NaN	2018	tt6776572	Beauty and the Dogs	Aala Ka
3364	The Quake	Magn.	6200.0	NaN	2018	tt6523720	The Quake	Skj
3365	An Actor Prepares	Grav.	1700.0	NaN	2018	tt5718046	An Actor Prepares	An Prep

3366 rows × 13 columns

Dropped domestic_gross_y and title_y columns.

In [8]:
```
movie_basics = movie_basics.drop(['domestic_gross_y','title_y'], axis=1)
movie_basics
```

Out[8]:

	title	studio	domestic_gross	foreign_gross	year	movie_id	primary_title	original
0	Toy Story 3	BV	415000000.0	652000000	2010	tt0435761	Toy Story 3	Toy St
1	Inception	WB	292600000.0	535700000	2010	tt1375666	Inception	Ince
2	Shrek Forever After	P/DW	238700000.0	513900000	2010	tt0892791	Shrek Forever After	Fo
3	The Twilight Saga: Eclipse	Sum.	300500000.0	398000000	2010	tt1325004	The Twilight Saga: Eclipse	The Tw Ec
4	Iron Man 2	Par.	312400000.0	311500000	2010	tt1228705	Iron Man 2	Iron M
...	...	...	...	...	...	...	...	
3361	Souvenir	Strand	11400.0	NaN	2018	tt2389092	Souvenir	Sou
3362	Souvenir	Strand	11400.0	NaN	2018	tt3478898	Souvenir	Sou
3363	Beauty and the Dogs	Osci.	8900.0	NaN	2018	tt6776572	Beauty and the Dogs	Aala Ka
3364	The Quake	Magn.	6200.0	NaN	2018	tt6523720	The Quake	Skj
3365	An Actor Prepares	Grav.	1700.0	NaN	2018	tt5718046	An Actor Prepares	An Prep

3366 rows × 11 columns

In [9]:
```
movie_basics["title"].describe()
```

Out[9]:
```
count      3366
unique     2605
top        Gone
freq         15
Name: title, dtype: object
```

The title merge with Movie Basics and Movie Gross shows 2605 unique titles, out of 3366. Due to missing data, I moved on and created a new dataframe to join Movie Basics and Movie ratings using Movie ID.

In [10]:
```
imbd_df= pd.read_sql("""

SELECT *
FROM movie_basics
JOIN movie_ratings
    USING(movie_id)
;
""", conn)
imbd_df.head()
```

Out[10]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres
0	tt0063540	Sunghursh	Sunghursh	2013	175.0	Action,Crime,Drama
1	tt0066787	One Day Before the Rainy Season	Ashad Ka Ek Din	2019	114.0	Biography,Drama
2	tt0069049	The Other Side of the Wind	The Other Side of the Wind	2018	122.0	Drama
3	tt0069204	Sabse Bada Sukh	Sabse Bada Sukh	2018	NaN	Comedy,Drama
4	tt0100275	The Wandering Soap Opera	La Telenovela Errante	2017	80.0	Comedy,Drama,Fantasy

Genres are separated by commas, and wanted to separate genres to get a better visualization for my analysis.

In [11]:
```
imbd_df['genres'] = imbd_df['genres'].str.split(',')
imbd_genres_df = imbd_df.explode('genres')
```

I used the pandas describe function to take a look at my new dataframe's stats. I don't see any missing data under movie_id so it's time to plot my data.

In [12]:
```
imbd_df.describe(include = [object])
```

Out[12]:

	movie_id	primary_title	original_title	genres	domestic_gross	title
count	73856	73856	73856	73052	0	0
unique	73856	69993	71097	923	0	0
top	tt3512290	The Return	Lucky	[Drama]	NaN	NaN
freq	1	11	9	11612	NaN	NaN

Analysis

Imported the required packages to plot my data.

In [13]:
```
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
```

I wanted to find out what the to grossing moving genres are. Using my movie_basics dataset, I used the explode function to separate genres.

In [14]:
```
#explode function to separate genres
movie_basics['genres'] = movie_basics['genres'].str.split(',')
movie_basics_genres = movie_basics.explode('genres')
movie_basics_genres
```

Out[14]:

	title	studio	domestic_gross	foreign_gross	year	movie_id	primary_title	original_
0	Toy Story 3	BV	415000000.0	652000000	2010	tt0435761	Toy Story 3	Toy Sto
0	Toy Story 3	BV	415000000.0	652000000	2010	tt0435761	Toy Story 3	Toy Sto
0	Toy Story 3	BV	415000000.0	652000000	2010	tt0435761	Toy Story 3	Toy Sto
1	Inception	WB	292600000.0	535700000	2010	tt1375666	Inception	Incep
1	Inception	WB	292600000.0	535700000	2010	tt1375666	Inception	Incep
...	...	...	...	...	...	...	...	
3363	Beauty and the Dogs	Osci.	8900.0	NaN	2018	tt6776572	Beauty and the Dogs	Aala Kaf
3364	The Quake	Magn.	6200.0	NaN	2018	tt6523720	The Quake	Skj
3364	The Quake	Magn.	6200.0	NaN	2018	tt6523720	The Quake	Skj
3364	The Quake	Magn.	6200.0	NaN	2018	tt6523720	The Quake	Skj
3365	An Actor Prepares	Grav.	1700.0	NaN	2018	tt5718046	An Actor Prepares	An A Prep

7471 rows × 11 columns

Now that my genres and separated, it was time to prepare my data for analysis.

In [15]:
```
#group genres, domestic gross, studio

moviebasics_group_table = (
    movie_basics_genres
    .groupby('genres')
    .sum()
    .reset_index()
    .sort_values('domestic_gross', ascending = False)[['genres', 'domestic_gross
)
moviebasics_group_table
```

Out[15]:

	genres	domestic_gross
1	Adventure	4.191778e+10
0	Action	3.843915e+10
4	Comedy	3.249809e+10
7	Drama	3.105158e+10
17	Sci-Fi	1.495762e+10
19	Thriller	1.367092e+10
2	Animation	1.362289e+10
5	Crime	9.352542e+09
9	Fantasy	9.288773e+09
16	Romance	7.331809e+09
11	Horror	7.088680e+09
3	Biography	6.420383e+09
8	Family	5.597358e+09
6	Documentary	5.443313e+09
14	Mystery	4.974365e+09
10	History	2.943172e+09
18	Sport	2.122595e+09
12	Music	1.697182e+09
13	Musical	5.508563e+08
21	Western	5.294837e+08
20	War	2.814003e+08
15	News	2.184540e+07

Renamed domestic_gross_x column to domestic_gross

In [16]:
```
moviebasics_group_table.rename(columns = {'domestic_gross_x':'domestic_gross'},
moviebasics_group_table
```

Out[16]:

	genres	domestic_gross

	genres	domestic_gross
1	Adventure	4.191778e+10
0	Action	3.843915e+10
4	Comedy	3.249809e+10
7	Drama	3.105158e+10
17	Sci-Fi	1.495762e+10
19	Thriller	1.367092e+10
2	Animation	1.362289e+10
5	Crime	9.352542e+09
9	Fantasy	9.288773e+09
16	Romance	7.331809e+09
11	Horror	7.088680e+09
3	Biography	6.420383e+09
8	Family	5.597358e+09
6	Documentary	5.443313e+09
14	Mystery	4.974365e+09
10	History	2.943172e+09
18	Sport	2.122595e+09
12	Music	1.697182e+09
13	Musical	5.508563e+08
21	Western	5.294837e+08
20	War	2.814003e+08
15	News	2.184540e+07

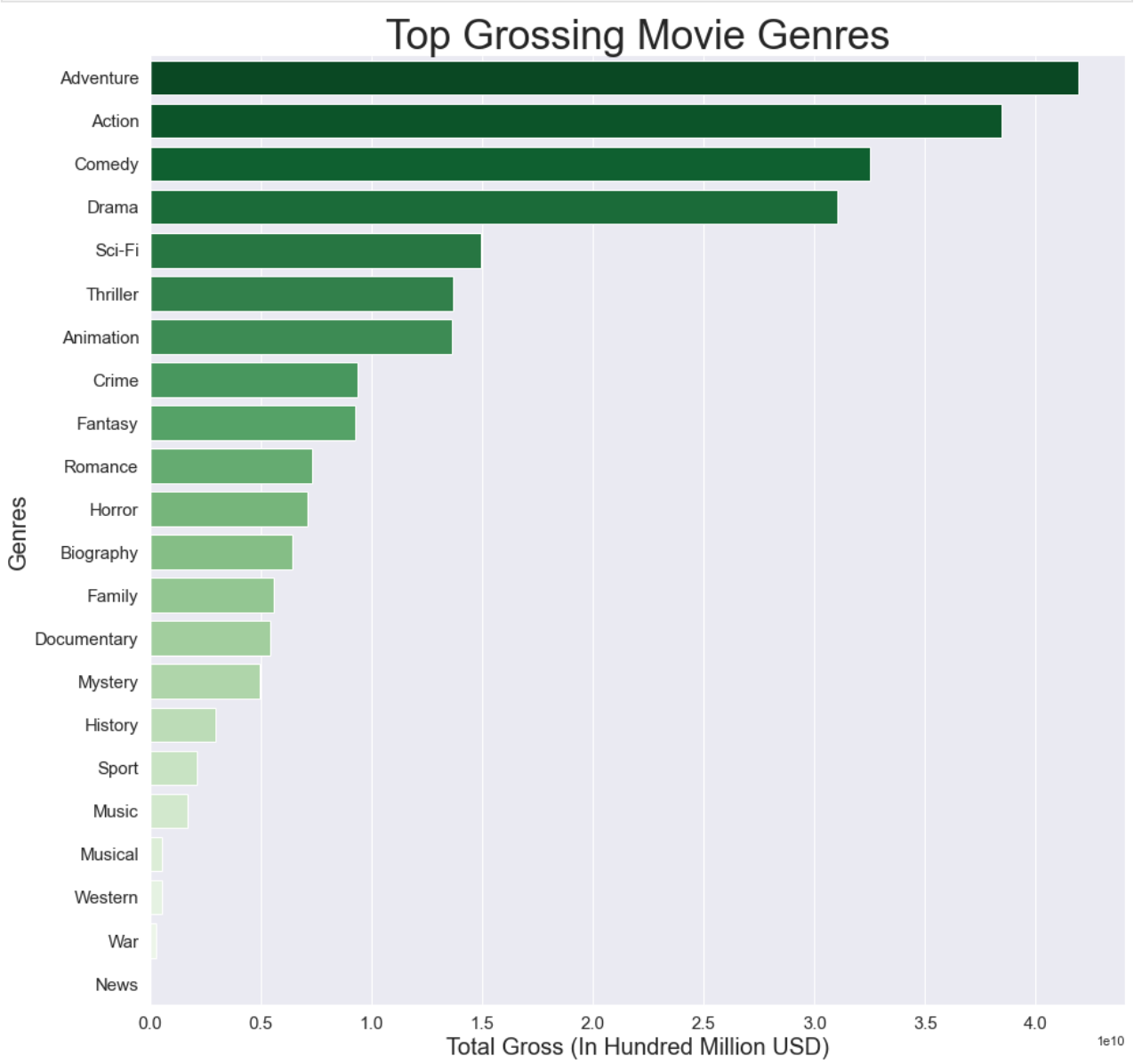
Now that my data is a nice table grouped by genre and domestic gross, it's time to create a bar graph.

In [17]:
```
#set figure and specify plot size
sns.set(rc = {'figure.figsize':(15,15)})

#plot dataframe
sns.barplot(data=moviebasics_group_table, x="domestic_gross", y="genres", ci=Non


#set ticks, labels, and title
plt.title('Top Grossing Movie Genres', fontsize=35, fontname='Arial')
plt.xlabel('Total Gross (In Hundred Million USD)', fontsize=20, fontname='Arial'
plt.ylabel('Genres', fontsize=20, fontname='Arial')
plt.xticks(fontsize=15, fontname='Arial')
plt.yticks(fontsize=15, fontname='Arial')


sns.despine()
plt.show()
```



It looks like Adventure, Action and Comdey is the top grossing movie genre.

Next, I prepared my data to create a scatter plot to show if there's a relationship between a movie's runtime and gross value. I chose to focus on movies that are full-length films rather than short films.

In [18]:
```
runtimes_gross = pd.read_sql("""
SELECT *
FROM imdb_runtime_df
WHERE runtime_minutes >= 60
GROUP BY title_x
ORDER BY domestic_gross_x desc;
""", conn)
runtimes_gross
```

Out[18]:

	title_x	domestic_gross_x	runtime_minutes	genres
0	Black Panther	700100000.0	134.0	Action
1	Avengers: Infinity War	678800000.0	149.0	Action
2	Jurassic World	652300000.0	124.0	Action

	title_x	domestic_gross_x	runtime_minutes	genres
3	Star Wars: The Last Jedi	620200000.0	152.0	Action
4	Incredibles 2	608600000.0	118.0	Action
...	...	...	...	...
2592	Dark Tide	NaN	94.0	Action
2593	Celine: Through the Eyes of the World	NaN	120.0	Documentary
2594	6 Souls	NaN	112.0	Horror
2595	22 Bullets	NaN	117.0	Action
2596	14 Blades	NaN	114.0	Action

2597 rows × 4 columns

In [19]:
```
runtimes_gross.rename(columns = {'title_x':'title', 'domestic_gross_x': 'domesti
runtimes_gross
```

Out[19]:

	title	domestic_gross	runtime_minutes	genres
0	Black Panther	700100000.0	134.0	Action
1	Avengers: Infinity War	678800000.0	149.0	Action
2	Jurassic World	652300000.0	124.0	Action
3	Star Wars: The Last Jedi	620200000.0	152.0	Action
4	Incredibles 2	608600000.0	118.0	Action
...	...	...	...	...
2592	Dark Tide	NaN	94.0	Action
2593	Celine: Through the Eyes of the World	NaN	120.0	Documentary
2594	6 Souls	NaN	112.0	Horror
2595	22 Bullets	NaN	117.0	Action
2596	14 Blades	NaN	114.0	Action

2597 rows × 4 columns

Renamed title_x and domestic_gross_x columns, to title and domestic gross

In [20]:
```
#set figure and specify plot size
sns.set_style("white")
plt.figure(figsize=(15,15))

plt.rcParams['axes.facecolor'] = 'lavender'
#plot runtime dataframe
sns.scatterplot(data=runtimes_gross, x="runtime_minutes", y="domestic_gross")

#set ticks, labels, and title
plt.xticks(fontsize=15, fontname='Arial')
plt.yticks(fontsize=15, fontname='Arial')
plt.xlabel('Runtime (Minutes)', fontsize=20, fontname='Arial')
```

```
plt.ylabel('Domestic Gross (In hundred million USD)', fontsize=15, fontname='Ari
plt.title('Runtimes and Gross Values', fontsize=20, fontname='Arial')

plt.xticks([60, 80, 100, 120, 140, 160, 180])
plt.margins(x=0, y=0)

sns.despine()
plt.show()
```

Most genres have a movie runtime between 80 to 140 minutes. Majority of the films do not gross more than a hundred million dollars. Though, films that do gross more than a hundred milion have a runtime between 100 to 180 minutes. The highest grossing film (Black Panther) is an action film with a runtime of 180 minutes.

Rotten Tomatoes

Now it's time to explore the Rotten Tomatoes data. I used pd.read to open the Rotten

Tomatoes review datafile and Rotten Tomatoes Movie info file.

In [21]:
```
rt_reviews = pd.read_csv('rt.reviews.tsv', delimiter="\t", header=0, encoding="u
rt_reviews.head(6)
```

Out[21]:

	id	review	rating	fresh	critic	top_critic	publisher	date
0	3	A distinctly gallows take on contemporary fina...	3/5	fresh	PJ Nabarro	0	Patrick Nabarro	November 10, 2018
1	3	It's an allegory in search of a meaning that n...	NaN	rotten	Annalee Newitz	0	io9.com	May 23, 2018
2	3	... life lived in a bubble in financial dealin...	NaN	fresh	Sean Axmaker	0	Stream on Demand	January 4, 2018
3	3	Continuing along a line introduced in last yea...	NaN	fresh	Daniel Kasman	0	MUBI	November 16, 2017
4	3	... a perverse twist on neorealism...	NaN	fresh	NaN	0	Cinema Scope	October 12, 2017
5	3	... Cronenberg's Cosmopolis expresses somethin...	NaN	fresh	Michelle Orange	0	Capital New York	September 11, 2017

Rt_reviews is exactly what it sounds like. It's literally reviews of films that contain rating, publisher of reviews and name of critic.

In [22]:
```
rt_info = pd.read_csv('rt.movie_info.tsv', delimiter = '\t', header=0, encoding=
rt_info.head()
```

Out[22]:

	id	synopsis	rating	genre	director	writer	theater_dat
0	1	This gritty, fast-paced, and innovative police...	R	Action and Adventure|Classics|Drama	William Friedkin	Ernest Tidyman	Oct 9, 197
1	3	New York City, not-too-distant-future: Eric Pa...	R	Drama|Science Fiction and Fantasy	David Cronenberg	David Cronenberg|Don DeLillo	Aug 17, 201
2	5	Illeana Douglas delivers a superb performance ...	R	Drama|Musical and Performing Arts	Allison Anders	Allison Anders	Sep 13, 199
3	6	Michael Douglas runs afoul of a treacherous su...	R	Drama|Mystery and Suspense	Barry Levinson	Paul Attanasio|Michael Crichton	Dec 9, 199
4	7	NaN	NR	Drama|Romance	Rodney Bennett	Giles Cooper	Na

RT_info has details about genre, director, writer etc. Since both datafiles do not contain a movie title, I used the id column from rt_reviews and rt_info to see if they match up. After many trials of random selections of id numbers, I finally found a process.

In [23]:
```
rt_reviews['id'][990:999]
```

Out[23]:
```
990    25
991    25
992    25
993    25
994    25
995    25
996    25
997    25
998    25
Name: id, dtype: int64
```

ID 25 was the lucky number. As you can see index 990 to 999 displays the review for movie id 25.

In [24]:
```
#change column display settings
pd.set_option('display.max_colwidth', None)
rt_reviews['review'][990:1000]
```

Out[24]:
```
990
Universal ruins Christmas and ends the cult of Keanu in one fell swoop.
991
It's a mute-button movie, with passages of gorgeous cinematic craftsmanship. I
t's too bad the rest of the effort blocks the view.
992                                                                      Any stor
y that's been passed down through several generations is likely to have been emb
ellished along the way, but this adaptation of a Japanese folk tale takes things
a little too far.
993
An overlong, underwhelming movie now hitting theaters that certainly wasn't wort
h the wait.
994
What sucks is that the production design and the creatures look really cool, and
a quest narrative set in this world could have been a lot of fun.
995
a respectful but inert advertisement for intercultural cooperation
996
Ultimately, this vision of feudal Japan seems to fall somewhere between a graphi
c novel and computer game. But even comics and games are less witless and tediou
s than this.
997
Memo to Hollywood: Find another use for Keanu Reeves.
998    The basics of the story remain unchanged, but it's the wanna-be-blockbust
er additions that rankle, be it the incoherent direction of first-time feature d
irector Carl Rinsch or the copious CGI beasties who look like rejected Lord of t
he Rings villains.
999
As impressive as these visual elements prove to be, the film struggles to grab a
nd maintain audiences' interest, whether or not they know the underlying legend
by heart.
Name: review, dtype: object
```

It's time to look at rt_info. Another random selection of numbers (after many trials), 18 is a match!

In [25]:
```
rt_info['synopsis'][15:19]
```

Out[25]:
```
15    Two-time Academy Award Winner Kevin Spacey gives the performance of a life
time in CASINO JACK, a riotous new film starring Spacey as a man hell bent on ac
quiring all that the good life has to offer. He plays in the same game as the hi
ghest of rollers and resorts to awe-inspiring levels of conning, scheming and fr
audulent antics to get what he wants. Inspired by true events that are too over-
the-top for even the wildest imaginations to conjure, CASINO JACK lays bare the
wild excesses and escapades of Jack Abramoff. Aided by his business partner Mich
ael Scanlon (Barry Pepper), Jack parlays his clout over some of the world's most
powerful men with the goal of creating a personal empire of wealth and influenc
e. When the two enlist a mob-connected buddy (Jon Lovitz) to help with one of th
eir illegal schemes, they soon find themselves in over their heads, entrenched i
n a world of mafia assassins, murder and a scandal that spins so out of control
that it makes worldwide headlines. Directed by George Hickenlooper (FACTORY GIR
L, THE MAN FROM ELYSIAN FIELDS), CASINO JACK returns Spacey to the type of role
that made him famous - a cool-headed, articulate snake charmer whose wild ambiti
ons knows no limits or boundaries. The film also stars Kelly Preston and Rachell
e Lefevre and is produced by Gary Howsam, Bill Marks and George Vitetzakis from
an original screenplay by Norman Snider. Executive Producers are Richard Rionda
Del Castro, Lewin Webb, Donald Zuckerman, Dana Brunetti, Patricia Eberle, Warren
Nimchuk, Angelo Paletta and Domenic Serafino. The Associate Producer is Rick Cha
d. -- (C) Art Takes Over
16
A fictional film set in the alluring world of one of the most stunning scandals
to rock our nation, American Hustle tells the story of brilliant con man Irving
Rosenfeld (Christian Bale), who along with his equally cunning and seductive Bri
tish partner Sydney Prosser (Amy Adams) is forced to work for a wild FBI agent R
ichie DiMaso (Bradley Cooper). DiMaso pushes them into a world of Jersey powerbr
okers and mafia that's as dangerous as it is enchanting. Jeremy Renner is Carmin
e Polito, the passionate, volatile, New Jersey political operator caught between
the con-artists and Feds. Irving's unpredictable wife Rosalyn (Jennifer Lawrenc
e) could be the one to pull the thread that brings the entire world crashing dow
n. Like David O. Russell's previous films, American Hustle defies genre, hinging
on raw emotion, and life and death stakes. (c) Sony
17
Three young boys discover a stranded Russian sailor on the shores of Key West in
this well-meaning but unexciting drama. Initially viewing him as an enemy, the b
oys soon grow to like their new companion and agree to help him find a way back
to his homeland.
18
From ancient Japan's most enduring tale, the epic 3D fantasy-adventure 47 Ronin
is born. Keanu Reeves leads the cast as Kai, an outcast who joins Oishi (Hiroyuk
i Sanada), the leader of 47 outcast samurai. Together they seek vengeance upon t
he treacherous overlord who killed their master and banished their kind. To rest
ore honor to their homeland, the warriors embark upon a quest that challenges th
em with a series of trials that would destroy ordinary warriors. 47 Ronin is hel
med by visionary director Carl Erik Rinsch (The Gift). Inspired by styles as div
erse as Miyazaki and Hokusai, Rinsch will bring to life the stunning landscapes
and enormous battles that will display the timeless Ronin story to global audien
ces in a way that's never been seen before. -- (C) Universal
Name: synopsis, dtype: object
```

Just to verify, I look at selection 18 a little closer to make sure it corresponds with the review from rt_review.

In [26]:
```
rt_info['synopsis'][18]
```

Out[26]:
```
"From ancient Japan's most enduring tale, the epic 3D fantasy-adventure 47 Ronin
is born. Keanu Reeves leads the cast as Kai, an outcast who joins Oishi (Hiroyuk
i Sanada), the leader of 47 outcast samurai. Together they seek vengeance upon t
he treacherous overlord who killed their master and banished their kind. To rest
ore honor to their homeland, the warriors embark upon a quest that challenges th
em with a series of trials that would destroy ordinary warriors. 47 Ronin is hel
```

```
med by visionary director Carl Erik Rinsch (The Gift). Inspired by styles as div
erse as Miyazaki and Hokusai, Rinsch will bring to life the stunning landscapes
and enormous battles that will display the timeless Ronin story to global audien
ces in a way that's never been seen before. -- (C) Universal"
```

With the help of Google, the movie is 47 Ronin. Which stars Keanu Reeves.

In [27]:
```
rt_info['id'][18]
```

Out[27]:
```
25
```

The final test was to see if the movie id from rt_info matches the movie id from rt_reviews. And lucky number 25 is a match! Now it's time to merge the two dataframes on Movie ID

In [28]:
```
#The movie IDs from RT_reviews and RT_info match so merge on ID
rotten_tomatoes_df = rt_info.merge(rt_reviews, how='inner', on='id')
rotten_tomatoes_df.head()
```

Out[28]:

	id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
0	3	New York City, not-too-distant-future: Eric Packer, a 28 year-old finance golden boy dreaming of living in a civilization ahead of this one, watches a dark shadow cast over the firmament of the Wall Street galaxy, of which he is the uncontested king. As he is chauffeured across midtown Manhattan to get a haircut at his father's old barber, his anxious eyes are glued to the yuan's exchange rate: it is mounting against all expectations, destroying Eric's bet against it. Eric Packer is	R	Drama|Science Fiction and Fantasy	David Cronenberg	David Cronenberg|Don DeLillo	Aug 17, 2012	Ja 2

	id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
		losing his empire with every tick of the clock. Meanwhile, an eruption of wild activity unfolds in the city's streets. Petrified as the threats of the real world infringe upon his cloud of virtual convictions, his paranoia intensifies during the course of his 24-hour cross-town odyssey. Packer starts to piece together clues that lead him to a most terrifying secret: his imminent assassination. -- (C) Official Site						
1	3	New York City, not-too-distant-future: Eric Packer, a 28 year-old finance golden boy dreaming of living in a civilization ahead of this one, watches a dark shadow cast over the firmament of the Wall Street galaxy, of which he is the uncontested king. As he is chauffeured across midtown Manhattan to	R	Drama|Science Fiction and Fantasy	David Cronenberg	David Cronenberg|Don DeLillo	Aug 17, 2012	Ja 2

	id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
		get a haircut at his father's old barber, his anxious eyes are glued to the yuan's exchange rate: it is mounting against all expectations, destroying Eric's bet against it. Eric Packer is losing his empire with every tick of the clock. Meanwhile, an eruption of wild activity unfolds in the city's streets. Petrified as the threats of the real world infringe upon his cloud of virtual convictions, his paranoia intensifies during the course of his 24-hour cross-town odyssey. Packer starts to piece together clues that lead him to a most terrifying secret: his imminent assassination. -- (C) Official Site						
2	3	New York City, not-too-distant-future: Eric Packer, a 28 year-old finance golden boy dreaming of living in a civilization ahead of this	R	Drama|Science Fiction and Fantasy	David Cronenberg	David Cronenberg|Don DeLillo	Aug 17, 2012	Ja 2

id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
	one, watches a dark shadow cast over the firmament of the Wall Street galaxy, of which he is the uncontested king. As he is chauffeured across midtown Manhattan to get a haircut at his father's old barber, his anxious eyes are glued to the yuan's exchange rate: it is mounting against all expectations, destroying Eric's bet against it. Eric Packer is losing his empire with every tick of the clock. Meanwhile, an eruption of wild activity unfolds in the city's streets. Petrified as the threats of the real world infringe upon his cloud of virtual convictions, his paranoia intensifies during the course of his 24-hour cross-town odyssey. Packer starts to piece together clues that lead him to a most terrifying secret: his imminent assassination.						

	id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
		-- (C) Official Site						
3	3	New York City, not-too-distant-future: Eric Packer, a 28 year-old finance golden boy dreaming of living in a civilization ahead of this one, watches a dark shadow cast over the firmament of the Wall Street galaxy, of which he is the uncontested king. As he is chauffeured across midtown Manhattan to get a haircut at his father's old barber, his anxious eyes are glued to the yuan's exchange rate: it is mounting against all expectations, destroying Eric's bet against it. Eric Packer is losing his empire with every tick of the clock. Meanwhile, an eruption of wild activity unfolds in the city's streets. Petrified as the threats of the real world infringe upon his cloud of virtual convictions, his paranoia intensifies	R	Drama|Science Fiction and Fantasy	David Cronenberg	David Cronenberg|Don DeLillo	Aug 17, 2012	Ja 2

	id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
		during the course of his 24-hour cross-town odyssey. Packer starts to piece together clues that lead him to a most terrifying secret: his imminent assassination. -- (C) Official Site						
4	3	New York City, not-too-distant-future: Eric Packer, a 28 year-old finance golden boy dreaming of living in a civilization ahead of this one, watches a dark shadow cast over the firmament of the Wall Street galaxy, of which he is the uncontested king. As he is chauffeured across midtown Manhattan to get a haircut at his father's old barber, his anxious eyes are glued to the yuan's exchange rate: it is mounting against all expectations, destroying Eric's bet against it. Eric Packer is losing his empire with every tick of	R	Drama|Science Fiction and Fantasy	David Cronenberg	David Cronenberg|Don DeLillo	Aug 17, 2012	Ja 2

	id	synopsis	rating_x	genre	director	writer	theater_date	dvd_d
		the clock. Meanwhile, an eruption of wild activity unfolds in the city's streets. Petrified as the threats of the real world infringe upon his cloud of virtual convictions, his paranoia intensifies during the course of his 24-hour cross-town odyssey. Packer starts to piece together clues that lead him to a most terrifying secret: his imminent assassination. -- (C) Official Site						

I created a new dataframe to reflect the columns that I need for my analysis.

In [29]:
```
rt_subset = rotten_tomatoes_df[['id', 'rating_x', 'genre', 'review', 'fresh']]
rt_subset.head()
```

Out[29]:

	id	rating_x	genre	review	fresh
0	3	R	Drama|Science Fiction and Fantasy	A distinctly gallows take on contemporary financial mores, as one absurdly rich man's limo ride across town for a haircut functions as a state-of-the-nation discourse.	fresh
1	3	R	Drama|Science Fiction and Fantasy	It's an allegory in search of a meaning that never arrives...It's just old-fashioned bad storytelling.	rotten
2	3	R	Drama|Science Fiction and Fantasy	... life lived in a bubble in financial dealings and digital communications and brief face-to-face conversations and sexual intermissions in a space shuttle of a limousine creeping through the gridlock of an anonymous New York City.	fresh
3	3	R	Drama|Science Fiction and Fantasy	Continuing along a line introduced in last year's "A Dangerous Method", David Cronenberg pushes his cinema towards a talky abstraction in his uncanny, perversely funny and frighteningly insular adaptation of Don DeLillo, "Cosmopolis".	fresh

	id	rating_x	genre	review	fresh
4	3	R	Drama|Science Fiction and Fantasy	... a perverse twist on neorealism...	fresh

In [30]:
```
#What genre has the most "fresh" review?
#need count of frequency for fresh values based on content rating and genre
#to count the number of fresh values I would need to create a for loop
```

Changed column names to format data.

In [31]:
```
rt_subset.rename(columns = {'fresh':'rating', 'rating_x':'contentrating'}, inpla
```

```
/Users/brittneynitta-lee/opt/anaconda3/envs/learn-env/lib/python3.8/site-package
s/pandas/core/frame.py:4296: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stab
le/user_guide/indexing.html#returning-a-view-versus-a-copy
  return super().rename(
```

I used the explode function to reorganize genre combinations into individual genres.

In [32]:
```
rt_subset['genre'] = rt_subset['genre'].str.split("|")
rt_subset_2 = rt_subset.explode('genre')
```

```
<ipython-input-32-0ca5509876af>:1: 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/stab
le/user_guide/indexing.html#returning-a-view-versus-a-copy
  rt_subset['genre'] = rt_subset['genre'].str.split("|")
```

I created a dictionary to assign numerical values to fresh and rotten ratings. Numerical values are now in a new column called numeric_rating.

In [33]:
```
rating_map = {'fresh': 1, 'rotten' : -1}
rt_subset_2['numeric_rating'] = rt_subset_2['rating'].map(rating_map)
rt_subset_2
```

Out[33]:

	id	contentrating	genre	review	rating	numeric_rating
0	3	R	Drama	A distinctly gallows take on contemporary financial mores, as one absurdly rich man's limo ride across town for a haircut functions as a state-of-the-nation discourse.	fresh	1
0	3	R	Science Fiction and Fantasy	A distinctly gallows take on contemporary financial mores, as one absurdly rich man's limo ride across town for a haircut functions as a state-of-the-nation discourse.	fresh	1

	id	contentrating	genre	review	rating	numeric_rating
1	3	R	Drama	It's an allegory in search of a meaning that never arrives...It's just old-fashioned bad storytelling.	rotten	-1
1	3	R	Science Fiction and Fantasy	It's an allegory in search of a meaning that never arrives...It's just old-fashioned bad storytelling.	rotten	-1
2	3	R	Drama	... life lived in a bubble in financial dealings and digital communications and brief face-to-face conversations and sexual intermissions in a space shuttle of a limousine creeping through the gridlock of an anonymous New York City.	fresh	1
...	...	...	...	...	...	...
54431	2000	R	Action and Adventure	NaN	fresh	1
54431	2000	R	Art House and International	NaN	fresh	1
54431	2000	R	Comedy	NaN	fresh	1
54431	2000	R	Drama	NaN	fresh	1
54431	2000	R	Mystery and Suspense	NaN	fresh	1

120079 rows × 6 columns

In [34]:
```
genre_numeric_rating = (
    rt_subset_2
    .groupby('genre')
    .sum()
    .reset_index()
    .sort_values('numeric_rating', ascending = False)[['genre', 'numeric_rating'
)
genre_numeric_rating
```

Out[34]:

	genre	numeric_rating
8	Drama	10286
5	Comedy	3958
3	Art House and International	2334
15	Romance	2248
14	Mystery and Suspense	2002
0	Action and Adventure	1756
4	Classics	1153

	genre	numeric_rating
12	Kids and Family	1119
1	Animation	929
16	Science Fiction and Fantasy	698
7	Documentary	612
13	Musical and Performing Arts	535
17	Special Interest	323
18	Sports and Fitness	183
20	Western	168
6	Cult Movies	38
10	Gay and Lesbian	30
9	Faith and Spirituality	19
2	Anime and Manga	7
19	Television	-65
11	Horror	-295

Genric_numeri_rating table shows each individual drama and their "fresh" or negative "rotten" rating.

In [35]:
```
import seaborn as sns
import matplotlib.pyplot as plt
```

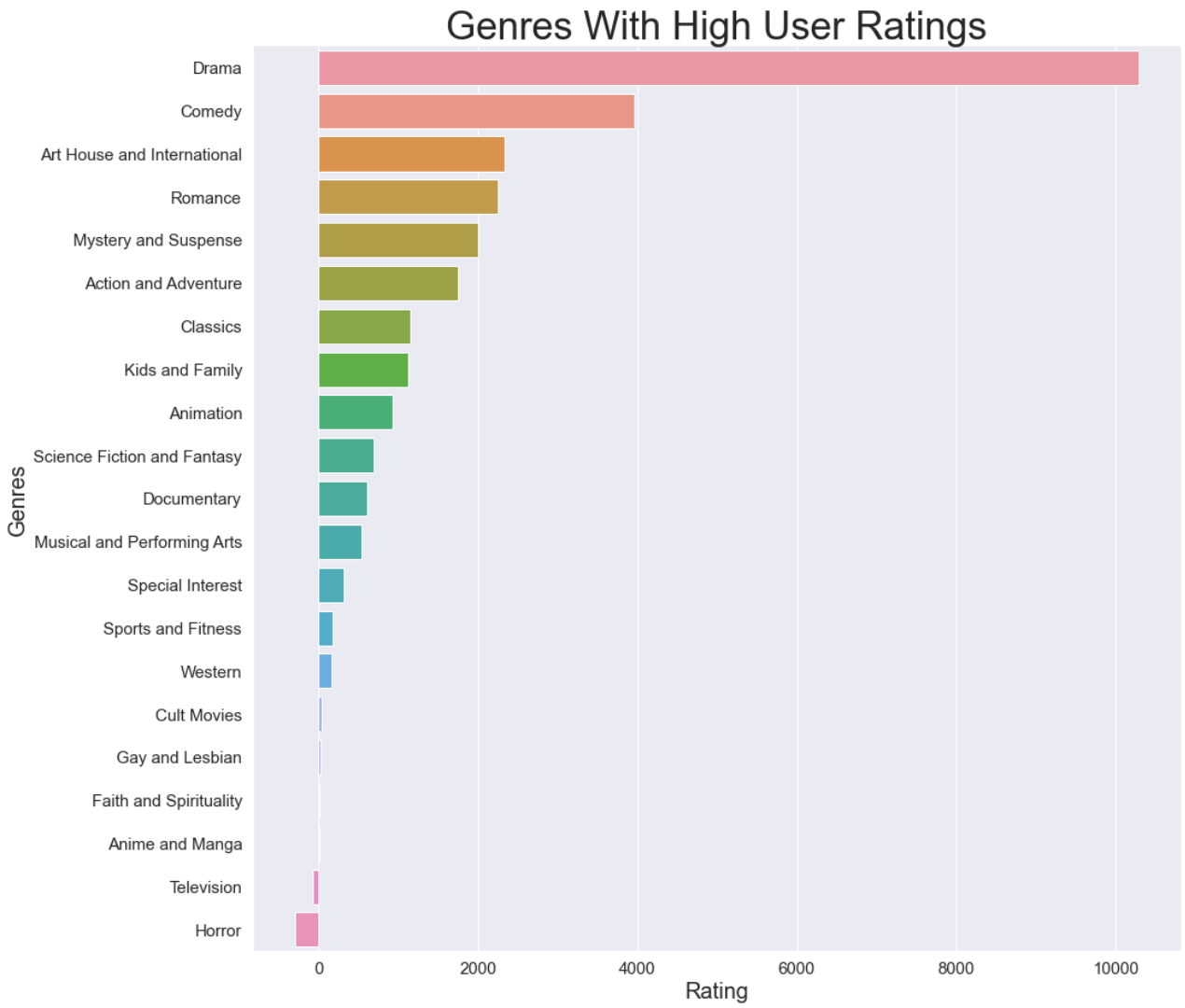
Time to plot the data!

In [36]:
```
#set figure and specify plot size
sns.set_style('darkgrid')
sns.set_palette('Set2')

#plot dataframe
sns.barplot(data=genre_numeric_rating, x="numeric_rating", y="genre", ci=None)
sns.set(rc = {'figure.figsize':(20,15)})

#set ticks, labels, and title
plt.title('Genres With High User Ratings', fontsize=35, fontname='Arial')
plt.xlabel('Rating', fontsize=20, fontname='Arial')
plt.ylabel('Genres', fontsize=20, fontname='Arial')
plt.xticks(fontsize=15, fontname='Arial')
plt.yticks(fontsize=15, fontname='Arial')


sns.despine()
plt.show()
```



To find the content rating with the most fresh reviews, I'll create a content rating dictionary and assign numeric values.

In [37]:
```
#What movie content rating has the most fresh reviews


contentrating_map = {'R': 0, 'PG' : 1, 'PG-13' : 2, 'NR' : 3, 'G' : 4}
rt_subset_2['numeric_contentrating'] = rt_subset_2['contentrating'].map(contentr
rt_subset_2
```

Out[37]:

	id	contentrating	genre	review	rating	numeric_rating	numeric_cont
0	3	R	Drama	A distinctly gallows take on contemporary financial mores, as one absurdly rich man's limo ride across town for a haircut functions as a state-of-the-nation discourse.	fresh	1	

	id	contentrating	genre	review	rating	numeric_rating	numeric_cont
0	3	R	Science Fiction and Fantasy	A distinctly gallows take on contemporary financial mores, as one absurdly rich man's limo ride across town for a haircut functions as a state-of-the-nation discourse.	fresh	1	
1	3	R	Drama	It's an allegory in search of a meaning that never arrives...It's just old-fashioned bad storytelling.	rotten	-1	
1	3	R	Science Fiction and Fantasy	It's an allegory in search of a meaning that never arrives...It's just old-fashioned bad storytelling.	rotten	-1	
2	3	R	Drama	... life lived in a bubble in financial dealings and digital communications and brief face-to-face conversations and sexual intermissions in a space shuttle of a limousine creeping through the gridlock of an anonymous New York City.	fresh	1	
...	...	...	...	...	...	...	
54431	2000	R	Action and Adventure	NaN	fresh	1	
54431	2000	R	Art House and International	NaN	fresh	1	
54431	2000	R	Comedy	NaN	fresh	1	
54431	2000	R	Drama	NaN	fresh	1	
54431	2000	R	Mystery and Suspense	NaN	fresh	1	

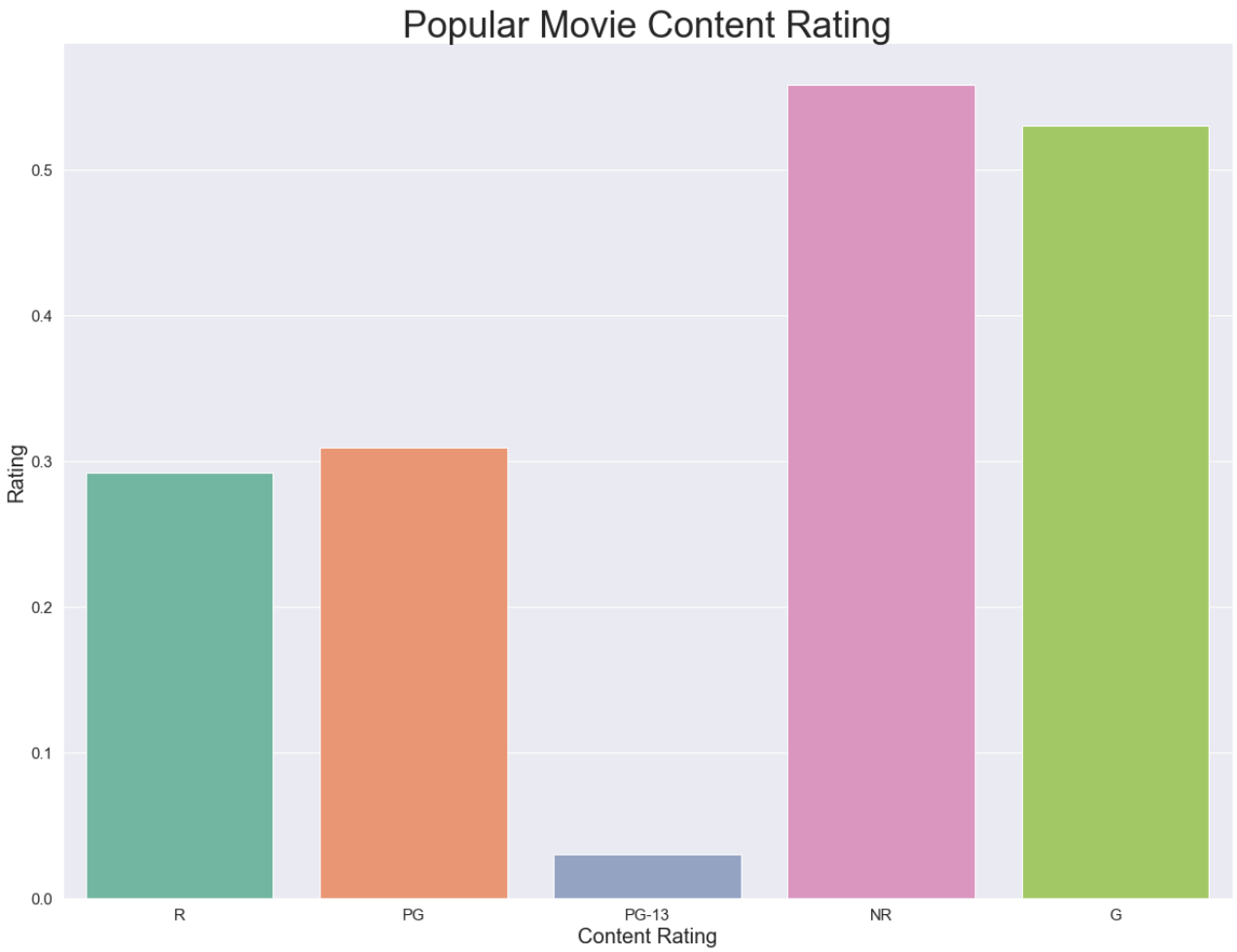
120079 rows × 7 columns

In [38]:
```
#set figure and specify plot size
sns.set_style('darkgrid')
sns.set_palette('Set2')

#plot dataframe
sns.barplot(data=rt_subset_2, x="contentrating", y="numeric_rating", ci=None)
sns.set(rc = {'figure.figsize':(15,15)})

#set ticks, labels, and title
plt.title('Popular Movie Content Rating', fontsize=35, fontname='Arial')
plt.xlabel('Content Rating', fontsize=20, fontname='Arial')
plt.ylabel('Rating', fontsize=20, fontname='Arial')
plt.xticks(fontsize=15, fontname='Arial')
plt.yticks(fontsize=15, fontname='Arial')


sns.despine()
plt.show()
```



Conclusion

In conclusion, here are recommendations for Microsoft's new movie studio:

Genres

Microsoft should focus on creating either drama, comedy, adventure or action movies. Adventure and comedy films are both the highest top grossing genre. Drama could also be considered since it has the highest user rating.

Content Rating

Based on user ratings, unrated or G-rated movies are the most popular. Microsoft could focus on creating movies that are either G-Rating or unrated.

</br>
Runtime

The highest-grossing movies have a runtime of just over 2 hours. But, the ideal runtime length of a movie is 100 to 160 minutes. So Microsoft could focus on creating movies that are between 100 to 160 minutes.

</br>

In [ ]: