Final Project Submission

Please fill out:
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* Blog post URL: https://datascience942.wordpress.com/2023/04/16/using-exploratory-data-analysis-to-generate-insights-for-a-technology-business/

BUSINESS UNDERSTANDING

In [ ]:
```
#Business Statement
Microsoft sees all the big companies creating original video content and they want to get in on the fun.
They have decided to create a new movie studio, but they don’t know anything about creating movies.
You are charged with exploring what types of films are currently doing the best at the box office.
You must then translate those findings into actionable insights,
that the head of Microsoft's new movie studio can use to help decide what type of films to create.
```

DATA PROCESSING

1.Loading data

In [1]:
```
# Importing the necessary libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sb
import sqlite3

%matplotlib inline
```

In [2]:
```
#Loading the gross csv
gross = pd.read_csv('data/bom.movie_gross.csv', index_col = 0)
```

In [3]:
```
#Loading the movie csv
movie = pd.read_csv('data/tmdb.movies.csv' , index_col = 0)
```

In [4]:
```
#Loading the budgets csv
budgets = pd.read_csv('data/tn.movie_budgets.csv' , index_col = 0)
```

In [5]:
```
conn = sqlite3.connect('data/im.db')

basics = pd.read_sql_query('SELECT* from movie_basics', conn)
ratings = pd.read_sql_query('SELECT* from movie_ratings', conn)

basics.to_csv('movie_basics.csv', index=False)
ratings.to_csv('movie_ratings.csv', index=False)

conn.close()
```

2. Inspecting the data - Movie_basics

In [7]:
```
#To display the first few rows
basics.head()
```

Out[7]:

	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

In [8]:
```
#To display the last few rows
basics.tail()
```

Out[8]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres
146139	tt9916538	Kuambil Lagi Hatiku	Kuambil Lagi Hatiku	2019	123.0	Drama
146140	tt9916622	Rodolpho Teóphilo - O Legado de um Pioneiro	Rodolpho Teóphilo - O Legado de um Pioneiro	2015	NaN	Documentary
146141	tt9916706	Dankyavar Danka	Dankyavar Danka	2013	NaN	Comedy
146142	tt9916730	6 Gunn	6 Gunn	2017	116.0	None
146143	tt9916754	Chico Albuquerque - Revelações	Chico Albuquerque - Revelações	2013	NaN	Documentary

In [9]:
```
#To get the information summary on the table
# we see some of the columns have null entries, data types of the columns.

basics.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 146144 entries, 0 to 146143
Data columns (total 6 columns):
 #   Column           Non-Null Count   Dtype
---  ------           --------------   -----
 0   movie_id         146144 non-null  object
 1   primary_title    146144 non-null  object
 2   original_title   146123 non-null  object
 3   start_year       146144 non-null  int64
 4   runtime_minutes  114405 non-null  float64
 5   genres           140736 non-null  object
dtypes: float64(1), int64(1), object(4)
memory usage: 6.7+ MB
```

In [10]:
```
#Check the number of rows and columns
basics.shape

#There are 6 columns and 146144 rows
```

Out[10]: (146144, 6)

In [11]:
```
#Gettings a summary of the numeric columns
basics.describe()
```

Out[11]:

	start_year	runtime_minutes
count	146144.000000	114405.000000
mean	2014.621798	86.187247
std	2.733583	166.360590
min	2010.000000	1.000000
25%	2012.000000	70.000000
50%	2015.000000	87.000000
75%	2017.000000	99.000000
max	2115.000000	51420.000000

In [12]:
```
#To check null values
basics.isna().sum()
```

Out[12]:
```
movie_id               0
primary_title          0
original_title        21
start_year             0
runtime_minutes    31739
genres              5408
dtype: int64
```

In [13]:
```
# To check Duplicates
basics.duplicated().sum()
```

Out[13]: 0

In [14]:
```
# Making a copy of the dataframe to use it avoid making permanent changes to the original
basics_copy = basics.copy()
```

3.Inspecting data - Move Rating

In [15]:
```
#To display the first few rows
ratings.head()
```

Out[15]:

	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

In [16]:
```
#To display the last few rows
ratings.tail()
```

Out[16]:

	movie_id	averagerating	numvotes
73851	tt9805820	8.1	25
73852	tt9844256	7.5	24
73853	tt9851050	4.7	14
73854	tt9886934	7.0	5
73855	tt9894098	6.3	128

In [17]:
```
#To get the information summary on the table
# we see some of the columns have null entries, data types of the columns.

ratings.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 73856 entries, 0 to 73855
Data columns (total 3 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   movie_id       73856 non-null  object 
 1   averagerating  73856 non-null  float64
 2   numvotes       73856 non-null  int64  
dtypes: float64(1), int64(1), object(1)
memory usage: 1.7+ MB
```

In [18]:
```
#Check the number of rows and columns
#There are 3 columns and 73856 rows
ratings.shape
```

Out[18]: (73856, 3)

In [19]:
```
#Gettings a summary of the numeric columns
ratings.describe()
```

Out[19]:

	averagerating	numvotes
count	73856.000000	7.385600e+04
mean	6.332729	3.523662e+03
std	1.474978	3.029402e+04
min	1.000000	5.000000e+00
25%	5.500000	1.400000e+01
50%	6.500000	4.900000e+01
75%	7.400000	2.820000e+02
max	10.000000	1.841066e+06

In [20]:
```
#To check null values
ratings.isna().sum()
```

Out[20]:
```
movie_id         0
averagerating    0
numvotes         0
dtype: int64
```

In [21]:
```
# To check Duplicates
ratings.duplicated().sum()
```

Out[21]:
```
0
```

In [22]:
```
# Making a copy of the dataframe to use it avoid making permanent changes to the original
ratings_copy = ratings.copy()
```

```
3. Inspecting gross
```

In [23]:
```
#To display the first few rows
gross.head()
```

Out[23]:

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

In [24]:
```
#To display the last few rows
gross.tail()
```

Out[24]:

title	studio	domestic_gross	foreign_gross	year
The Quake	Magn.	6200.0	NaN	2018
Edward II (2018 re-release)	FM	4800.0	NaN	2018
El Pacto	Sony	2500.0	NaN	2018
The Swan	Synergetic	2400.0	NaN	2018
An Actor Prepares	Grav.	1700.0	NaN	2018

In [25]:
```
#To get the information summary on the table
# we see some of the columns have null entries, data types of the columns.

gross.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 3387 entries, Toy Story 3 to An Actor Prepares
Data columns (total 4 columns):
 #   Column          Non-Null Count  Dtype  
---  ------          --------------  -----  
 0   studio          3382 non-null   object 
 1   domestic_gross  3359 non-null   float64
 2   foreign_gross   2037 non-null   object 
 3   year            3387 non-null   int64  
dtypes: float64(1), int64(1), object(2)
memory usage: 132.3+ KB
```

In [26]:
```
#Check the number of rows and columns
#There are 4 columns and 3387 rows
gross.shape
```

Out[26]:
```
(3387, 4)
```

In [27]:
```
#Gettings a summary of the numeric columns
gross.describe()
```

Out[27]:

	domestic_gross	year
count	3.359000e+03	3387.000000
mean	2.874585e+07	2013.958075
std	6.698250e+07	2.478141
min	1.000000e+02	2010.000000
25%	1.200000e+05	2012.000000
50%	1.400000e+06	2014.000000
75%	2.790000e+07	2016.000000
max	9.367000e+08	2018.000000

In [28]:
```
#To check null values
gross.isna().sum()
```

Out[28]:
```
studio              5
domestic_gross     28
foreign_gross    1350
year                0
dtype: int64
```

In [29]:
```
# To check Duplicates
gross.duplicated().sum()
```

Out[29]: 11

In [30]:
```
# sorting the data in ascending order inorder to test for outliers.
gross_year = gross.sort_values(by ='year',ascending = True)
```

In [32]:
```
# Making a copy of the dataframe to use it avoid making permanent changes to the original
gross_copy = gross.copy()
```

4. Inspecting Movie

In [33]:
```
#To display the first few rows
movie.head()
```

Out[33]:

	genre_ids	id	original_language	original_title	popularity	release_date	title	vote_average	vote_count
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
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
2	[12, 28, 878]	10138	en	Iron Man 2	28.515	2010-05-07	Iron Man 2	6.8	12368
3	[16, 35, 10751]	862	en	Toy Story	28.005	1995-11-22	Toy Story	7.9	10174
4	[28, 878, 12]	27205	en	Inception	27.920	2010-07-16	Inception	8.3	22186

In [34]:
```
#To display the last few rows
movie.tail()
```

Out[34]:

	genre_ids	id	original_language	original_title	popularity	release_date	title	vote_average	vote_count
26512	[27, 18]	488143	en	Laboratory Conditions	0.6	2018-10-13	Laboratory Conditions	0.0	1
26513	[18, 53]	485975	en	_EXHIBIT_84xxx_	0.6	2018-05-01	_EXHIBIT_84xxx_	0.0	1
26514	[14, 28, 12]	381231	en	The Last One	0.6	2018-10-01	The Last One	0.0	1
26515	[10751, 12, 28]	366854	en	Trailer Made	0.6	2018-06-22	Trailer Made	0.0	1
26516	[53, 27]	309885	en	The Church	0.6	2018-10-05	The Church	0.0	1

In [35]:
```
#To get the information summary on the table
# we see some of the columns have null entries, data types of the columns.

movie.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 26517 entries, 0 to 26516
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   genre_ids          26517 non-null  object 
 1   id                 26517 non-null  int64  
 2   original_language  26517 non-null  object 
 3   original_title     26517 non-null  object 
 4   popularity         26517 non-null  float64
 5   release_date       26517 non-null  object 
 6   title              26517 non-null  object 
 7   vote_average       26517 non-null  float64
 8   vote_count         26517 non-null  int64  
dtypes: float64(2), int64(2), object(5)
memory usage: 2.0+ MB
```

In [ ]:
```
#Check the number of rows and columns
#There are 9 columns and 26517
movie.shape
```

In [36]:
```
#Gettings a summary of the numeric columns
movie.describe()
```

Out[36]:

	id	popularity	vote_average	vote_count
count	26517.000000	26517.000000	26517.000000	26517.000000
mean	295050.153260	3.130912	5.991281	194.224837
std	153661.615648	4.355229	1.852946	960.961095
min	27.000000	0.600000	0.000000	1.000000
25%	157851.000000	0.600000	5.000000	2.000000
50%	309581.000000	1.374000	6.000000	5.000000
75%	419542.000000	3.694000	7.000000	28.000000
max	608444.000000	80.773000	10.000000	22186.000000

In [37]:
```
#To check null values
movie.isna().sum()
```

Out[37]:
```
genre_ids            0
id                   0
original_language    0
original_title       0
popularity           0
release_date         0
title                0
vote_average         0
vote_count           0
dtype: int64
```

In [38]:
```
# To check Duplicates
movie.duplicated().sum()
```

Out[38]:
```
1020
```

In [39]:
```
# sorting the data in ascending order inorder to test for outliers.
movie_id = movie.sort_values(by ='id',ascending = True)
```

In [43]:
```
# Making a copy of the dataframe to use it avoid making permanent changes to the original
movie_copy = movie.copy()
```

5. Inspecting budgets

In [42]:
```
#To display the first few rows
budgets.head()
```

Out[42]:

id	release_date	movie	production_budget	domestic_gross	worldwide_gross
1	Dec 18, 2009	Avatar	$425,000,000	$760,507,625	$2,776,345,279
2	May 20, 2011	Pirates of the Caribbean: On Stranger Tides	$410,600,000	$241,063,875	$1,045,663,875
3	Jun 7, 2019	Dark Phoenix	$350,000,000	$42,762,350	$149,762,350
4	May 1, 2015	Avengers: Age of Ultron	$330,600,000	$459,005,868	$1,403,013,963
5	Dec 15, 2017	Star Wars Ep. VIII: The Last Jedi	$317,000,000	$620,181,382	$1,316,721,747

In [44]:
```
#To display the last few rows
budgets.tail()
```

Out[44]:

id	release_date	movie	production_budget	domestic_gross	worldwide_gross
78	Dec 31, 2018	Red 11	$7,000	$0	$0
79	Apr 2, 1999	Following	$6,000	$48,482	$240,495
80	Jul 13, 2005	Return to the Land of Wonders	$5,000	$1,338	$1,338
81	Sep 29, 2015	A Plague So Pleasant	$1,400	$0	$0
82	Aug 5, 2005	My Date With Drew	$1,100	$181,041	$181,041

In [45]:
```
#To get the information summary on the table
# we see some of the columns have null entries, data types of the columns.

budgets.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 5782 entries, 1 to 82
Data columns (total 5 columns):
 #   Column             Non-Null Count  Dtype 
---  ------             --------------  ----- 
 0   release_date       5782 non-null   object
 1   movie              5782 non-null   object
 2   production_budget  5782 non-null   object
 3   domestic_gross     5782 non-null   object
 4   worldwide_gross    5782 non-null   object
dtypes: object(5)
memory usage: 271.0+ KB
```

In [46]:
```
#Check the number of rows and columns
#There are 5 columns and 5782 rows
budgets.shape
```

Out[46]: (5782, 5)

In [47]:
```
#Gettings a summary of the numeric columns
budgets.describe()
```

Out[47]:

	release_date	movie	production_budget	domestic_gross	worldwide_gross
count	5782	5782	5782	5782	5782
unique	2418	5698	509	5164	5356
top	Dec 31, 2014	Halloween	$20,000,000	$0	$0
freq	24	3	231	548	367

In [48]:
```
#To check null values
budgets.isna().sum()
```

Out[48]:
```
release_date         0
movie                0
production_budget    0
domestic_gross       0
worldwide_gross      0
dtype: int64
```

In [49]:
```
# To check Duplicates
budgets.duplicated().sum()
```

Out[49]:
```
0
```

In [50]:
```
# sorting the data in ascending order inorder to test for outliers.
budget_production_budget = budgets.sort_values(by ='production_budget',ascending = True)
```

In [51]:
```
print(budgets.columns)
```

```
Index(['release_date', 'movie', 'production_budget', 'domestic_gross',
       'worldwide_gross'],
      dtype='object')
```

In [52]:
```
# Making a copy of the dataframe to use it avoid making permanent changes to the original
budgets_copy = budgets.copy()
```

DATA ISSUES

```
1.Datasets in Separate dataframes

2.Missings Data

4.Duplicates
```

DATA CLEANING

In [53]:
```
# joining basics_copy and ratings_copy so that it retains only the movies/series that have a rating and votecount
new_df = basics_copy.merge(ratings_copy, on='movie_id',how='right')

new_df.head()
```

Out[53]:

	movie_id	primary_title	original_title	start_year	runtime_minutes	genres	averagerating	numvotes
0	tt10356526	Laiye Je Yaarian	Laiye Je Yaarian	2019	117.0	Romance	8.3	31
1	tt10384606	Borderless	Borderless	2019	87.0	Documentary	8.9	559
2	tt1042974	Just Inès	Just Inès	2010	90.0	Drama	6.4	20
3	tt1043726	The Legend of Hercules	The Legend of Hercules	2014	99.0	Action,Adventure,Fantasy	4.2	50352
4	tt1060240	Até Onde?	Até Onde?	2011	73.0	Mystery,Thriller	6.5	21

In [54]:
```
#To get a summary of the combined datasets
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 73856 entries, 0 to 73855
Data columns (total 8 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   movie_id         73856 non-null  object 
 1   primary_title    73856 non-null  object 
 2   original_title   73856 non-null  object 
 3   start_year       73856 non-null  int64  
 4   runtime_minutes  66236 non-null  float64
 5   genres           73052 non-null  object 
 6   averagerating    73856 non-null  float64
 7   numvotes         73856 non-null  int64  
dtypes: float64(2), int64(2), object(4)
memory usage: 5.1+ MB
```

In [55]:
```
#Notice the columns have been combined and number of rows from the ratings have remained constant
new_df.shape
```

Out[55]:
```
(73856, 8)
```

In [56]:
```
#Renaming the column primary_title to title to allow for us to work with a aprimary key since they have similar data.
new_df.rename(columns = {'primary_title':'title'}, inplace = True)
```

In [57]:
```
#confirming the renaming
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 73856 entries, 0 to 73855
Data columns (total 8 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   movie_id         73856 non-null  object 
 1   title            73856 non-null  object 
 2   original_title   73856 non-null  object 
 3   start_year       73856 non-null  int64  
 4   runtime_minutes  66236 non-null  float64
 5   genres           73052 non-null  object 
 6   averagerating    73856 non-null  float64
 7   numvotes         73856 non-null  int64  
dtypes: float64(2), int64(2), object(4)
memory usage: 5.1+ MB
```

In [58]:
```
# Joining the combined dataset and the gross copy
combined_df = new_df.merge(gross_copy, on="title")

combined_df.head()
```

Out[58]:

	movie_id	title	original_title	start_year	runtime_minutes	genres	averagerating	numvotes	studio	domestic_gross	foreign_g
0	tt1043726	The Legend of Hercules	The Legend of Hercules	2014	99.0	Action,Adventure,Fantasy	4.2	50352	LG/S	18800000.0	424(
1	tt1171222	Baggage Claim	Baggage Claim	2013	96.0	Comedy	5.1	8296	FoxS	21600000.0	8(
2	tt1181840	Jack and the Cuckoo-Clock Heart	Jack et la mécanique du coeur	2013	94.0	Adventure,Animation,Drama	7.0	5494	Shout!	NaN	34(
3	tt1210166	Moneyball	Moneyball	2011	133.0	Biography,Drama,Sport	7.6	326657	Sony	75600000.0	346(
4	tt1212419	Hereafter	Hereafter	2010	129.0	Drama,Fantasy,Romance	6.5	87288	WB	32700000.0	725(

In [59]:
```
# Working with the combined data onwards

#To display the last few rows from the table
combined_df.tail()
```

Out[59]:

ie_id	title	original_title	start_year	runtime_minutes	genres	averagerating	numvotes	studio	domestic_gross	foreign_gross
9916	The Dead Lands	The Dead Lands	2014	107.0	Action,Adventure	6.3	4185	Magn.	5200.0	NaN
6916	The Wave	Bølgen	2015	105.0	Action,Drama,Thriller	6.7	28167	Magn.	177000.0	NaN
8512	Hitchcock/Truffaut	Hitchcock/Truffaut	2015	79.0	Documentary	7.4	4977	Cohen	260000.0	NaN
8872	Boy Erased	Boy Erased	2018	115.0	Biography,Drama	7.0	18768	Focus	6800000.0	5000000
8622	The Insult	L'insulte	2017	113.0	Crime,Drama,Thriller	7.7	11168	Cohen	1000000.0	NaN

In [60]:
```
#To check the summary of the table
combined_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 3027 entries, 0 to 3026
Data columns (total 12 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   movie_id         3027 non-null   object 
 1   title            3027 non-null   object 
 2   original_title   3027 non-null   object 
 3   start_year       3027 non-null   int64  
 4   runtime_minutes  2980 non-null   float64
 5   genres           3020 non-null   object 
 6   averagerating    3027 non-null   float64
 7   numvotes         3027 non-null   int64  
 8   studio           3024 non-null   object 
 9   domestic_gross   3005 non-null   float64
 10  foreign_gross    1832 non-null   object 
 11  year             3027 non-null   int64  
dtypes: float64(3), int64(3), object(6)
memory usage: 307.4+ KB
```

In [61]:
```
#To check the number of rows and columns
combined_df.shape
```

Out[61]: (3027, 12)

In [62]:
```
# To check the summary of the numeric columns
combined_df.describe()
```

Out[62]:

	start_year	runtime_minutes	averagerating	numvotes	domestic_gross	year
count	3027.000000	2980.000000	3027.000000	3.027000e+03	3.005000e+03	3027.000000
mean	2013.783284	107.217114	6.457582	6.170030e+04	3.064033e+07	2014.077635
std	2.466955	20.073886	1.012277	1.255132e+05	6.671629e+07	2.442245
min	2010.000000	3.000000	1.600000	5.000000e+00	1.000000e+02	2010.000000
25%	2012.000000	94.000000	5.900000	2.117000e+03	1.390000e+05	2012.000000
50%	2014.000000	105.000000	6.600000	1.310900e+04	2.000000e+06	2014.000000
75%	2016.000000	118.000000	7.100000	6.276550e+04	3.250000e+07	2016.000000
max	2019.000000	272.000000	9.200000	1.841066e+06	7.001000e+08	2018.000000

In [63]:
```
#Checking duplicated data
# no duplicates,combining the datasets automatically eliminated the duplicated data from the individual dataset inspection
combined_df.duplicated().sum()
```

Out[63]: 0

In [64]:
```
#To check null values
combined_df.isna().sum()
```

Out[64]:
```
movie_id              0
title                 0
original_title        0
start_year            0
runtime_minutes      47
genres                7
averagerating         0
numvotes              0
studio                3
domestic_gross       22
foreign_gross      1195
year                  0
dtype: int64
```

In [65]:
```
# drop any rows with missing values in the 'runtime_minutes' or 'genres' columns
combined_df = combined_df.dropna(subset=['runtime_minutes' ,'genres', 'domestic_gross'])
```

In [66]:
```
#To check null values
combined_df.isna().sum()
```

Out[66]:
```
movie_id              0
title                 0
original_title        0
start_year            0
runtime_minutes       0
genres                0
averagerating         0
numvotes              0
studio                1
domestic_gross        0
foreign_gross      1186
year                  0
dtype: int64
```

In [73]:
```
# Check the data type of the 'foreign_gross' column
print(combined_df['foreign_gross'].dtype)
```

```
float64
```

In [78]:
```
# Convert the 'foreign_gross' column to string type
combined_df['foreign_gross'] = combined_df['foreign_gross'].astype(str)

# Use the .str accessor on the 'foreign_gross' column
combined_df['foreign_gross'] = combined_df['foreign_gross'].str.replace(',', '').astype(float)
```

In [79]:
```
# replace missing values in the 'foreign_gross' column with the median
median_foreign_gross = combined_df['foreign_gross'].median()
combined_df['foreign_gross'] = combined_df['foreign_gross'].fillna(median_foreign_gross)
```

In [80]:
```
#To check for the data type
print(type("combined_df"))
```

```
<class 'str'>
```

In [81]:
```
#To check null values
combined_df.isna().sum()
```

Out[81]:
```
movie_id           0
title              0
original_title     0
start_year         0
runtime_minutes    0
genres             0
averagerating      0
numvotes           0
studio             1
domestic_gross     0
foreign_gross      0
year               0
dtype: int64
```

In [82]:
```
# select only the columns that we need for analysis
selected_df = combined_df[['title', 'genres', 'averagerating', 'domestic_gross', 'foreign_gross', 'year']]

selected_df.head()
```

Out[82]:

	title	genres	averagerating	domestic_gross	foreign_gross	year
0	The Legend of Hercules	Action,Adventure,Fantasy	4.2	18800000.0	42400000.0	2014
1	Baggage Claim	Comedy	5.1	21600000.0	887000.0	2013
3	Moneyball	Biography,Drama,Sport	7.6	75600000.0	34600000.0	2011
4	Hereafter	Drama,Fantasy,Romance	6.5	32700000.0	72500000.0	2010
5	Mission: Impossible - Ghost Protocol	Action,Adventure,Thriller	7.4	209400000.0	485300000.0	2011

In [86]:
```
#To check the summary of the table
selected_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2953 entries, 0 to 3026
Data columns (total 7 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   title           2953 non-null   object
 1   genres          2953 non-null   object
 2   averagerating   2953 non-null   float64
 3   domestic_gross  2953 non-null   float64
 4   foreign_gross   2953 non-null   float64
 5   year            2953 non-null   int64
 6   total_gross     2953 non-null   float64
dtypes: float64(4), int64(1), object(2)
memory usage: 184.6+ KB
```

In [89]:
```
#To check the summary of the table
selected_df.head()
```

Out[89]:

	title	genres	averagerating	domestic_gross	foreign_gross	year	total_gross
0	The Legend of Hercules	Action,Adventure,Fantasy	4.2	18800000.0	42400000.0	2014	61200000.0
1	Baggage Claim	Comedy	5.1	21600000.0	887000.0	2013	22487000.0
3	Moneyball	Biography,Drama,Sport	7.6	75600000.0	34600000.0	2011	110200000.0
4	Hereafter	Drama,Fantasy,Romance	6.5	32700000.0	72500000.0	2010	105200000.0
5	Mission: Impossible - Ghost Protocol	Action,Adventure,Thriller	7.4	209400000.0	485300000.0	2011	694700000.0

In [88]:
```
# combining our domestic_gross and foreign_gross columns to have one column for total_column
selected_df.loc[:,'total_gross'] = selected_df['foreign_gross'] + selected_df['domestic_gross']
```

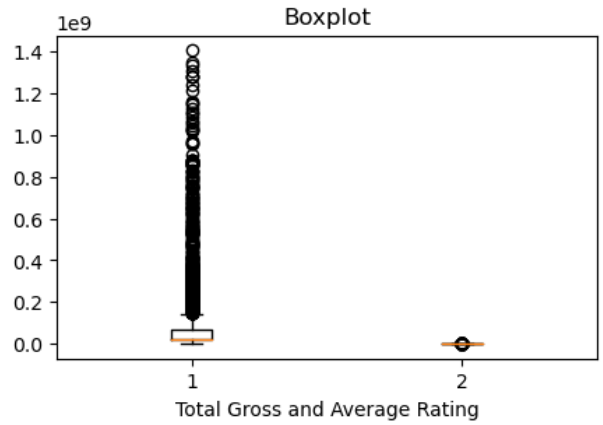
```
C:\Users\c.chiuri\AppData\Local\Temp\ipykernel_18692\77355260.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/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)
  selected_df.loc[:,'total_gross'] = selected_df['foreign_gross'] + selected_df['domestic_gross']
```

In [91]:
```
# select only the columns that we need for analysis
final_df = selected_df[['title', 'genres', 'averagerating', 'total_gross', 'year']]

final_df.head()
```

Out[91]:

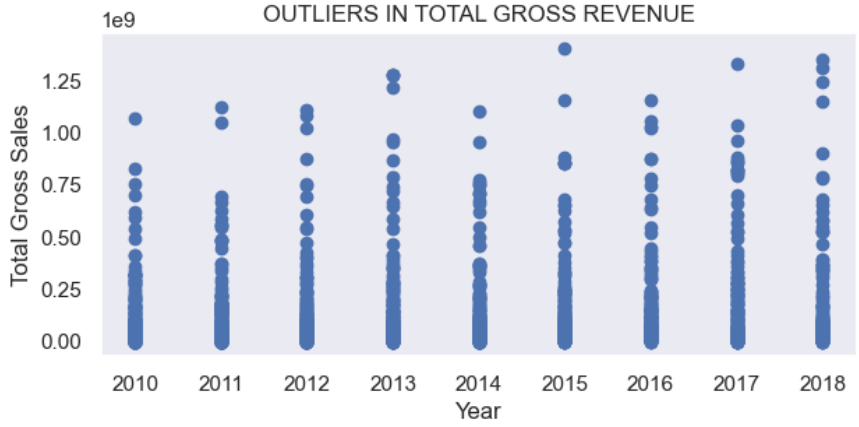
	title	genres	averagerating	total_gross	year
0	The Legend of Hercules	Action,Adventure,Fantasy	4.2	61200000.0	2014
1	Baggage Claim	Comedy	5.1	22487000.0	2013
3	Moneyball	Biography,Drama,Sport	7.6	110200000.0	2011
4	Hereafter	Drama,Fantasy,Romance	6.5	105200000.0	2010
5	Mission: Impossible - Ghost Protocol	Action,Adventure,Thriller	7.4	694700000.0	2011

In [96]:
```
# inspecting for outliers
fig = plt.figure(figsize =(5, 3))
# create a boxplot of the 'total_gross' and'averagerating column
plt.boxplot([final_df['total_gross'], final_df['averagerating']])

# set the title and labels
plt.title('Boxplot')
plt.xlabel('Total Gross and Average Rating')
plt.show()
```




```
All outliers in the dataframe will be retained .
```

In [173]:
```
fig, ax = plt.subplots(figsize =(7, 3))

ax.scatter(final_df["year"],final_df["total_gross"])
ax.set_title('OUTLIERS IN TOTAL GROSS REVENUE')
ax.set_xlabel('Year')
ax.set_ylabel('Total Gross Sales')

plt.show()
```



DATA ANALYSIS

```
My aim for this study is to answer these three questions
1.Which is the most common genre
2.which genre has the highest number of return
3.Is the highest paying genre correlated to its rating
```

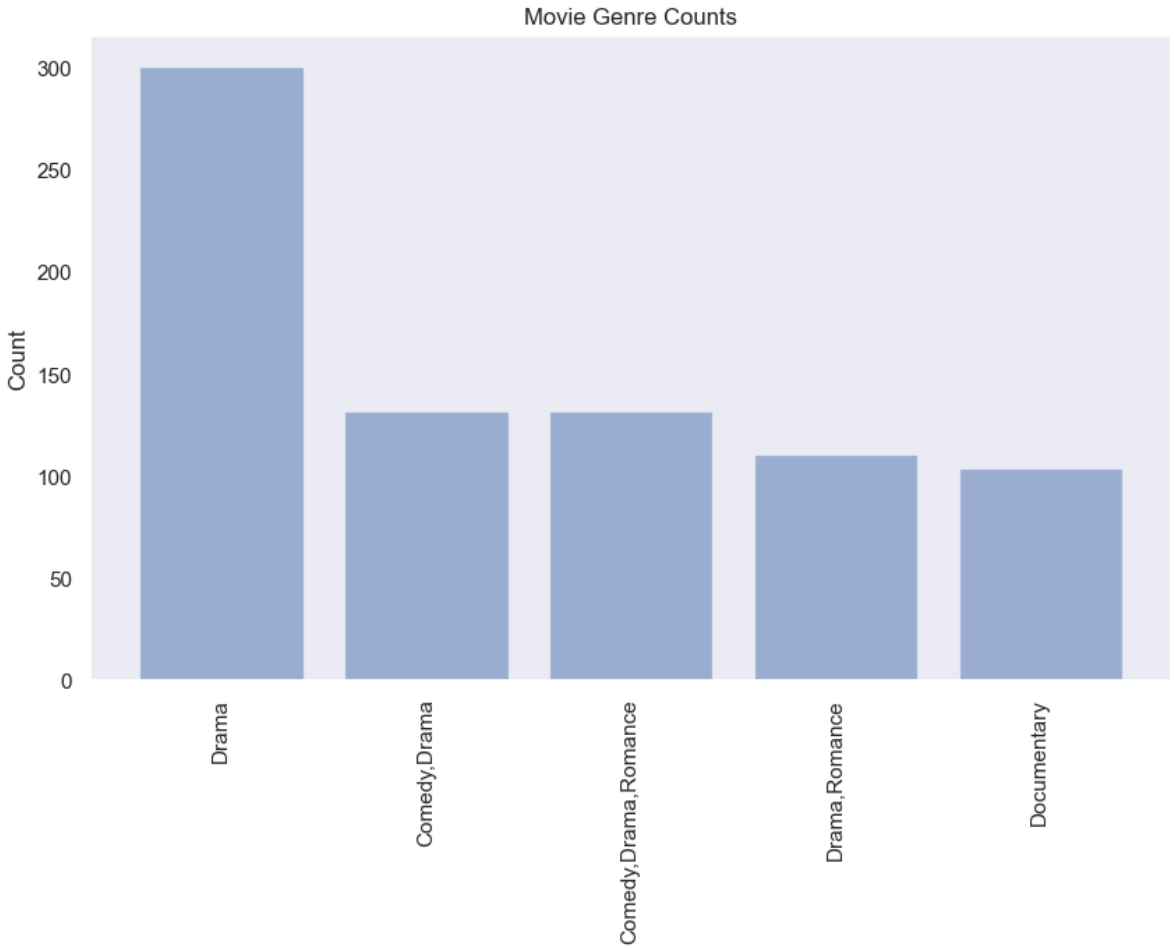
In [108]:
```
# Create a new dataframe with the count of movies per genre
genres_counts = final_df['genres'].value_counts().reset_index(name='count').rename(columns={'index': 'title'})
print(genres_counts)
```

```
                         title  count
0                        Drama    301
1                Comedy,Drama    132
2          Comedy,Drama,Romance    132
3                Drama,Romance    111
4                  Documentary    104
..                         ...    ...
313    Action,Biography,History      1
314            Crime,Drama,War      1
315  Biography,History,Thriller      1
316   Documentary,Drama,Romance      1
317    Adventure,Comedy,Western      1

[318 rows x 2 columns]
```

In [186]:
```
# Define a list of genres you want to keep
genres_to_keep = ['Drama', 'Comedy,Drama','Comedy,Drama,Romance','Drama,Romance','Documentary']

# Use boolean indexing to select only the rows with the desired genres
genres_filtered = genres_counts[genres_counts['title'].isin(genres_to_keep)]
print(genres_filtered)
```

```
                 title  count
0                Drama    301
1         Comedy,Drama    132
2  Comedy,Drama,Romance    132
3         Drama,Romance    111
4          Documentary    104
```

In [191]:
```
# create a bar chart
fig, ax = plt.subplots(figsize=(10, 6))
genres = genres_filtered['title']
counts = genres_filtered['count']
y_pos = np.arange(len(genres))

ax.bar(y_pos, counts, align='center', alpha=0.5)
ax.set_xticks(y_pos)
ax.set_xticklabels(genres, rotation='vertical')
ax.set_ylabel('Count')
ax.set_title('Movie Genre Counts')

plt.show()
```



Its evident from the graph above that Drama is the most common Genre,this gives us more insights on which show Microsoft should focus on more.

In [118]:
```
#Chceking the number of unique genres in the dataframe
len(final_df['genres'].unique())
```

Out[118]: 318

In [121]:
```
#Displaying the first 10
genres_counts.head(10)
```

Out[121]:

	title	count
0	Drama	301
1	Comedy,Drama	132
2	Comedy,Drama,Romance	132
3	Drama,Romance	111
4	Documentary	104
5	Comedy	92
6	Adventure,Animation,Comedy	75
7	Comedy,Romance	71
8	Drama,Thriller	54
9	Action,Adventure,Sci-Fi	47

In [123]:
```
# tpe of created dataframe where genres are stored
type(genres_counts)
```

Out[123]:
```
pandas.core.frame.DataFrame
```

In [124]:
```
# Saving the cleaned data into a csv file
final_df.to_csv('final_df.csv',index=False)
```

In [174]:
```
# Veryfing storage of data by reading the file
final_df = pd.read_csv('final_df.csv')
```

In [175]:
```
final_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2953 entries, 0 to 2952
Data columns (total 5 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   title          2953 non-null   object 
 1   genres         2953 non-null   object 
 2   averagerating  2953 non-null   float64
 3   total_gross    2953 non-null   float64
 4   year           2953 non-null   int64  
dtypes: float64(2), int64(1), object(2)
memory usage: 115.5+ KB
```

DATA EXPLORATION

In [ ]:
```
-What are the top popular genres by rating ?

-Does the number of revenue and ratings correlate ?

-What are the correlations of the ratings and other attributes ?
```

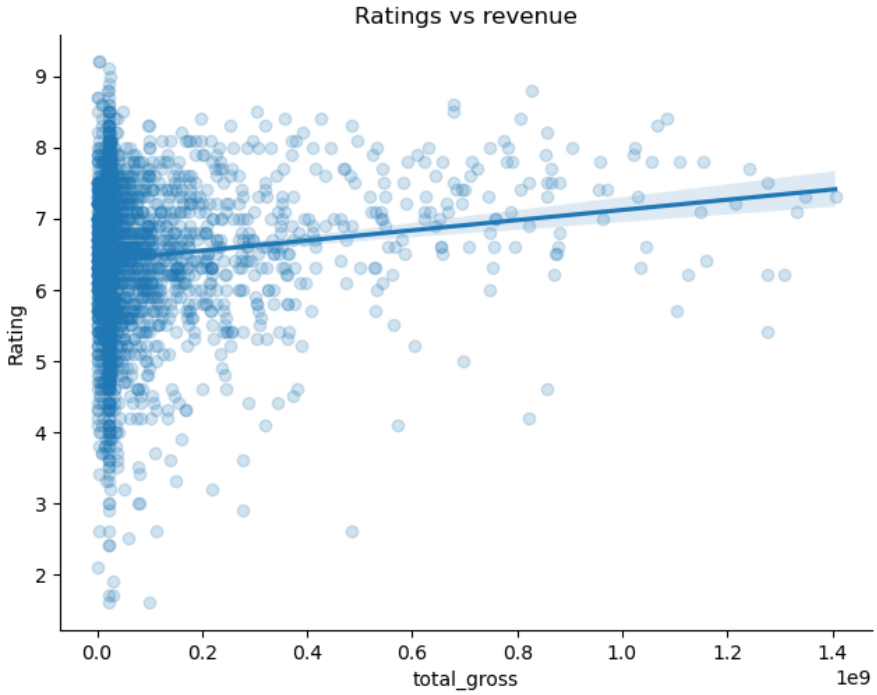
In [227]:
```
#Arranging my data in descending order from the highest rating to the lowest rating
by_rating = final_df.sort_values(by='averagerating',ascending = False)
```

In [230]:
```
#Creating a variable that contains column genres,averageratings and titles as sorted
genres_orderby_rating = by_rating.loc[:,['genres','averagerating','title']]
genres_orderby_rating.head()
```

Out[230]:

	genres	averagerating	title
1003	Documentary	9.2	The Wall
187	Adventure	9.2	The Runaways
1319	Drama	9.1	Tomorrow
119	Documentary	9.0	The Way
1273	Comedy,Documentary,Drama	8.9	The Mayor

In [153]:
```
# Plot scatterplot of retweet vs favorite count
sb.lmplot(x="total_gross",
          y="averagerating",
          data= final_df,
          height = 5,
          aspect=1.3,
          scatter_kws={'alpha':1/5})
plt.title('Ratings vs revenue')
plt.xlabel('total_gross')
plt.ylabel('Rating');
```



In [154]:
```
# correlation
cor1 =final_df[["averagerating","total_gross"]].corr(method ='pearson')
print (cor1)
```

```
              averagerating  total_gross
averagerating          1.000        0.123
total_gross            0.123        1.000
```

The is a positive correlation between domestic_gross and the rating of a movie though its weak 0.12(rounded) meaning the investemnt put in the production of a movie has a proportion to the ratings

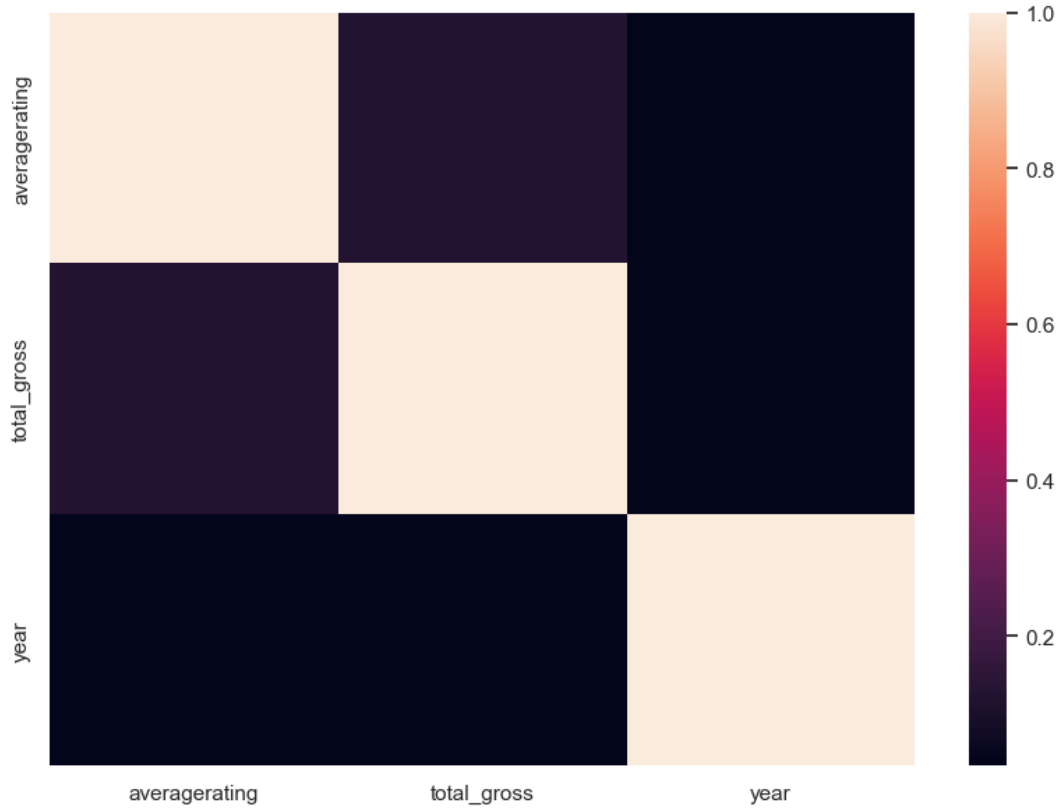
CORRELATIONS

In [164]:
```
#Checking the correlation of genre and domestic gross which could affect the type of genre to be produced
final_df[final_df.columns[1:]].corr()['averagerating'][:].sort_values(ascending=False).to_frame()

#df[df.columns[1:]].corr()['median_house_value'][:].sort_values(ascending=False).to_frame()
```

Out[164]:

	averagerating
averagerating	1.000000
total_gross	0.123000
year	0.034451

In [167]:
```
# Creating a correlation heatmap
plt.figure(figsize=(10,7))
sb.set_theme(style="dark")
corr = final_df.corr()
heatmap = sb.heatmap(corr, annot=False, fmt='.1g')
```



The light shades show high correlation betwen the elements while dark shades show low correlation between the elements.Eg the averagerating has a weak positive correlation with total_gross meaning that a high rating indicates a descent gross return.

Conclusions

We have drawn many interesting inferences from the dataset,here's a summary of the few of them:

The most genre type is drama with the least as war,

The amount of total Gross does affect the rating of the movie,

Some Genre Combinations are more relatable to each other unlike others.

Recommendations

The studios that should be invested in should be either The mayor,Tomorrow or The way

The company should consider starting with the production of drama genre movies.