Microsoft Movie Studio Analysis

The purpose of this analysis is to come up with actionable insights based on the key findings to guide Microsoft's new movie studio in making informed decisions about the types of films to create.To address this problem, the project will dive into data-driven analysis to uncover the genres, runtimes, and studios that define success in the world of movie making.

KEY STAKE HOLDERS 1.The Head of Microsoft's New Movie Studio:He/She is responsible for making strategic decisions about the types of films to produce. They need the insights to guide the studio's film production strategy. 2.Microsoft Executives:These are stakeholders because they ensure the success of the new movie studio aligns with the company's broader goals and strategies. They are interested in the project's outcomes and recommendations. 3.Marketing and Distribution Teams:These teams within Microsoft are concerned with how the films are marketed and distributed. They can benefit from insights about which types of films are currently popular and how to best promote and distribute them. 4.Investors and Shareholders:The investors and shareholders have a financial interest in the success of the new movie studio.Therefore ,they ensure the findings will impact on sales and seehow it impacts positively to the studio sales.

In [82]:
```python
# Loading needed libraries
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

%matplotlib inline
```

SOURCE OF DATA -::learn-co-curriculum github repository

Files used: 1.imdb.title.basics csv file 2.imdb.title.ratings csv file 3.bom.movie_gross csv file

I chose this dataset to explore the following insights that could be achieved from this data: 1.Runtime Analysis - Explore if there are ideal runtime lengths associated with higher ratings. Recommend optimal target runtime. 2.Genre selection - Find the most popular genre based on the total frequency/count of that particular genre in terms of production. 3.Production studios - Find the highest grossing production studios and seek to partner with such studios.

In [83]:
```python
# Loading of the data
df1= pd.read_csv(r'C:\Users\user.DESKTOP-OMQ89VA\OneDrive\Documents\MORINGA PHASE 1 PROJECT\imdb.title.basics.csv\title.basics.csv')
df2= pd.read_csv(r'C:\Users\user.DESKTOP-OMQ89VA\OneDrive\Documents\MORINGA PHASE 1 PROJECT\imdb.title.ratings.csv\title.ratings.csv')
```

Checking the Data and Datatypes

In [84]:
```python
pd.set_option('display.max_rows',None)
```

In [85]:
```python
df2.head(5)
```

Out[85]:

	tconst	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 [86]:
```python
df1.head(5)
```

Out[86]:

	tconst	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 [87]:
```python
df1.duplicated().sum()
```

Out[87]:
```
0
```

In [88]:
```python
df2.duplicated().sum()
```

Out[88]:
```
0
```

In [89]:
```python
df1.columns
```

Out[89]:
```
Index(['tconst', 'primary_title', 'original_title', 'start_year',
       'runtime_minutes', 'genres'],
      dtype='object')
```

In [90]:
```python
df1.isnull().sum()
```

Out[90]:
```
tconst                 0
primary_title          0
original_title        21
start_year             0
runtime_minutes    31739
genres              5408
dtype: int64
```

In [91]:
```python
df1.shape
```

Out[91]:
```
(146144, 6)
```

In [92]:
```python
df2.shape
```

Out[92]:
```
(73856, 3)
```

In [93]:
```python
df2.isnull().sum()
```

Out[93]:
```
tconst           0
averagerating    0
numvotes         0
dtype: int64
```

In [94]:
```python
pd.reset_option('display.max_rows')
```

In [95]:
```python
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 146144 entries, 0 to 146143
Data columns (total 6 columns):
 #   Column           Non-Null Count   Dtype  
---  ------           --------------   -----  
 0   tconst           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 [96]:
```python
df2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 73856 entries, 0 to 73855
Data columns (total 3 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   tconst         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
```

Data Preprocessing

In [97]:
```python
# Dropped the original_title since it had null values and the primary_title had all the necessary rows
df1 = df1.drop('original_title', axis=1)
```

In [98]:
```python
df1
```

Out[98]:

	tconst	primary_title	start_year	runtime_minutes	genres
0	tt0063540	Sunghursh	2013	175.0	Action,Crime,Drama
1	tt0066787	One Day Before the Rainy Season	2019	114.0	Biography,Drama
2	tt0069049	The Other Side of the Wind	2018	122.0	Drama
3	tt0069204	Sabse Bada Sukh	2018	NaN	Comedy,Drama
4	tt0100275	The Wandering Soap Opera	2017	80.0	Comedy,Drama,Fantasy
...	...	...	...	...	...
146139	tt9916538	Kuambil Lagi Hatiku	2019	123.0	Drama
146140	tt9916622	Rodolpho Teóphilo - O Legado de um Pioneiro	2015	NaN	Documentary
146141	tt9916706	Dankyavar Danka	2013	NaN	Comedy
146142	tt9916730	6 Gunn	2017	116.0	NaN
146143	tt9916754	Chico Albuquerque - Revelações	2013	NaN	Documentary

146144 rows × 5 columns

In [99]:
```python
# Dropped all the other rows that had null values since I had enough data to work with and it wasnt possible to get a work around for the other mis
df1=df1.dropna()
```

In [100…
```python
df1.shape
```

Out[100…
```
(112233, 5)
```

In [101…
```python
# Merged the two datasets using column tconst as the primary key and created df3 as the third dataframe that Id work with
df3 = df1.merge(df2, on='tconst')
```

In [102…
```python
df3
```

Out[102…

	tconst	primary_title	start_year	runtime_minutes	genres	averagerating	numvotes
0	tt0063540	Sunghursh	2013	175.0	Action,Crime,Drama	7.0	77
1	tt0066787	One Day Before the Rainy Season	2019	114.0	Biography,Drama	7.2	43
2	tt0069049	The Other Side of the Wind	2018	122.0	Drama	6.9	4517
3	tt0100275	The Wandering Soap Opera	2017	80.0	Comedy,Drama,Fantasy	6.5	119
4	tt0137204	Joe Finds Grace	2017	83.0	Adventure,Animation,Comedy	8.1	263
...	...	...	...	...	...	...	...
65715	tt9911774	Padmavyuhathile Abhimanyu	2019	130.0	Drama	8.4	365
65716	tt9913056	Swarm Season	2019	86.0	Documentary	6.2	5
65717	tt9913084	Diabolik sono io	2019	75.0	Documentary	6.2	6
65718	tt9914286	Sokagin Çocuklari	2019	98.0	Drama,Family	8.7	136
65719	tt9916160	Drømmeland	2019	72.0	Documentary	6.5	11

65720 rows × 7 columns

In [103…
```python
# Visualize the distribution of movie genres
# Split the genres into individual categories
genres_split = df3['genres'].str.split(',').explode()
```

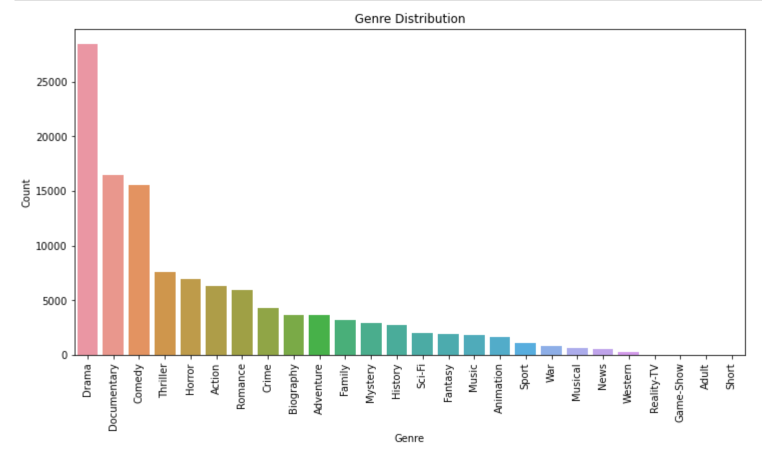
In [104…
```python
genres_split
```

Out[104…
```
0             Action
0              Crime
0              Drama
1          Biography
1              Drama
            ...     
65716    Documentary
65717    Documentary
65718          Drama
65718         Family
65719    Documentary
Name: genres, Length: 118437, dtype: object
```

In [105…
```python
# Count the frequency of each genre
# Get the most popular genre by analyzing the count
genre_counts = genres_split.value_counts()
genre_counts
```

Out[105…
```
Drama          28394
Documentary    16423
Comedy         15514
Thriller        7583
Horror          6917
Action          6297
Romance         5976
Crime           4338
Biography       3693
Adventure       3621
Family          3231
Mystery         2889
History         2704
Sci-Fi          2048
Fantasy         1969
Music           1844
Animation       1615
Sport           1099
War              795
Musical          638
News             575
Western          256
Reality-TV        13
Game-Show          2
Adult              2
Short              1
Name: genres, dtype: int64
```

In [106…
```python
# Created a bargraph to showcase the frequency of each genre
plt.figure(figsize=(12, 6))
sns.barplot(x=genre_counts.index, y=genre_counts.values)
plt.title('Genre Distribution')
plt.xlabel('Genre')
plt.ylabel('Count')
plt.xticks(rotation=90)
plt.show()
```



Based on the analysis of the genre data,Drama seems to be the most popular genre being produced.Id recommend to the new Microsoft studios to leverage on this by creating movies in this genre to appeal to a wider audience.

In [107…
```python
# Identify which genres have higher average ratings and number of votes
# Group the data by genre and calculate average ratings and total number of votes
genre_ratings_votes = df3.groupby('genres').agg({'averagerating': 'mean', 'numvotes': 'sum'}).reset_index()
genre_ratings_votes
```

Out[107…

	genres	averagerating	numvotes
0	Action	5.665187	319126
1	Action,Adult,Comedy	5.900000	8
2	Action,Adventure	5.059677	108835
3	Action,Adventure,Animation	6.548734	3570049
4	Action,Adventure,Biography	7.105556	999592
...	...	...	...
901	Thriller	5.603727	431778
902	Thriller,War	5.650000	7166
903	Thriller,Western	6.300000	13222
904	War	5.746667	5309
905	Western	4.939063	15391

906 rows × 3 columns

In [108…
```python
genre_ratings = df3.groupby('genres')['averagerating'].mean().reset_index()
genre_ratings
```

Out[108…

	genres	averagerating
0	Action	5.665187
1	Action,Adult,Comedy	5.900000
2	Action,Adventure	5.059677
3	Action,Adventure,Animation	6.548734
4	Action,Adventure,Biography	7.105556
...	...	...
901	Thriller	5.603727
902	Thriller,War	5.650000
903	Thriller,Western	6.300000
904	War	5.746667
905	Western	4.939063

906 rows × 2 columns

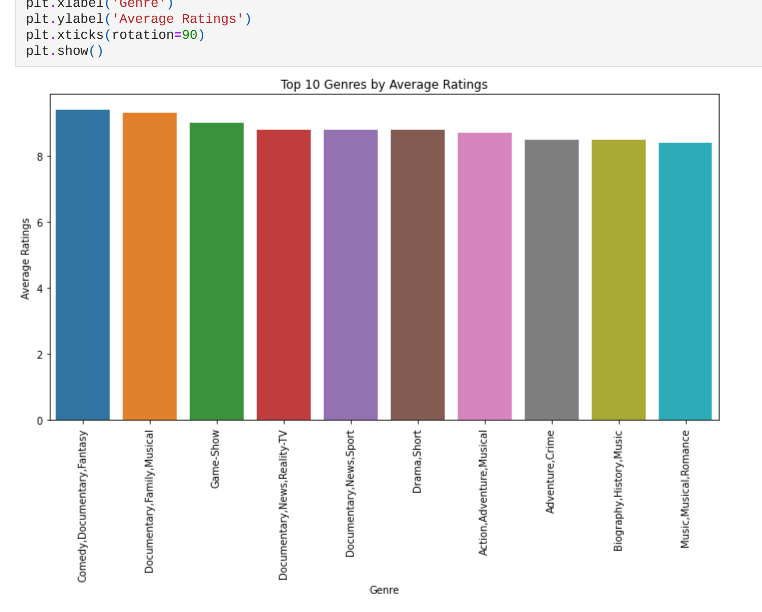
In [109…
```python
# grouped the top genres based on the highest averaging rating
top_10_genres = genre_ratings.nlargest(10, 'averagerating')
top_10_genres
```

Out[109…

	genres	averagerating
442	Comedy,Documentary,Fantasy	9.4
622	Documentary,Family,Musical	9.3
824	Game-Show	9.0
668	Documentary,News,Reality-TV	8.8
670	Documentary,News,Sport	8.8
763	Drama,Short	8.8
14	Action,Adventure,Musical	8.7
185	Adventure,Crime	8.5
410	Biography,History,Music	8.5
866	Music,Musical,Romance	8.4

Movies with the genre combination Comedy, Documentary & Fantasy have the highest average rating.Microsoft should consider producing movies in these genres as they tend to resonate with audiences.

In [110…
```python
plt.figure(figsize=(12, 6))
sns.barplot(x='genres', y='averagerating', data=top_10_genres)
plt.title('Top 10 Genres by Average Ratings')
plt.xlabel('Genre')
plt.ylabel('Average Ratings')
plt.xticks(rotation=90)
plt.show()
```



In [111…
```python
genre_numvotes = df3.groupby('genres')['numvotes'].mean().reset_index()
genre_numvotes
```

Out[111…

	genres	numvotes
0	Action	442.615811
1	Action,Adult,Comedy	8.000000
2	Action,Adventure	1755.403226
3	Action,Adventure,Animation	22595.246835
4	Action,Adventure,Biography	55532.888889
...	...	...
901	Thriller	335.231366
902	Thriller,War	1791.500000
903	Thriller,Western	6611.000000
904	War	176.966667
905	Western	240.484375

906 rows × 2 columns

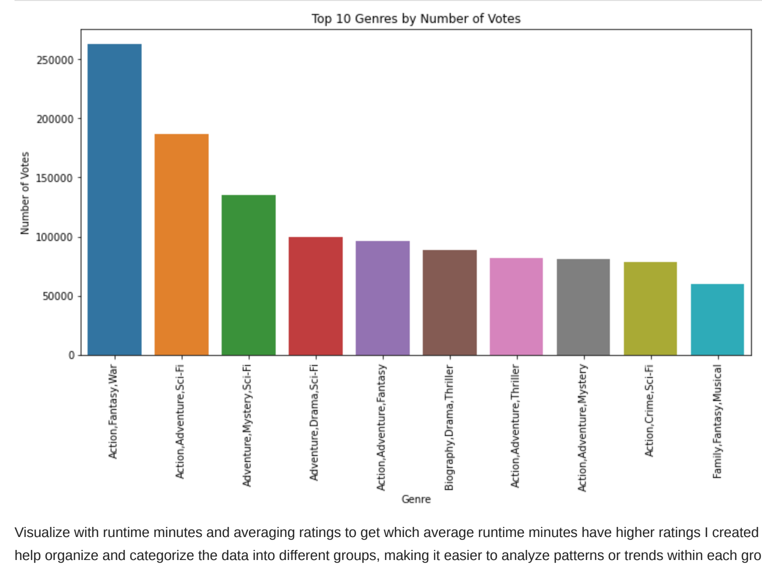
In [112…
```python
#grouped the top genres based on the highest number of votes
top_10_numvotes = genre_numvotes.nlargest(10, 'numvotes')
top_10_numvotes
```

Out[112…

	genres	numvotes
110	Action,Fantasy,War	262978.000000
17	Action,Adventure,Sci-Fi	187179.292683
257	Adventure,Mystery,Sci-Fi	135042.500000
217	Adventure,Drama,Sci-Fi	99316.950000
10	Action,Adventure,Fantasy	96588.050000
401	Biography,Drama,Thriller	88518.904762
19	Action,Adventure,Thriller	81476.152174
15	Action,Adventure,Mystery	80838.111111
69	Action,Crime,Sci-Fi	78214.125000
776	Family,Fantasy,Musical	59606.500000

Movies with the genre combination Action, Fantasy & War topped the leaderboard in number of votes, this combination is obviously a hit at the box office worldwide, make this the first type of movie to produce for success.

In [113…
```python
plt.figure(figsize=(12, 6))
sns.barplot(x='genres', y='numvotes', data=top_10_numvotes)
plt.title('Top 10 Genres by Number of Votes')
plt.xlabel('Genre')
plt.ylabel('Number of Votes')
plt.xticks(rotation=90)
plt.show()
```



Visualize with runtime minutes and averaging ratings to get which average runtime minutes have higher ratings I created bins for grouping data based on runtime minutes. These bins help organize and categorize the data into different groups, making it easier to analyze patterns or trends within each group.

In [114…
```python
# Create runtime bins
bin_edges = [0, 60, 90, 120, 150, float('inf')]
bin_labels = ['<60', '60-90', '90-120', '120-150', '150+']
```

In [115…
```python
# Bin the data based on runtime
df3['runtime_bins'] = pd.cut(df3['runtime_minutes'], bins=bin_edges, labels=bin_labels)
df3['runtime_bins']
```

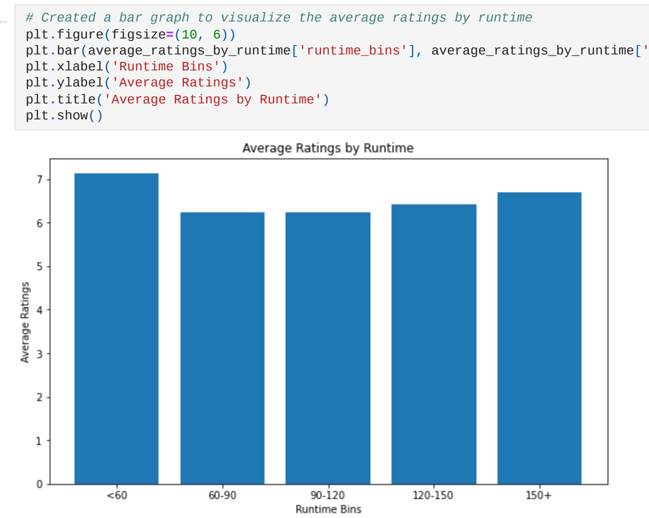
Out[115…
```
0           150+
1         90-120
2        120-150
3          60-90
4          60-90
          ...   
65715    120-150
65716      60-90
65717      60-90
65718     90-120
65719      60-90
Name: runtime_bins, Length: 65720, dtype: category
Categories (5, object): ['<60' < '60-90' < '90-120' < '120-150' < '150+']
```

In [116…
```python
# Calculated the average ratings for each bin
average_ratings_by_runtime = df3.groupby('runtime_bins')['averagerating'].mean().reset_index()
average_ratings_by_runtime
```

Out[116…

	runtime_bins	averagerating
0	<60	7.124790
1	60-90	6.231207
2	90-120	6.245296
3	120-150	6.419724
4	150+	6.688738

In [117…
```python
# Created a bar graph to visualize the average ratings by runtime
plt.figure(figsize=(10, 6))
plt.bar(average_ratings_by_runtime['runtime_bins'], average_ratings_by_runtime['averagerating'])
plt.xlabel('Runtime Bins')
plt.ylabel('Average Ratings')
plt.title('Average Ratings by Runtime')
plt.show()
```



Based on the runtime analysis,movie that had a runtime of 60 minutes and below had a higher rating.Microsoft new studio wouldthen be adviced to create movies within that time frame for optimum concentration from the viewers.

Analysing the data using the BOM MOVIE GROSS

In [118…
```python
# Loading of the data
df5 = pd.read_csv(r'C:\Users\user.DESKTOP-OMQ89VA\OneDrive\Documents\MORINGA PHASE 1 PROJECT\bom.movie_gross.csv\bom.movie_gross.csv')
df5
```

Out[118…

	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
...	...	...	...	...	...
3382	The Quake	Magn.	6200.0	NaN	2018
3383	Edward II (2018 re-release)	FM	4800.0	NaN	2018
3384	El Pacto	Sony	2500.0	NaN	2018
3385	The Swan	Synergetic	2400.0	NaN	2018
3386	An Actor Prepares	Grav.	1700.0	NaN	2018

3387 rows × 5 columns

Data Preprocessing

In [119…
```python
df5.shape
```

Out[119…
```
(3387, 5)
```

In [120…
```python
df5.duplicated().sum()
```

Out[120…
```
0
```

In [121…
```python
df5.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3387 entries, 0 to 3386
Data columns (total 5 columns):
 #   Column          Non-Null Count  Dtype  
---  ------          --------------  -----  
 0   title           3387 non-null   object 
 1   studio          3382 non-null   object 
 2   domestic_gross  3359 non-null   float64
 3   foreign_gross   2037 non-null   object 
 4   year            3387 non-null   int64  
dtypes: float64(1), int64(1), object(3)
memory usage: 132.4+ KB
```

In [122…
```python
df5.dtypes
```

Out[122…
```
title              object
studio             object
domestic_gross    float64
foreign_gross      object
year                int64
dtype: object
```

In [123…
```python
# Removed the , from the values in order to change the datatype
df5['foreign_gross'] = df5['foreign_gross'].str.replace(',', '')
df5['foreign_gross']
```

Out[123…
```
0       652000000
1       691300000
2       664300000
3       535700000
4       513900000
          ...    
3382          NaN
3383          NaN
3384          NaN
3385          NaN
3386          NaN
Name: foreign_gross, Length: 3387, dtype: object
```

In [124…
```python
# Changed the data type of the foreign_gross column to float in order to perform calculations on it
df5['foreign_gross'] = df5['foreign_gross'].astype('float64')
```

In [125…
```python
df5.dtypes
```

Out[125…
```
title              object
studio             object
domestic_gross    float64
foreign_gross     float64
year                int64
dtype: object
```

In [126…
```python
df5.isnull().sum()
```

Out[126…
```
title                0
studio               5
domestic_gross      28
foreign_gross     1350
year                 0
dtype: int64
```

In [127…
```python
df5[df5['studio'].isna() == 1]
```

Out[127…

	title	studio	domestic_gross	foreign_gross	year
210	Outside the Law (Hors-la-loi)	NaN	96900.0	3300000.0	2010
555	Fireflies in the Garden	NaN	70600.0	3300000.0	2011
933	Keith Lemon: The Film	NaN	NaN	4000000.0	2012
1862	Plot for Peace	NaN	7100.0	NaN	2014
2825	Secret Superstar	NaN	NaN	122000000.0	2017

In [128…
```python
# Dropped all the rows that had null values
df5=df5.dropna()
```

In [129…
```python
df5.shape
```

Out[129…
```
(2007, 5)
```

Creation of a new total gross column to find the total gross each studio was raking per movie.Eventually calculate the average total gross of each movie studio in order to find the highest grossing movie studios.

In [141…
```python
# Created a new column with the total of the domestic and foreign gross columns
Total_gross = df5['domestic_gross'] + df5['foreign_gross']
Total_gross
```

Out[141…
```
0       1.067000e+09
1       1.025500e+09
2       9.603000e+08
3       8.283000e+08
4       7.526000e+08
            ...     
3275    1.501400e+06
3286    9.540000e+05
3309    2.660000e+05
3342    9.840000e+04
3353    7.320000e+04
Length: 2007, dtype: float64
```

In [144…
```python
# Added the total gross column to the Dataframe
df5['Total_gross'] = df5['domestic_gross'] + df5['foreign_gross']
```

```
<ipython-input-144-eca1617685d2>: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
  df5['Total_gross'] = df5['domestic_gross'] + df5['foreign_gross']
```

In [145…
```python
df5
```

Out[145…

	title	studio	domestic_gross	foreign_gross	year	Total_gross
0	Toy Story 3	BV	415000000.0	652000000.0	2010	1.067000e+09
1	Alice in Wonderland (2010)	BV	334200000.0	691300000.0	2010	1.025500e+09
2	Harry Potter and the Deathly Hallows Part 1	WB	296000000.0	664300000.0	2010	9.603000e+08
3	Inception	WB	292600000.0	535700000.0	2010	8.283000e+08
4	Shrek Forever After	P/DW	238700000.0	513900000.0	2010	7.526000e+08
...	...	...	...	...	...	...
3275	I Still See You	LGF	1400.0	1500000.0	2018	1.501400e+06
3286	The Catcher Was a Spy	IFC	725000.0	229000.0	2018	9.540000e+05
3309	Time Freak	Grindstone	10000.0	256000.0	2018	2.660000e+05
3342	Reign of Judges: Title of Liberty - Concept Short	Darin Southa	93200.0	5200.0	2018	9.840000e+04
3353	Antonio Lopez 1970: Sex Fashion & Disco	FM	43200.0	30000.0	2018	7.320000e+04

2007 rows × 6 columns

In [146…
```python
# Grouped the data by 'studio' and calculate the average total gross
studio_avg_gross = df5.groupby('studio')['Total_gross'].mean().reset_index()
studio_avg_gross
```

Out[146…

	studio	Total_gross
0	3D	1.600000e+07
1	A24	2.625889e+07
2	AF	2.327500e+06
3	AGF	1.768000e+05
4	AR	5.805000e+07
...	...	...
167	WOW	4.940000e+04
168	Wein.	5.936091e+07
169	Yash	4.920575e+07
170	Zee	1.671000e+06
171	Zeit.	4.405840e+06

172 rows × 2 columns

In [136…
```python
# Sort the studios by average total gross in descending order
studio_avg_gross_sorted = studio_avg_gross.sort_values(by='Total_gross', ascending=False)
```

In [147…
```python
studio_avg_gross_sorted
```

Out[147…

	studio	Total_gross
67	HC	8.703000e+08
116	P/DW	5.076500e+08
22	BV	4.249075e+08
66	GrtIndia	2.542000e+08
163	WB	2.368577e+08
...	...	...
36	Darin Southa	9.840000e+04
70	ICir	7.960000e+04
73	ITL	5.290000e+04
167	WOW	4.940000e+04
33	Crnth	3.830000e+04

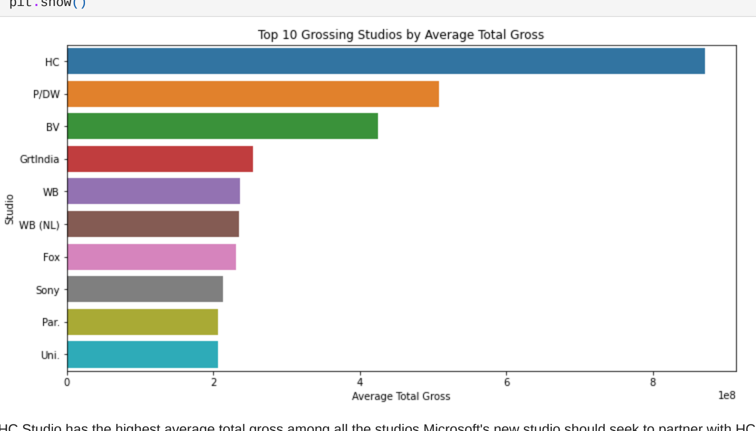
172 rows × 2 columns

In [138…
```python
# Selected the top 10 studios based on the total gross
top_10_studios = studio_avg_gross_sorted.head(10)
top_10_studios
```

Out[138…

	studio	Total_gross
67	HC	8.703000e+08
116	P/DW	5.076500e+08
22	BV	4.249075e+08
66	GrtIndia	2.542000e+08
163	WB	2.368577e+08
164	WB (NL)	2.344114e+08
57	Fox	2.311968e+08
142	Sony	2.133782e+08
126	Par.	2.068532e+08
155	Uni.	2.065751e+08

In [139…
```python
# Created a bar plot to visualize the top 10 grossing studios
plt.figure(figsize=(12, 6))
sns.barplot(x='Total_gross', y='studio', data=top_10_studios)
plt.xlabel('Average Total Gross')
plt.ylabel('Studio')
plt.title('Top 10 Grossing Studios by Average Total Gross')
plt.show()
```



HC Studio has the highest average total gross among all the studios.Microsoft's new studio should seek to partner with HC based on its ability to rake in high gross.

CONCLUSION

This analysis leads to three recommendations that could could be used by Microsoft in the launching of its movie studios: Microsoft should seek to release movies with runtimes of 60 minutes and below since they tend to have higher average ratings.They should aim for movie runtimes within this range to maximize audience satisfaction.Most movies released are of the Drama genre and due to its requent production,Microsoft can look into incorporating drama into its movies since most releases are within that genre.HC being the studio with the highest average gross,Microsoft should seek to partner with HC studio for its movies production due to its high rating gross income.

In [ ]: