PHASE 1 PROJECT- MOVIES DATA ANALYSIS

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

PROJECT MAIN OBJECTIVE

For this project, We will use exploratory data analysis to generate insights for the Microsoft stakeholder.

SPECIFIC OBJECTIVES

- **This project's value is in helping a this specific stakeholder solve a real-world problem by exploring the following insights**.

- Understanding what content is available in different countries
- Types of studios that are currently doing best in movie making.
- Identifying similar content by matching text-based features
- Network analysis of Actors / Directors and find interesting insights
- Analysing whether Microsoft should put more focus on TV Shows than movies in recent years.

In [1]:
```
# Import standard packages
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

%matplotlib inline
```

In [2]:
```
movie_gross=pd.read_csv('/content/bom.movie_gross.csv')
movie_gross.head(2)
```

Out[2]:

	title	studio	domestic_gross	foreign_gross	year
0	Toy Story 3	BV	415000000.0	652000000.0	2010
1	Alice in Wonderland (2010)	BV	334200000.0	691300000.0	2010

In [6]:
```
basics=pd.read_csv('/content/title.basics.csv')
basics.head(2)
```

Out[6]:

	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

In [5]:
```
ratings=pd.read_csv("/content/title.ratings.csv")
ratings.head(2)
```

Out[5]:

	tconst	averagerating	numvotes
0	tt10356526	8.3	31
1	tt10384606	8.9	559

In [7]:
```
#checking shape for df1 dataset
movie_gross.shape
```

Out[7]:
```
(3387, 5)
```

In [8]:
```
#checking shape for df2 dataset
basics.shape
```

Out[8]:
```
(146144, 6)
```

In [9]:
```
#checking shape for df3 dataset
ratings.shape
```

Out[9]:
```
(73856, 3)
```

In [11]:
```
df0=ratings.merge(basics, on = 'tconst', how = 'inner')
df0.head(2)
```

Out[11]:

	tconst	averagerating	numvotes	primary_title	original_title	start_year	runtime_minutes	genres
0	tt10356526	8.3	31	Laiye Je Yaarian	Laiye Je Yaarian	2019	117.0	Romance
1	tt10384606	8.9	559	Borderless	Borderless	2019	87.0	Documentary

In [13]:
```
df0.shape
```

Out[13]:
```
(73856, 8)
```

In [14]:
```
#concatenating the df0 on df
df = pd.concat([movie_gross,df0])
df.head(2)
```

Out[14]:

	title	studio	domestic_gross	foreign_gross	year	tconst	averagerating	numvotes	primary_title	original_title	start_year	runtime_minutes	genres
0	Toy Story 3	BV	415000000.0	652000000.0	2010.0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	Alice in Wonderland (2010)	BV	334200000.0	691300000.0	2010.0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

In [15]:
```
#checking for missing values
df.isna().sum()
```

Out[15]:
```
title              73856
studio             73861
domestic_gross     73884
foreign_gross      75206
year               73856
tconst              3387
averagerating       3387
numvotes            3387
primary_title       3387
original_title      3387
start_year          3387
runtime_minutes    11007
genres              4191
dtype: int64
```

- **filling missing values on columns with mean**

In [16]:
```
df.domestic_gross.fillna(df.domestic_gross.mean(),inplace=True)
```

In [17]:
```
df.foreign_gross.fillna(df.foreign_gross.mean(),inplace=True)
```

In [18]:
```
df.averagerating.fillna(df.averagerating.mean(),inplace=True)
```

In [19]:
```
df.numvotes.fillna(df.numvotes.mean(),inplace=True)
```

In [20]:
```
df.runtime_minutes.fillna(df.runtime_minutes.mean(),inplace=True)
```

- **Filling and dropping missing values**

In [21]:
```
df['genres'].fillna('Unknown_genres', inplace=True)
```

In [22]:
```
df['studio'].dropna(inplace=True)
```

In [23]:
```
df['year'].dropna(inplace=True)
```

In [24]:
```
df['start_year'].dropna(inplace=True)
```

In [26]:
```
df.drop(['original_title'], axis=1).head(3)
```

Out[26]:

	title	studio	domestic_gross	foreign_gross	year	tconst	averagerating	numvotes	primary_title	start_year	runtime_minutes	genres
0	Toy Story 3	BV	415000000.0	652000000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	94.65404	Unknown_genres
1	Alice in Wonderland (2010)	BV	334200000.0	691300000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	94.65404	Unknown_genres
2	Harry Potter and the Deathly Hallows Part 1	WB	296000000.0	664300000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	94.65404	Unknown_genres

In [27]:
```
mode_value1=df['year'].mode()[0]
mode_value1
```

Out[27]:
```
2015.0
```

In [28]:
```
df['year'].fillna(mode_value1, inplace=True)
```

In [29]:
```
mode_value=df['start_year'].mode()[0]
mode_value
```

Out[29]:
```
2016.0
```

In [30]:
```
df['start_year'].fillna(mode_value, inplace=True)
```

In [31]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 77243 entries, 0 to 73855
Data columns (total 13 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   title            3387 non-null   object
 1   studio           3382 non-null   object
 2   domestic_gross   77243 non-null  float64
 3   foreign_gross    77243 non-null  float64
 4   year             77243 non-null  float64
 5   tconst           73856 non-null  object
 6   averagerating    77243 non-null  float64
 7   numvotes         77243 non-null  float64
 8   primary_title    73856 non-null  object
 9   original_title   73856 non-null  object
 10  start_year       77243 non-null  float64
 11  runtime_minutes  77243 non-null  float64
 12  genres           77243 non-null  object
dtypes: float64(7), object(6)
memory usage: 8.3+ MB
```

In [32]:
```
df.head(3)
```

Out[32]:

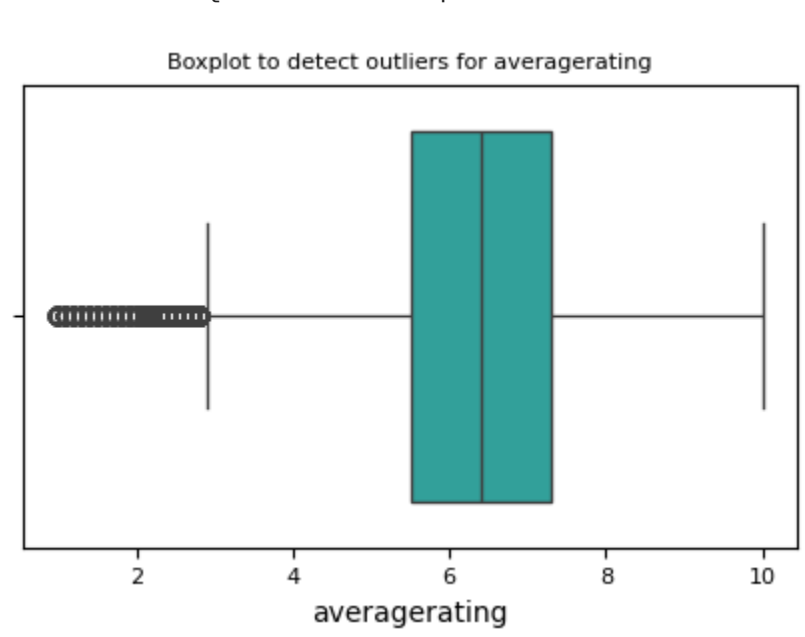
	title	studio	domestic_gross	foreign_gross	year	tconst	averagerating	numvotes	primary_title	original_title	start_year	runtime_minutes	genres
0	Toy Story 3	BV	415000000.0	652000000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	2016.0	94.65404	Unknown_genres
1	Alice in Wonderland (2010)	BV	334200000.0	691300000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	2016.0	94.65404	Unknown_genres
2	Harry Potter and the Deathly Hallows Part 1	WB	296000000.0	664300000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	2016.0	94.65404	Unknown_genres

EXPLORATORY DATA ANALYSIS

- **Checking for outliers**

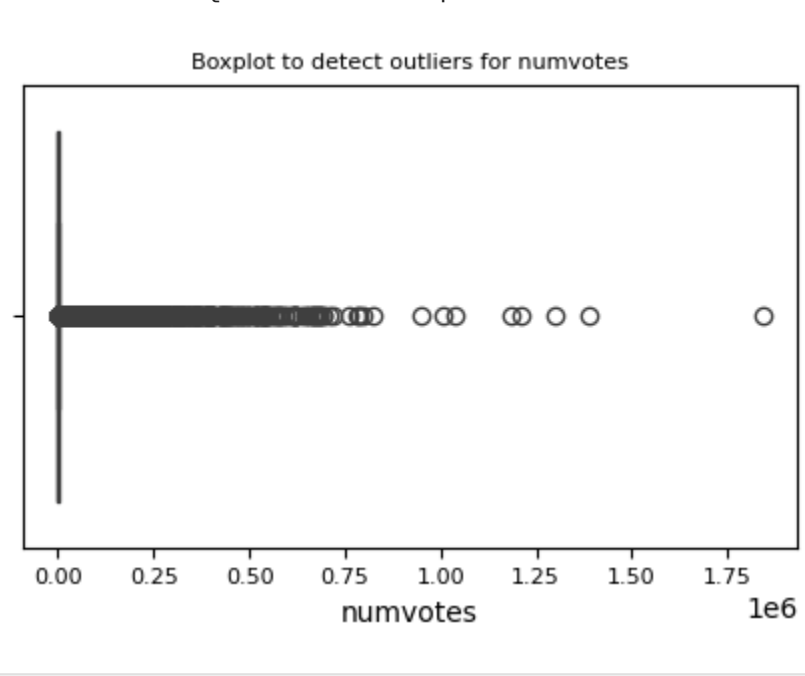
In [97]:
```
#a boxplot to visualize distribution of any outliers in aveararegating
plt.figure(figsize=(5,3))
plt.title('Boxplot to detect outliers for averagerating', fontsize=8)
plt.xticks(fontsize=8)
plt.yticks(fontsize=8)
sns.boxplot(x=df['averagerating'],color='lightseagreen')
```

Out[97]:
```
<Axes: title={'center': 'Boxplot to detect outliers for averagerating'}, xlabel='averagerating'>
```



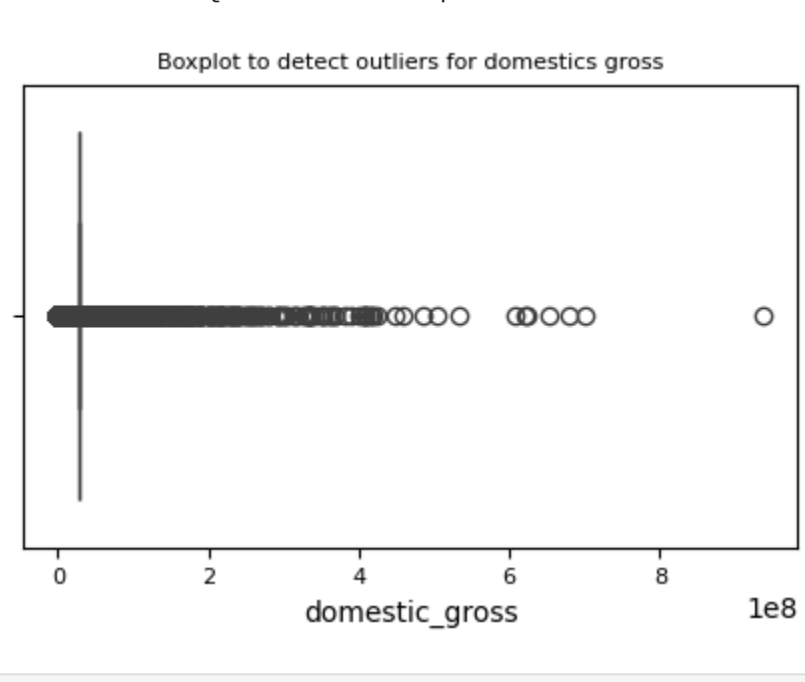
In [98]:
```
#a boxplot to visualize distribution of any outliers in numvotes
plt.figure(figsize=(5,3))
plt.title('Boxplot to detect outliers for numvotes', fontsize=8)
plt.xticks(fontsize=8)
plt.yticks(fontsize=8)
sns.boxplot(x=df['numvotes'])
```

Out[98]:
```
<Axes: title={'center': 'Boxplot to detect outliers for numvotes'}, xlabel='numvotes'>
```



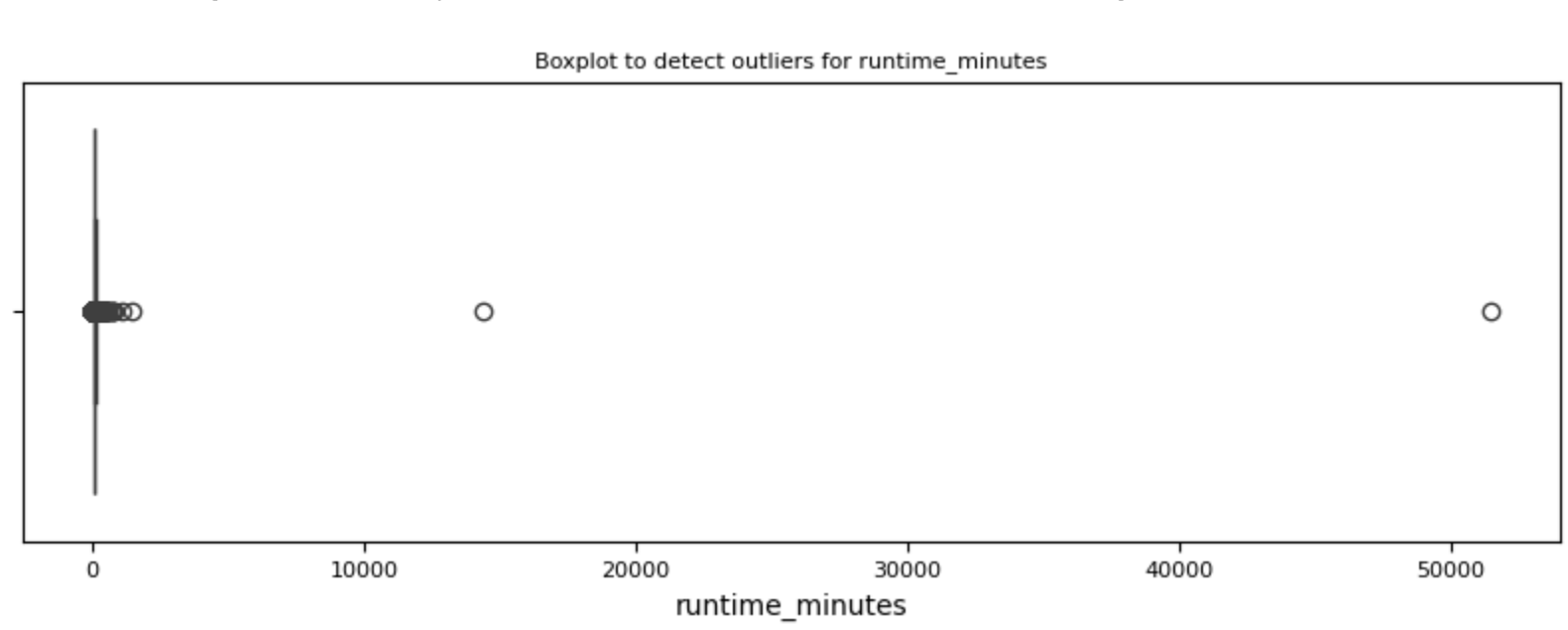
In [99]:
```
#a boxplot to visualize distribution of any outliers in domestics gross
plt.figure(figsize=(5,3))
plt.title('Boxplot to detect outliers for domestics gross', fontsize=8)
plt.xticks(fontsize=8)
plt.yticks(fontsize=8)
sns.boxplot(x=df['domestic_gross'])
```

Out[99]:
```
<Axes: title={'center': 'Boxplot to detect outliers for domestics gross'}, xlabel='domestic_gross'>
```



In [88]:
```
#a boxplot to visualize distribution of any outliers in runtime minutes
plt.figure(figsize=(10,3))
plt.title('Boxplot to detect outliers for runtime_minutes', fontsize=8)
plt.xticks(fontsize=8)
plt.yticks(fontsize=8)
sns.boxplot(x=df['runtime_minutes'])
```

Out[88]:
```
<Axes: title={'center': 'Boxplot to detect outliers for runtime_minutes'}, xlabel='runtime_minutes'>
```



In [34]:
```
df.head(2)
```

Out[34]:

	title	studio	domestic_gross	foreign_gross	year	tconst	averagerating	numvotes	primary_title	original_title	start_year	runtime_minutes	genres
0	Toy Story 3	BV	415000000.0	652000000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	2016.0	94.65404	Unknown_genres
1	Alice in Wonderland (2010)	BV	334200000.0	691300000.0	2010.0	NaN	6.332729	3523.662167	NaN	NaN	2016.0	94.65404	Unknown_genres

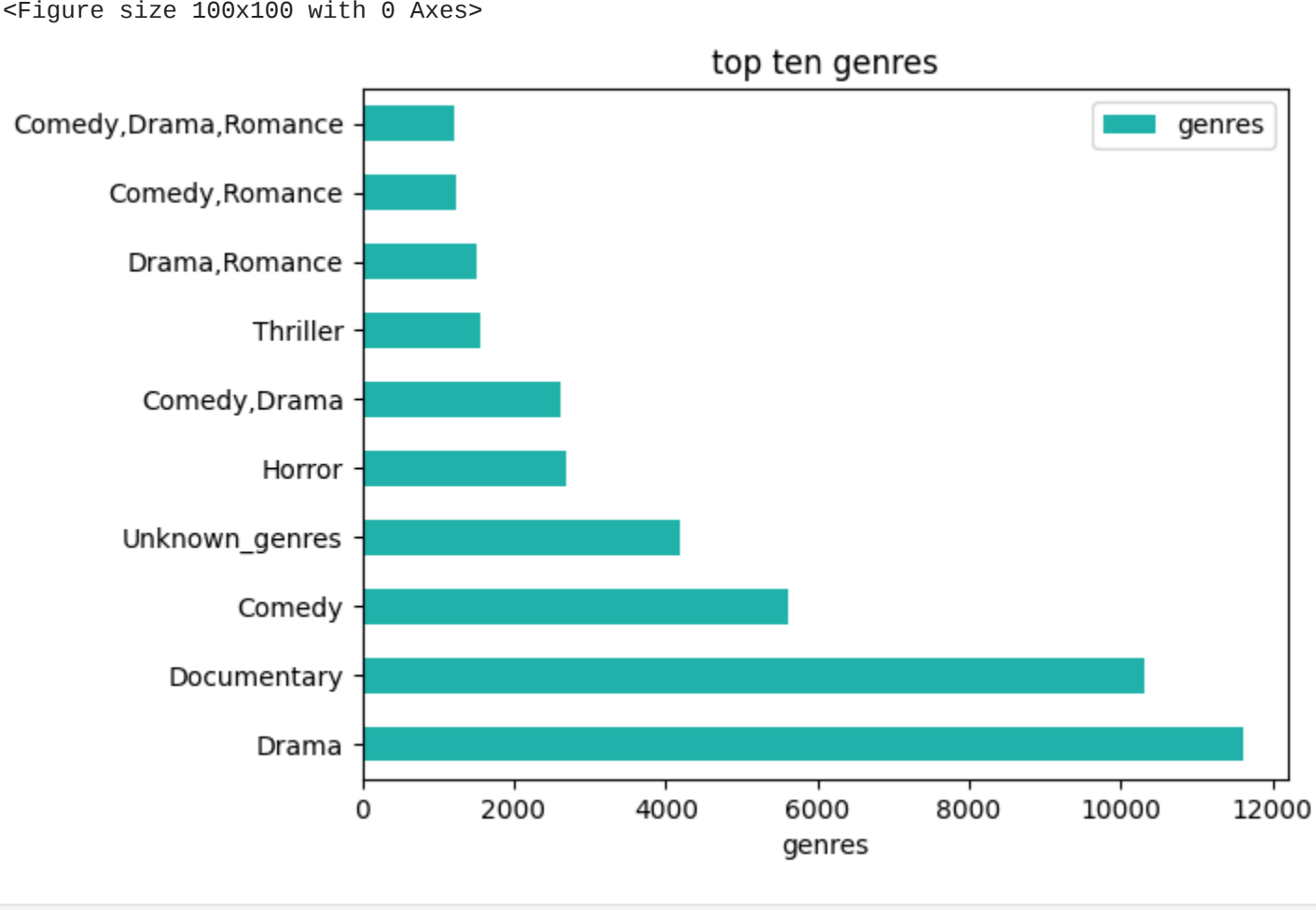
In [35]:
```
#determining top genres
top_10_genres = pd.DataFrame(df['genres'].value_counts().head(10))
top_10_genres
```

Out[35]:

	genres
Drama	11612
Documentary	10313
Comedy	5613
Unknown_genres	4191
Horror	2692
Comedy,Drama	2617
Thriller	1555
Drama,Romance	1510
Comedy,Romance	1236
Comedy,Drama,Romance	1208

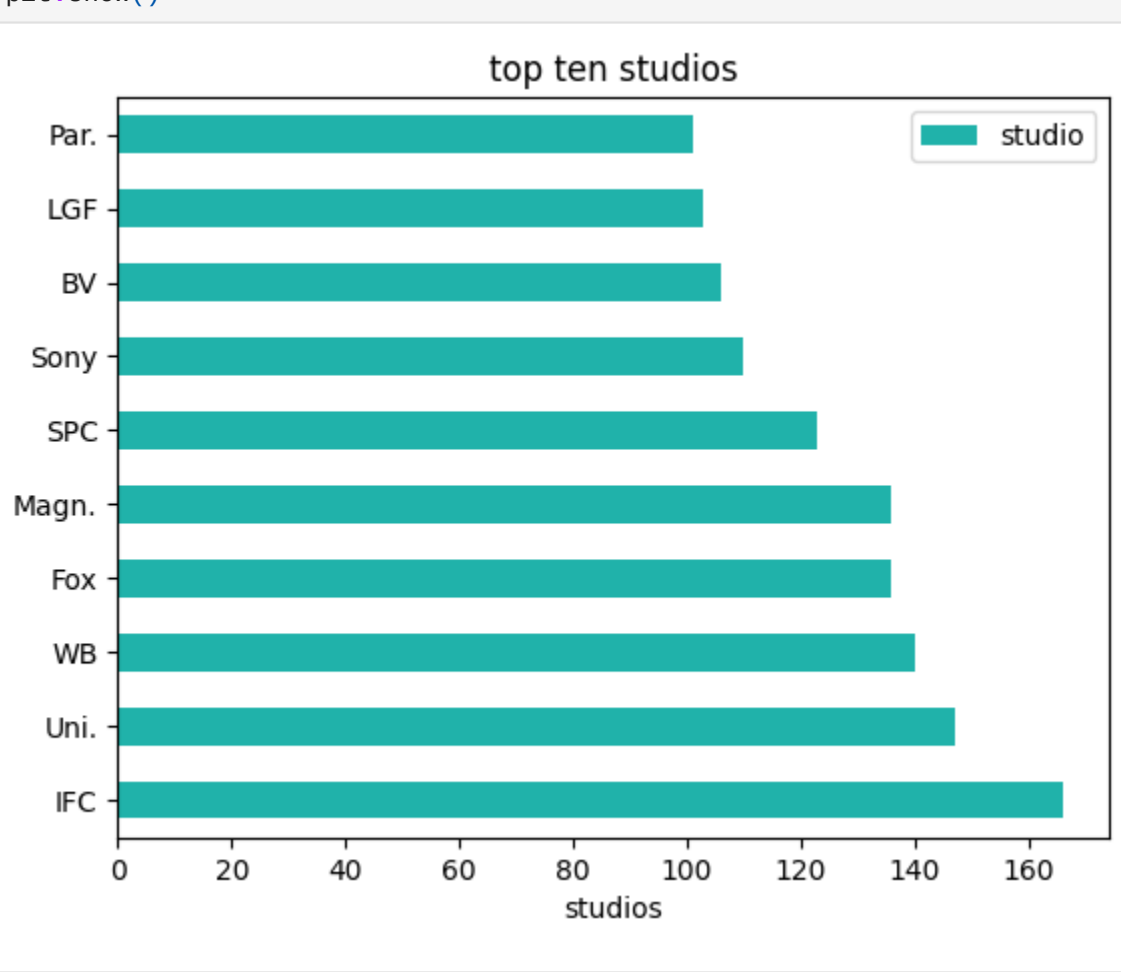
In [93]:
```
#a bar chart to top  genres by movie titles
plt.figure(figsize=(1,1))
top_10_genres.plot(kind='barh', color='lightseagreen')
plt.title('top ten genres')
plt.xlabel("genres")
plt.show()
```

```
<Figure size 100x100 with 0 Axes>
```



In [ ]:
```
#determining top studios
top_10_studios=pd.DataFrame(df['studio'].value_counts().head(10))
top_10_studios
```

In [92]:
```
#bar chart to represent  to ten studios in the industry
top_10_studios.plot(kind='barh', color='lightseagreen')
plt.title('top ten studios')
plt.xlabel("studios")
plt.show()
```



In [40]:
```
#importing budgets dataset to analyze profits
budgets=pd.read_csv('/content/tn.movie_budgets.csv')
budgets.head(2)
```

Out[40]:

	id	release_date	movie	production_budget	domestic_gross	worldwide_gross
0	1	18-Dec-09	Avatar	425000000	760507625	2776345279
1	2	20-May-11	Pirates of the Caribbean: On Stranger Tides	410600000	241063875	1045663875

In [41]:
```
#creating the profits column
budgets['profits']=budgets['worldwide_gross']-budgets['production_budget']
budgets.head(2)
```

Out[41]:

	id	release_date	movie	production_budget	domestic_gross	worldwide_gross	profits
0	1	18-Dec-09	Avatar	425000000	760507625	2776345279	2351345279
1	2	20-May-11	Pirates of the Caribbean: On Stranger Tides	410600000	241063875	1045663875	635063875

In [58]:
```
#renaming movie  column to title
budgets.rename(columns = {'title':'primary_title'}, inplace = True)
```

In [59]:
```
budgets.columns
```

Out[59]:
```
Index(['id', 'release_date', 'primary_title', 'production_budget',
       'domestic_gross', 'worldwide_gross', 'profits'],
      dtype='object')
```

In [60]:
```
df0.columns
```

Out[60]:
```
Index(['tconst', 'averagerating', 'numvotes', 'primary_title',
       'original_title', 'start_year', 'runtime_minutes', 'genres'],
      dtype='object')
```

In [61]:
```
#merging df0 to the new dataset called budgets
df6=pd.merge(df0,budgets, on='primary_title')
```

In [55]:
```
df0
```

Out[55]:

	tconst	averagerating	numvotes	primary_title	original_title	start_year	runtime_minutes	genres
0	tt10356526	8.3	31	Laiye Je Yaarian	Laiye Je Yaarian	2019	117.0	Romance
1	tt10384606	8.9	559	Borderless	Borderless	2019	87.0	Documentary
2	tt1042974	6.4	20	Just Inès	Just Inès	2010	90.0	Drama
3	tt1043726	4.2	50352	The Legend of Hercules	The Legend of Hercules	2014	99.0	Action,Adventure,Fantasy
4	tt1060240	6.5	21	Até Onde?	Até Onde?	2011	73.0	Mystery,Thriller
...	...	...	...	...	...	...	...	...
73851	tt9805820	8.1	25	Caisa	Caisa	2018	84.0	Documentary
73852	tt9844256	7.5	24	Code Geass: Lelouch of the Rebellion - Glorifi...	Code Geass: Lelouch of the Rebellion Episode III	2018	120.0	Action,Animation,Sci-Fi
73853	tt9851050	4.7	14	Sisters	Sisters	2019	NaN	Action,Drama
73854	tt9886934	7.0	5	The Projectionist	The Projectionist	2019	81.0	Documentary
73855	tt9894098	6.3	128	Sathru	Sathru	2019	129.0	Thriller

73856 rows × 8 columns

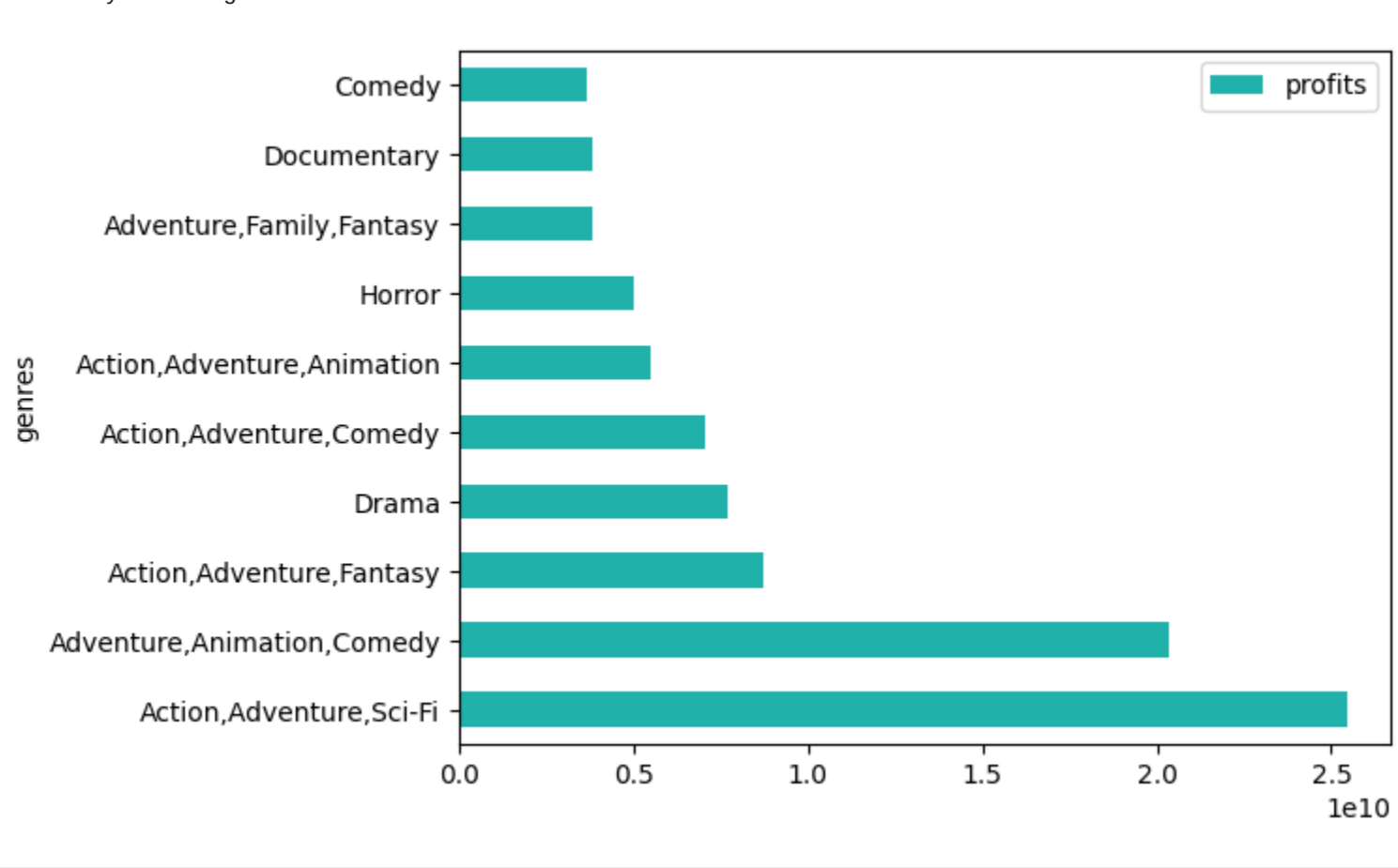
In [62]:
```
#Finding the most profitable genres
profits_by_genre = pd.DataFrame(df6.groupby(['genres'])['profits'].sum())
J=profits_by_genre.sort_values( by ='profits',ascending=False).head(10)
J
```

Out[62]:

genres	profits
Action,Adventure,Sci-Fi	25434152015
Adventure,Animation,Comedy	20347160147
Action,Adventure,Fantasy	8711757789
Drama	7678410452
Action,Adventure,Comedy	7068300318
Action,Adventure,Animation	5478379310
Horror	5010270640
Adventure,Family,Fantasy	3838998673
Documentary	3815704039
Comedy	3635591608

In [81]:
```
#a bar chart to show top of genres by profit
J.plot(kind='barh', color='lightseagreen')
```

Out[81]:
```
<Axes: ylabel='genres'>
```



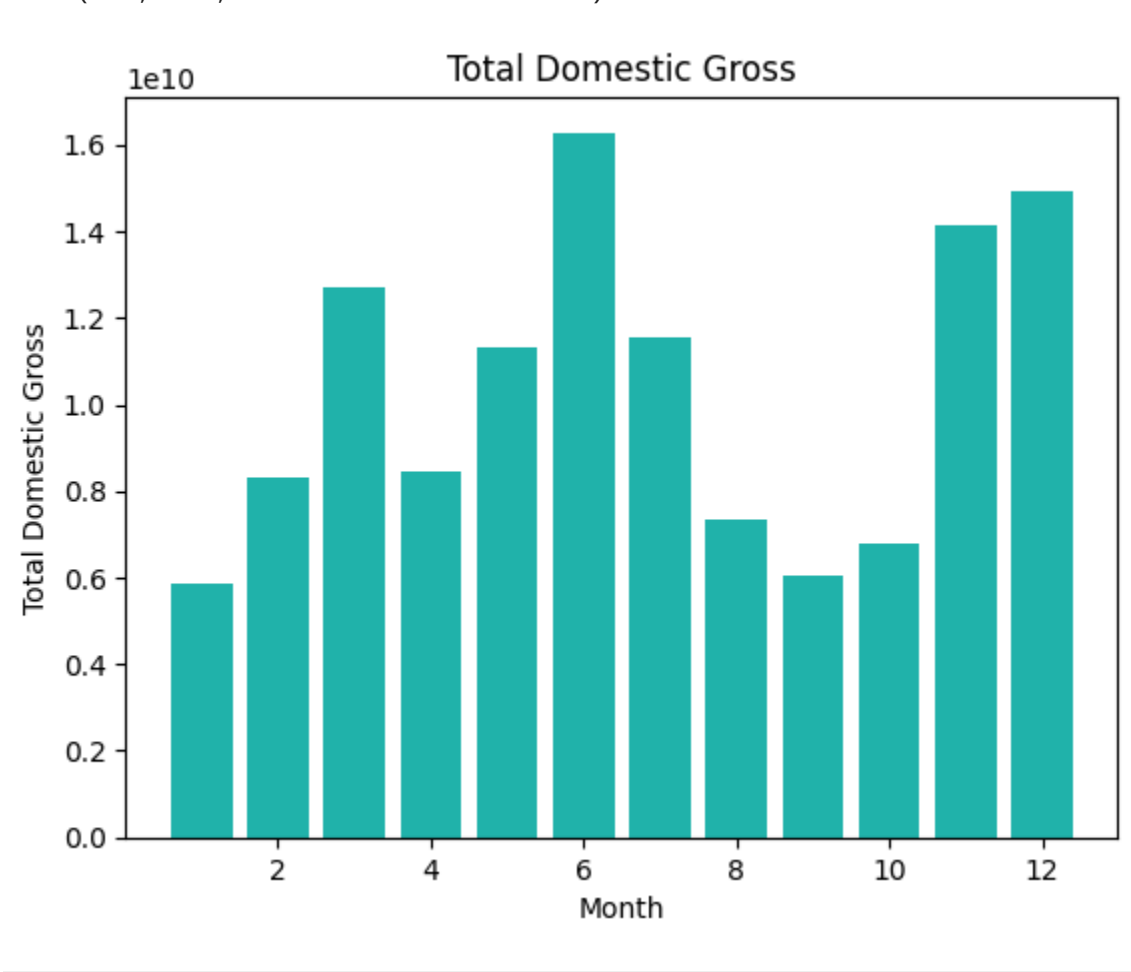
In [64]:
```
df6.columns
```

Out[64]:
```
Index(['tconst', 'averagerating', 'numvotes', 'primary_title',
       'original_title', 'start_year', 'runtime_minutes', 'genres', 'id',
       'release_date', 'production_budget', 'domestic_gross',
       'worldwide_gross', 'profits'],
      dtype='object')
```

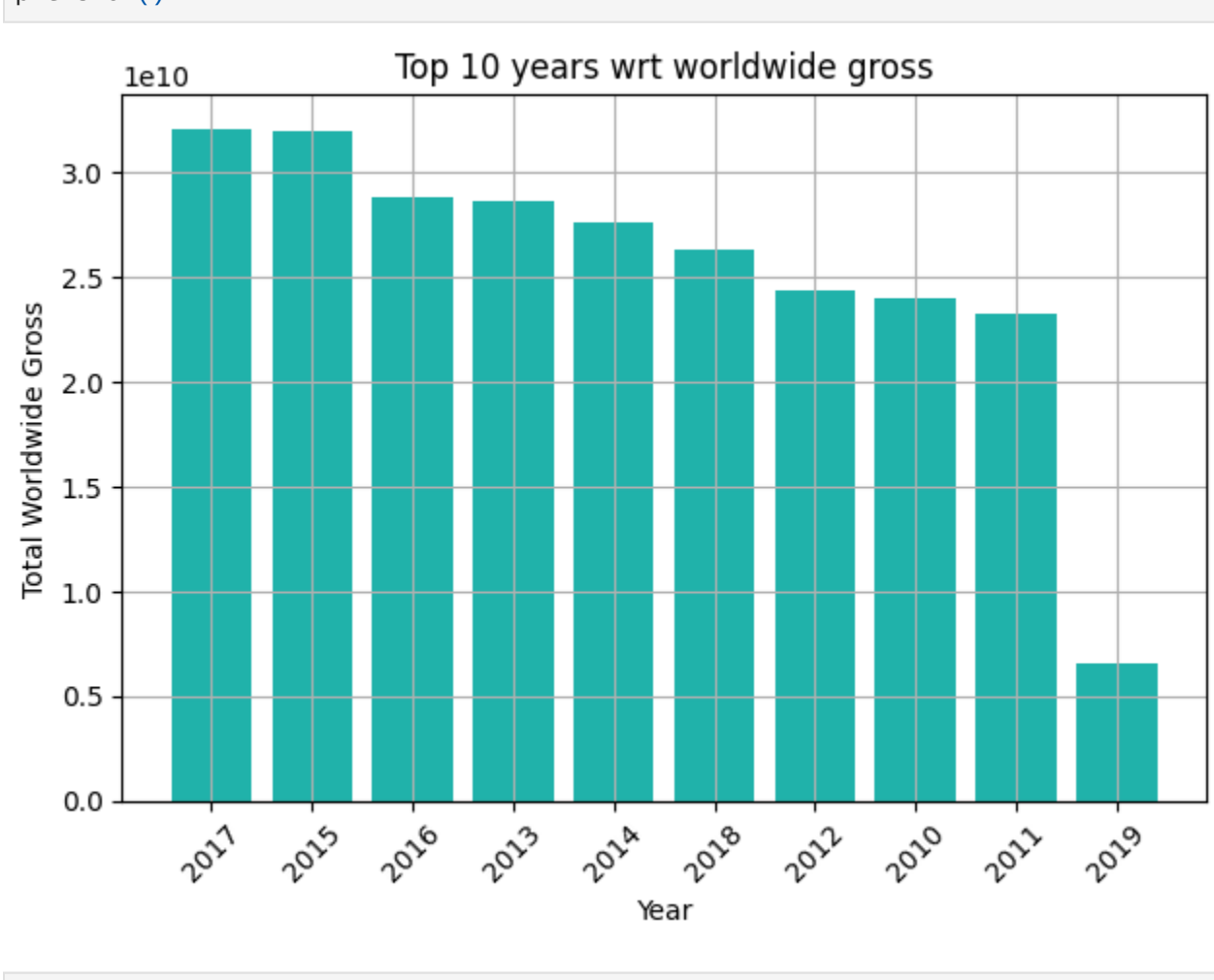
Trend in movie production over the years

In [84]:
```
# Convert release date to datetime format
df6['release_date'] = pd.to_datetime(df6['release_date'])

# Extract month from release date
df6['Release Month'] = df6['release_date'].dt.month

# Group by month and calculate total domestic gross
monthly_domestic_gross = df6.groupby('Release Month')['domestic_gross'].sum()

# Plot bar chart
plt.bar(monthly_domestic_gross.index, monthly_domestic_gross.values, color='lightseagreen')

# Customize plot
plt.xlabel('Month')
plt.ylabel('Total Domestic Gross')
plt.title('Total Domestic Gross')
```

Out[84]:
```
Text(0.5, 1.0, 'Total Domestic Gross')
```

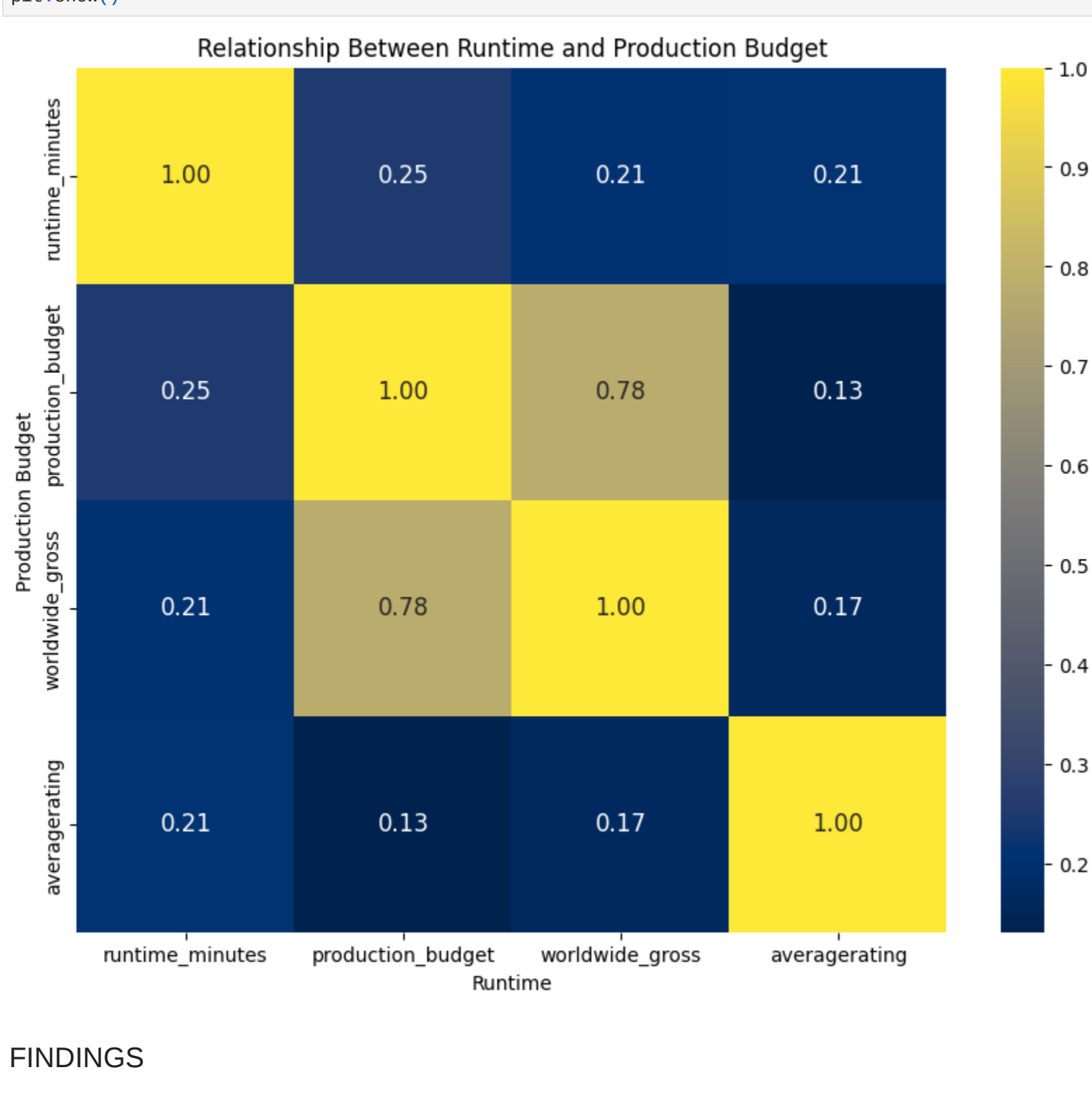


In [85]:
```
# Convert release date to datetime format and extract release year
df6['Release Year'] = pd.to_datetime(df6['release_date']).dt.year

# Group by year and calculate total worldwide gross
yearly_worldwide_gross = df6.groupby('Release Year')['worldwide_gross'].sum()


# Sort years based on total worldwide gross and select top 10 years
top_10_years = yearly_worldwide_gross.sort_values(ascending=False).head(10)

# Plot bar chart
plt.bar(top_10_years.index.astype(str), top_10_years.values, color='lightseagreen')

# Customize plot
plt.xlabel('Year')
plt.ylabel('Total Worldwide Gross')
plt.title('Top 10 years wrt worldwide gross')
plt.xticks(rotation=45)
plt.grid(True)

# Show plot
plt.tight_layout()
plt.show()
```



In [86]:
```
# Convert release date to datetime format and extract release year
df6['Release Year'] = pd.to_datetime(df6['release_date']).dt.year

# Group by year and calculate total worldwide gross
yearly_worldwide_gross = df6.groupby('Release Year')['profits'].sum()
#yearly_worldwide_gross.sort_values(yearly_worldwide_gross, ascending=False)


# Sort years based on total worldwide gross and select top 10 years
top_10_years = yearly_worldwide_gross.sort_values(ascending=False).head(10)

# Plot bar chart
plt.bar(top_10_years.index.astype(str), top_10_years.values, color='lightseagreen')

# Customize plot
plt.xlabel('Year')
plt.ylabel('Total profits')
plt.title('Top 10 years with respect to profits')
plt.xticks(rotation=45)
plt.grid(True)

# Show plot
plt.tight_layout()
plt.show()
```

In [91]:
```
#Plotting a heartmap correlation
plt.figure(figsize=(10, 8))
sns.heatmap(data=df6[['runtime_minutes', 'production_budget','worldwide_gross','averagerating']].corr(), annot=True, cmap='cividis', fmt=".2f", annc
plt.title('Relationship Between Runtime and Production Budget')
plt.xlabel('Runtime')
plt.ylabel('Production Budget')
plt.show()
```



FINDINGS

- **There is a slight relationship between a movie's runtime, averageratings and number of votes to its production budget**
- **Action adventure and SCI-FI were the most profitable in revenue**
- **Drama led in the mos produced genres**

RECCOMENDATIONS

- **To consider venturing in genres like Action adventure ,SCI-FI and Drama**