Final Project Submission

Please fill out:

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- Scheduled project review date/time: 15th October 2023
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- Blog post URL:

Overview

This project involves the analysis of data to fulfill Microsoft's objective of producing a highly successful movie. By conducting a descriptive examination of movies from the past century, we aim to identify recurring patterns that contribute to the formula for a blockbuster film. Microsoft can then leverage this analysis to track trends and understand the key factors behind the success of blockbuster movies.

Business Problem

Microsoft has taken notice of major corporations venturing into the realm of producing unique video content, and they are eager to join the fray. As part of this endeavor, Microsoft has made the strategic decision to establish a brand-new film studio. However, they currently lack expertise in the field of filmmaking. Your role involves conducting research to identify the most successful film genres currently dominating the box office. Subsequently, you will be tasked with transforming this research into practical recommendations that can guide the head of Microsoft's newly established movie studio in making informed decisions about the types of films to produce.

In [1]:

```
# Import library
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

%matplotlib inline
```

In [2]:

```
# You can execute your code here to investigate the data.
title_basic_df = pd.read_csv('./zippedData/imdb.title.basics.csv.gz
movie_budget_df = pd.read_csv('./zippedData/tn.movie_budgets.csv.gz
title_rating_df = pd.read_csv('./zippedData/imdb.title.ratings.csv.
bom_movie_gross_df = pd.read_csv('./zippedData/bom.movie_gross.csv.
```

Data Preparation

Explain and provide details of the procedure taken to get the data ready for analysis.

Questions:

1. How did you resolve missing values or outliers?
2. Did you eliminate or introduce any variables?
3. Why do these selections align with the data and the business issue at hand?

In [3]:

```
# Run this code to clean the data
rating_basic_df = pd.merge(title_basic_df, title_rating_df,on = ['t
```

In [4]:
```
# Run this code to identify how many datas are missing on rating_ba
rating_basic_df.isna().sum()
```

Out[4]:
```
tconst                0
primary_title         0
original_title        0
start_year            0
runtime_minutes    7620
genres              804
averagerating         0
numvotes              0
dtype: int64
```

In [5]:
```
# I will create a new DataFrame variable to display the outcome.
rating_basic_filled_df = rating_basic_df
```

In [6]:
```
# I need to convert the data type to a float so that I can perform
rating_basic_filled_df['runtime_minutes'] = pd.to_numeric(rating_ba
```

In [7]:
```
Now that the data is in a format I can work with, I will replace the
ting_basic_filled_df['runtime_minutes'] = rating_basic_df['runtime_r
```

In [8]:
```
# I am renaming the 'primary_title' column in the `rating_basic_fil
rating_basic_filled_df.rename(columns = {'primary_title':'title'},
```

Data Merging

In [9]:
```
# We can begin by merging the bom_movie_gross_df and movie_budget_d
movie_budget_df.rename(columns = {'movie':'title'}, inplace = True)
movie_gross_budget_df = pd.merge(bom_movie_gross_df, movie_budget_d
merged_df = pd.merge(movie_gross_budget_df, rating_basic_filled_df,
```

In [10]:
```
# I want to remove any duplicates that share the same title and rel
merged_df = merged_df.drop_duplicates(subset= ['title', 'release_da
```

In [11]:

```
# This error appeared as an issue that requires resolution before w
merged_df[merged_df['foreign_gross'] == '1,019.4']
merged_df[merged_df['foreign_gross'] == '1,163.0']
merged_df[merged_df['foreign_gross'] == '1,010.0']
merged_df[merged_df['foreign_gross'] == '1,369.5']
```

Out[11]:

	title	studio	domestic_gross_x	foreign_gross	year	id	release_date	productio
1302	Avengers: Infinity War	BV	678800000.0	1,369.5	2018	7	Apr 27, 2018	$30

In [12]:

```

# Now we need to address and resolve the error
merged_df['foreign_gross'][824] = '1017600000'
merged_df['foreign_gross'][825] = '1163000000'
merged_df['foreign_gross'][1170] = '1010000000'
merged_df['foreign_gross'][1302] = '1369500000'
```

```
/var/folders/zr/m5b0ldvs7695p_h8w70ndwc40000gn/T/ipykernel_26664/3
024590889.py:3: 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/pa
ndas-docs/stable/user_guide/indexing.html#returning-a-view-versus-
a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/in
dexing.html#returning-a-view-versus-a-copy)
  merged_df['foreign_gross'][825] = '1163000000'
/var/folders/zr/m5b0ldvs7695p_h8w70ndwc40000gn/T/ipykernel_26664/3
024590889.py:4: 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/pa
ndas-docs/stable/user_guide/indexing.html#returning-a-view-versus-
a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/in
dexing.html#returning-a-view-versus-a-copy)
  merged_df['foreign_gross'][1170] = '1010000000'
/var/folders/zr/m5b0ldvs7695p_h8w70ndwc40000gn/T/ipykernel_26664/3
024590889.py:5: 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/pa
ndas-docs/stable/user_guide/indexing.html#returning-a-view-versus-
a-copy (https://pandas.pydata.org/pandas-docs/stable/user_guide/in
dexing.html#returning-a-view-versus-a-copy)
  merged_df['foreign_gross'][1302] = '1369500000'
```

In [13]:

```
# Now, it's possible to modify the data type of the 'foreign_gross'
merged_df['foreign_gross'] = pd.to_numeric(merged_df['foreign_gross
```

In [14]:

```
# As certain foreign gross data was absent, I filled it using the me
merged_df['foreign_gross'] = merged_df['foreign_gross'].fillna(value
```

Data Cleaning

In [15]:

```
# I would like to eliminate the comma with the genre
def split_comma(x):
    return x.split(",")
```

In [16]:

```
# I need to determine whether there is any missing data in the genr
merged_df['genres'].isna().sum()
```

Out[16]:

```
1
```

In [17]:

```
# I have identified 1 missing data where we can choose between drop
# In this scenario, I have filled it with "missing" since it should
merged_df['genres'] = merged_df['genres'].fillna (value = 'missing'
```

In [18]:

```
# In here, I am using the map method to remove the comma
merged_df['genres'] = merged_df ['genres'].map(split_comma)
```

In [19]:

```
# I am defining another function to remove the dollar sign and comm
def remove_dollar_comma(x):
    x = x.replace("," , "")
    return x.replace("$", "")
```

In [20]:

```
# Using the new function that was created, we can now proceed with
merged_df['production_budget'] = merged_df['production_budget'].map
```

In [21]:

```
# We can now change the type of column production_budget to int
merged_df['production_budget'] = pd.to_numeric(merged_df['productio
```

Feature Engineering

In [22]:
```
# I intend to remove the existing 'worldwide_gross' column
# then create a new one to be accurate especially in cases where th
# This will produce consistent data
merged_df.drop("worldwide_gross", axis = 1)
```

	title	studio	domestic_gross_x	foreign_gross	year	id	release_date	production_budget	dom
0	Toy Story 3	BV	415000000.0	652000000.0	2010	47	Jun 18, 2010	200000000	
1	Inception	WB	292600000.0	535700000.0	2010	38	Jul 16, 2010	160000000	
2	Shrek Forever After	P/DW	238700000.0	513900000.0	2010	27	May 21, 2010	165000000	
3	The Twilight Saga: Eclipse	Sum.	300500000.0	398000000.0	2010	53	Jun 30, 2010	68000000	
4	Iron Man 2	Par.	312400000.0	311500000.0	2010	15	May 7, 2010	170000000	

In [23]:
```
# I want to calculate the global earnings and place them in a new c
# This represents the total of both 'domestic_gross' and 'foreign_g
merged_df['worldwide_gross'] = merged_df['domestic_gross_x'] + merg
```

In [24]:
```
# I want to create a new column that is called 'blockbuster' that w
# A straightforward criterion for this would be if the overall budg
# contains all expenses from production to marketing, qualifies the
merged_df['blockbuster'] = (merged_df['worldwide_gross']) >= (2 * m
```

In [25]:
```
# I want to refine the selection to include only the movies classif
# then arrange them based on their global earnings
blockbusters_df = merged_df[merged_df['blockbuster'] == True]
blockbusters_sort_df = blockbusters_df.sort_values(['worldwide_gros
```

In [26]:
```
# I want to isolate studio and calculate the 'worldwide_gross'
top_studios = blockbusters_sort_df.groupby('studio')['worldwide_gro
```

In [27]:
```
studio_totals_df = top_studios.reset_index()
```

In [28]:
```
# I want to sort out the value of 'worldwide_gross'
studio_name = studio_totals_df.sort_values(['worldwide_gross'], asc
```

In [29]:
```
studio_name.tail(10)
```

Out[29]:

	studio	worldwide_gross
70	Wein.	2.605300e+09
44	P/DW	4.967600e+09
32	LGF	6.136418e+09
68	WB (NL)	8.110400e+09
47	Par.	1.220320e+10
58	Sony	1.588030e+10
67	WB	1.824430e+10
22	Fox	2.392370e+10
64	Uni.	2.520552e+10
9	BV	3.027660e+10

In [30]:
```
replacements = {'Wein.': 'Weinstein', 'P/DW': '20th Century', 'LGF'
                'WB (NL)': 'Warner Bros (NL)', 'Par.': 'Paramount',
                'WB': 'WB', 'Fox': 'Fox', 'Uni.': 'Universal', 'BV'

for key, value in replacements.items():
    studio_name['studio'] = studio_name['studio'].replace(key, valu
```

In [31]:
```
# I want to split the genres using explode method
top_genres = blockbusters_sort_df.explode('genres')
```

In [32]:
```
# I want to isolate genre and calculate the 'worldwide_gross'
genre_totals = top_genres.groupby('genres')['worldwide_gross'].sum(
```

In [33]:
```
genre_totals_df = genre_totals.reset_index()
```

In [34]:
```
# I want to sort the DataFrame in descending order by 'worldwide_gr
genre_totals_df_sorted = genre_totals_df.sort_values(by='worldwide_
```

In [35]:
```
# I want to refine the selection to include only the genres as bloc
# then arrange them based on their global earnings
genre_totals_df_sorted = genre_totals_df_sorted.sort_values(by='wor
```

In [36]:
```

kbuster', 'averagerating','genres', 'domestic_gross_y','tconst','ori

```

Data Modelling

Explain and provide a rationale for the procedure employed in analyzing or constructing data models.

Questions:

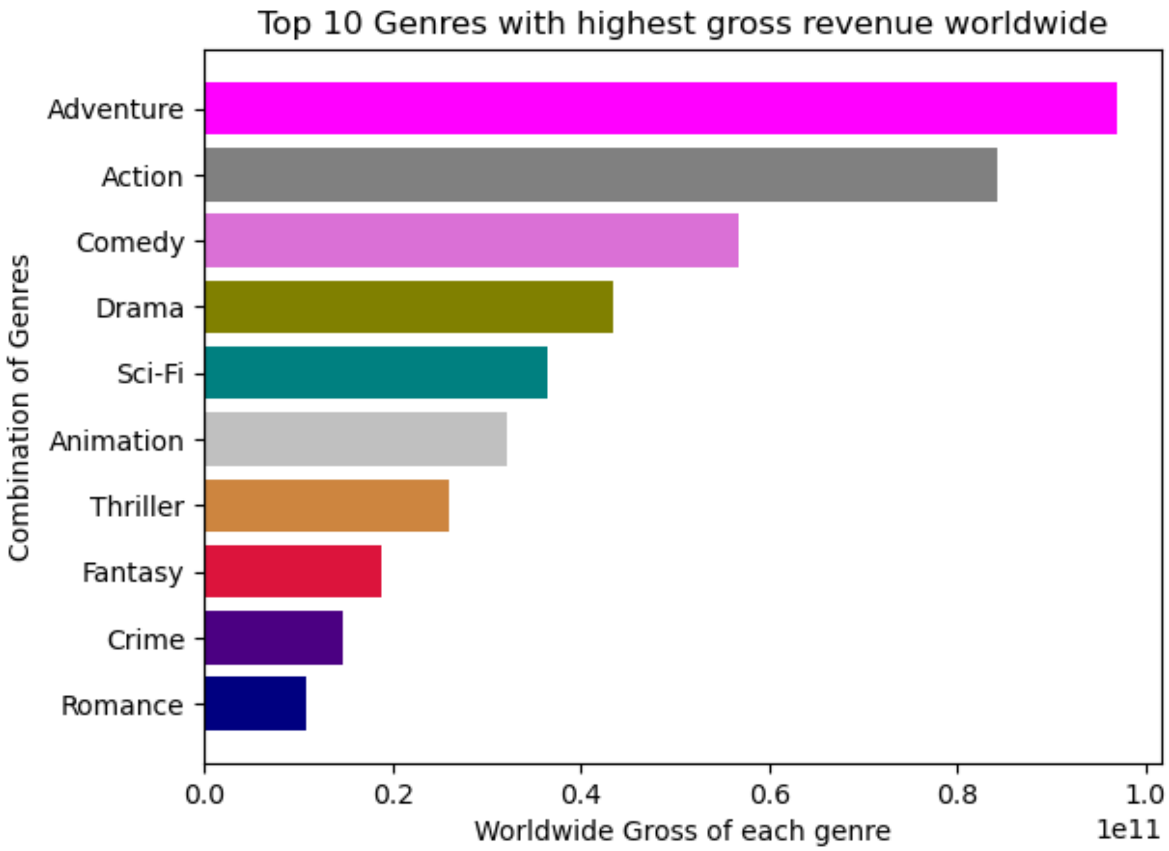
1. What methods were employed for data analysis or modeling?
2. How was the initial approach refined through iterations to enhance its effectiveness?
3. How can these choices be justified in light of the data and the business problem at hand?

In [37]:

```
# Run the code to model the data
colors = ['navy', 'indigo', 'crimson', 'peru', 'silver', 'teal', 'o
```

In [38]:

```
# I selected the top 10 genres to establish a foundational understa
# with the potential to earn the most revenue.
fig, ax = plt.subplots()
ax.barh(genre_totals_df_sorted['genres'].head(10), genre_totals_df_
ax.set_xlabel('Worldwide Gross of each genre')
ax.set_ylabel('Combination of Genres')
ax.set_title('Top 10 Genres with highest gross revenue worldwide')
plt.savefig(".\\image\\genres_bar.png", dpi=150, bbox_inches='tight
```

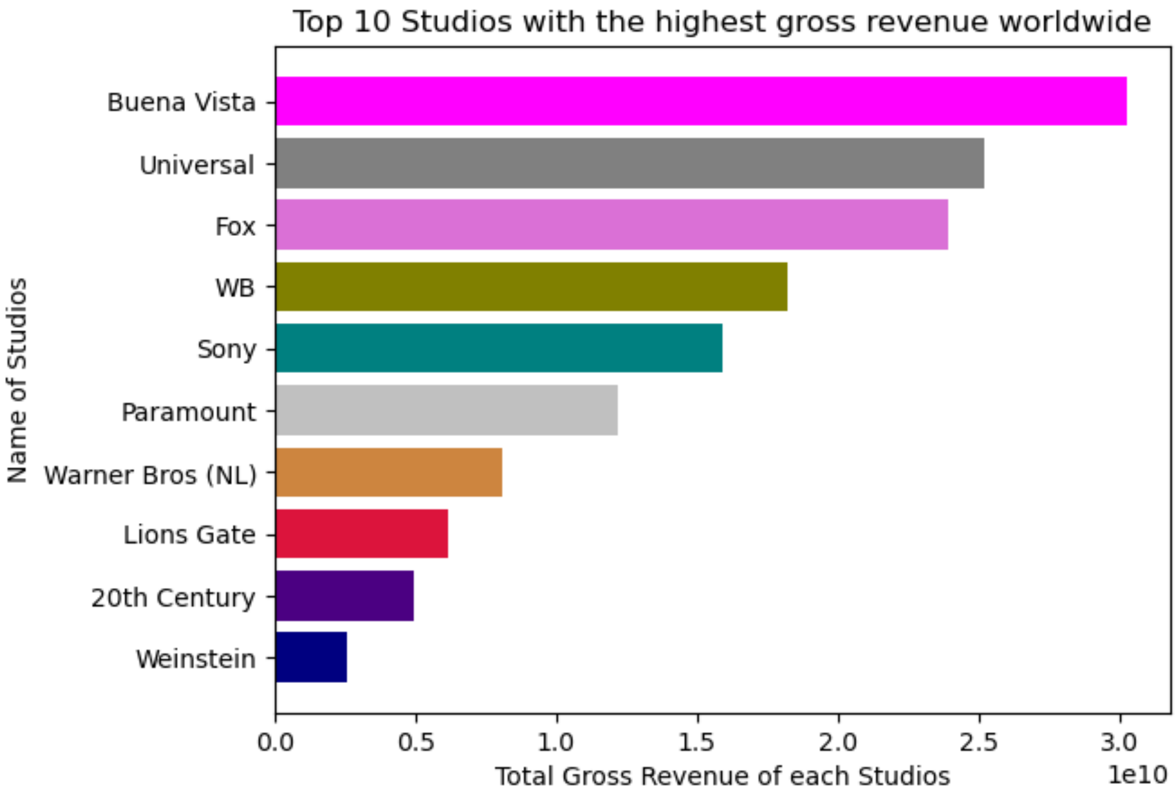


In [39]:
```
# I chose the top 10 Studios to determine which of them had produce
# which could lead to potential collaborations in creating new, ori
fig, ax = plt.subplots()

ax.barh(studio_name['studio'].tail(10), studio_name['worldwide_gros
ax.set_xlabel('Total Gross Revenue of each Studios')
ax.set_ylabel('Name of Studios')
ax.set_title('Top 10 Studios with the highest gross revenue worldwi

plt.savefig(".\image\studio_bar.png", dpi = 150, bbox_inches = 'tig

plt.show()
```



In [40]:

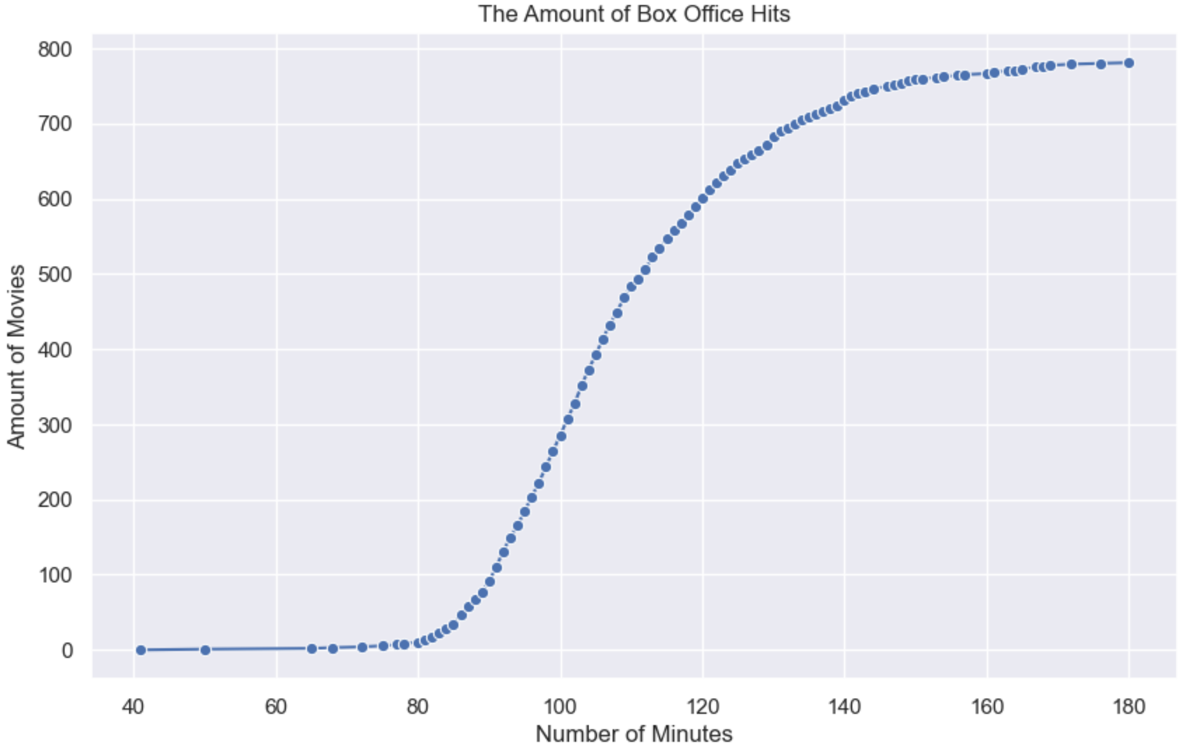
```
# Here is a breakdown of the number of movies and their typical run
# which could influence viewers' decisions to watch these films
sns.set(style="darkgrid")

plt.figure(figsize=(10, 6))  # Adjust the figure size if needed
sns.lineplot(x=sorted(blockbusters_df['runtime_minutes']), y=range(

plt.xlabel('Number of Minutes')
plt.ylabel('Amount of Movies')
plt.title('The Amount of Box Office Hits')


plt.savefig("numberminutes_line_seaborn.png", dpi=500, bbox_inches=

plt.show()
```



In [41]:

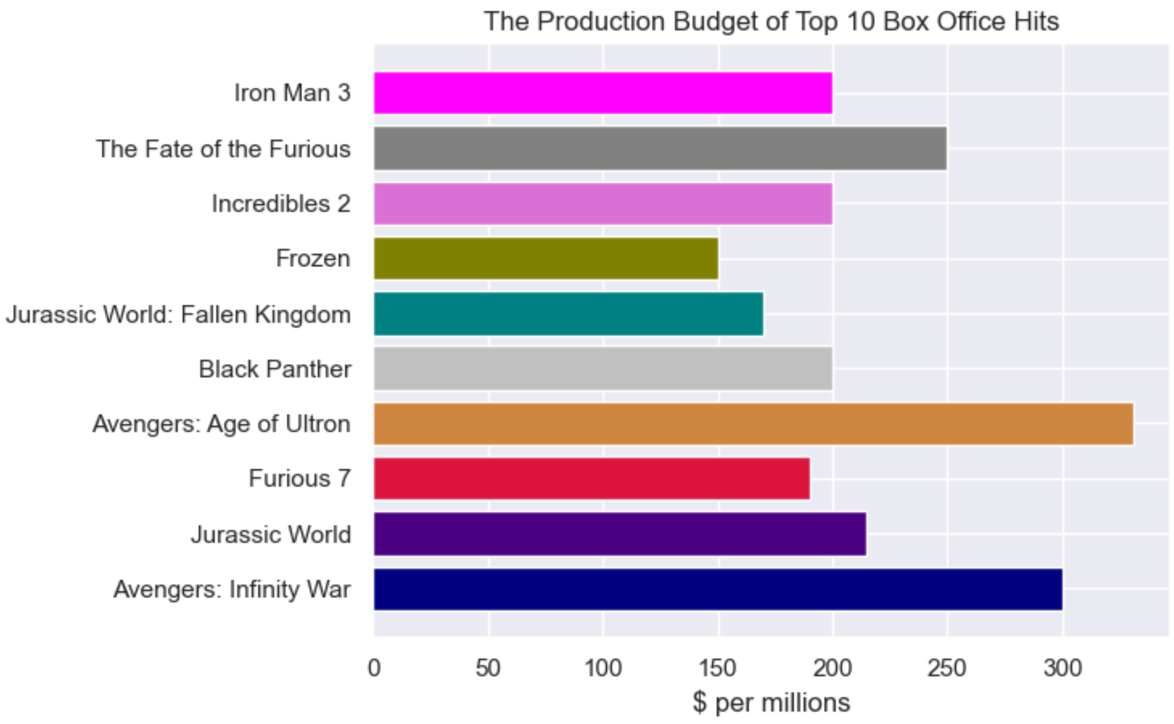
```
# Here is the chart displaying the production budget of the top 10

fig, ax = plt.subplots()

ax.barh(top_10_num['title'] ,list(top_10_num['production_budget']/1
ax.set_xlabel('$ per millions')
ax.set_title('The Production Budget of Top 10 Box Office Hits')

plt.savefig(".\image\production_budget_bar.png", dpi = 150, bbox_in

plt.show()
```



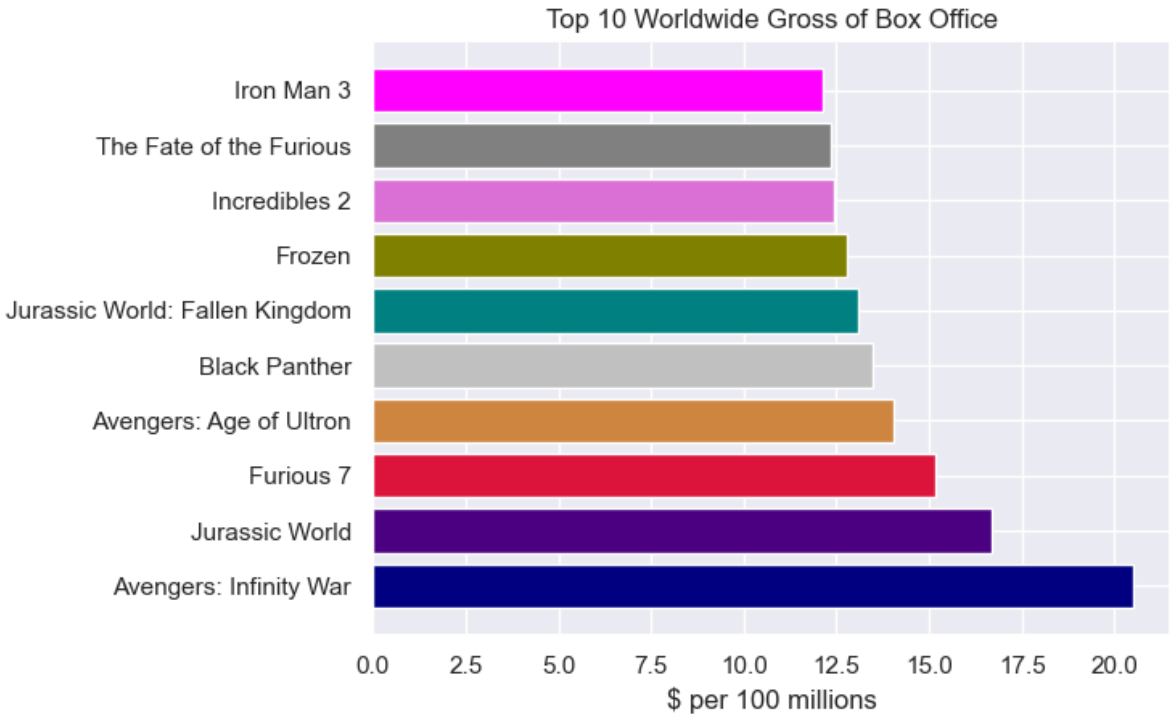
In [42]:

```
# Here is a chart that illustrates which titles generated the highe
fig, ax = plt.subplots()

ax.barh(top_10_num['title'] ,list(top_10_num['worldwide_gross']/100
ax.set_xlabel('$ per 100 millions')
ax.set_title('Top 10 Worldwide Gross of Box Office')

plt.savefig(".\image\worldwide_gross_bar.png", dpi = 150, bbox_inch

plt.show()
```



Evaluation

Assess the effectiveness of your work in addressing the specified business problem.

Questions

1. How do you analyze the outcomes?
2. How effectively does your model align with the data?
3. To what extent does it outperform the baseline model?
4. How assured are you of the model's ability to generalize beyond the available data?
5. How convinced are you that implementing this model would be advantageous for the business?

Based on the provided data, we have valuable information to work with. We have insights into successful genres, optimal runtime, and an estimated production budget, which can help us approach the goal of achieving a position among the top 10 highest-grossing movies worldwide. I am confident that this data can serve as a helpful guide for creating a potential blockbuster hit.

Conclusion

Share your final remarks on the project, encompassing findings, constraints, and potential future actions.

1. What actions would you suggest the company take based on the outcomes of this project?
2. What are some factors that could limit the comprehensiveness of your analysis in addressing the business challenge?
3. What potential enhancements or strategies could be considered for future iterations of this project?

Based on this analysis, we propose three recommendations for Microsoft's movie studio's inaugural blockbuster film:

- Develop a movie that combines the genres of adventure, animation, and comedy, specifically a superhero-theme. These genres consistently perform well at the box office, with five of the top ten worldwide gross earners falling into the superhero category.
- Consider forming strategic partnerships with established studios like Universal Pictures. Buena Vista or 20th Century Fox, renowned for their extensive experience in film production and their track record of producing successful blockbusters.
- Aim for a movie duration within the 140 minute range and allocate a production budget in the range of 150 million to 300 million, which represents a reasonable maximum benchmark for investment.

Progression plan

Future considerations involve the acquisition of additional data to assess the impact of influential directors, actors, and other crew members on the potential for blockbuster success.

Furthermore, we should explore predictive models for production delays that may impact the budget.

In addition, it's essential to maintain a proactive approach towards industry trends, ensuring timely adoption to capitalize on emerging concepts before their novelty diminishes. Given the time required for movie production, sustained relevance is critical for maximizing profits.