In [115…

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from collections import Counter

# pandas - used for data manipulation
# matplotlib - used for graphs and charts
# seaborn - used for graphs that more interactive
```

1. Data Import

In [116…

```
df = pd.read_csv("imdb_movies.csv")
df.head()
```

Out[116…

	names	date_x	score	genre	overviev
0	Creed III	03/02/2023	73.0	Drama, Action	Afte dominating the boxing world Adoni Cree.
1	Avatar: The Way of Water	12/15/2022	78.0	Science Fiction, Adventure, Action	Set more than a decade afte the events o the.
2	The Super Mario Bros. Movie	04/05/2023	76.0	Animation, Adventure, Family, Fantasy, Comedy	Whil working undergrounc to fix a wate main,.
3	Mummies	01/05/2023	70.0	Animation, Comedy, Family, Adventure, Fantasy	Through a series o unfortunate events, three .
4	Supercell	03/17/2023	61.0	Action	Good heartec teenage Willian always livec in .

2. Data Overveiw and Basic Explanation

In [117…

```
df.shape
```

Out[117…

```
(10178, 12)
```

In [118…

```
df.columns

# The dataset has 10178 rows
# The dataset has 12 columns
```

Out[118…

```
Index(['names', 'date_x', 'score', 'genre', 'overview', 'crew', 'orig_title',
       'status', 'orig_lang', 'budget_x', 'revenue', 'country'],
      dtype='object')
```

Use .info() to understand the data types and missing values. What potential issues can you spot?

In [119…

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10178 entries, 0 to 10177
Data columns (total 12 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   names       10178 non-null  object 
 1   date_x      10178 non-null  object 
 2   score       10178 non-null  float64
 3   genre       10093 non-null  object 
 4   overview    10178 non-null  object 
 5   crew        10122 non-null  object 
 6   orig_title  10178 non-null  object 
 7   status      10178 non-null  object 
 8   orig_lang   10178 non-null  object 
 9   budget_x    10178 non-null  float64
 10  revenue     10178 non-null  float64
 11  country     10178 non-null  object 
dtypes: float64(3), object(9)
memory usage: 954.3+ KB
```

In [120…

```
# The date_x col is in object which needs to be converted to datetime
```

Describe the main characteristics of each column using .describe(). What can you infer from the mean, median, and distribution of numerical columns ?

In [121…

```
df.describe()
```

Out[121…

	score	budget_x	revenue
count	10178.000000	1.017800e+04	1.017800e+04
mean	63.497052	6.488238e+07	2.531401e+08
std	13.537012	5.707565e+07	2.777880e+08
min	0.000000	1.000000e+00	0.000000e+00
25%	59.000000	1.500000e+07	2.858898e+07
50%	65.000000	5.000000e+07	1.529349e+08
75%	71.000000	1.050000e+08	4.178021e+08
max	100.000000	4.600000e+08	2.923706e+09

3. Data Cleaning

Handling Missing Values

Which columns contain missing values? How would you handle them ?

In [122…

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10178 entries, 0 to 10177
Data columns (total 12 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   names       10178 non-null  object 
 1   date_x      10178 non-null  object 
 2   score       10178 non-null  float64
 3   genre       10093 non-null  object 
 4   overview    10178 non-null  object 
 5   crew        10122 non-null  object 
 6   orig_title  10178 non-null  object 
 7   status      10178 non-null  object 
 8   orig_lang   10178 non-null  object 
 9   budget_x    10178 non-null  float64
 10  revenue     10178 non-null  float64
 11  country     10178 non-null  object 
dtypes: float64(3), object(9)
memory usage: 954.3+ KB
```

Are there any columns where data types need conversion (e.g., date, ratings)? Explain your decision.

In [123…

```
# Converting date_x to datetime format

df["date_x"] = pd.to_datetime(df["date_x"])
```

In [124…

```
date_sort = df["date_x"].sort_values(ascending = False)
date_sort
```

Out[124…

```
1317   2023-12-31
7852   2023-10-06
9224   2023-09-29
3583   2023-09-22
801    2023-09-08
          ...
7715   1920-02-27
9525   1915-02-08
9526   1915-02-08
7428   1907-06-20
558    1903-05-15
Name: date_x, Length: 10178, dtype: datetime64[ns]
```

In [125…

```
df.isnull().sum()
```

Out[125…

```
names          0
date_x         0
score          0
genre         85
overview       0
crew          56
orig_title     0
status         0
orig_lang      0
budget_x       0
revenue        0
country        0
dtype: int64
```

In [126…

```
missing_rows = df[df.isnull().any(axis = 1)]
missing_rows
```

Out[126…

	names	date_x	score	genre	overview	crew	orig_t
148	Orgasm Inc: The Story of OneTaste	2022-11-05	64.0	Documentary	A sexual wellness company gains fame and follo...	NaN	Orga Inc: Stor OneTa
206	Legend of the Galactic Heroes: Die Neue These ...	2022-09-30	61.0	Animation	The story focuses on the exploits of rivals Re...	NaN	銀河英 伝説 N These 話
305	Housewife Sex Slaves: Hatano Yui	2015-01-09	0.0	NaN	We don't have an overview translated in Englis...	Yui Hatano,	人妻性 隷 波多 結
649	Cuento de Primavera-A Spring Tale	2022-12-20	81.0	Drama, Fantasy, Mystery	We don't have an overview translated in Englis...	NaN	Cuento Primave A Spr
938	Cat Pack: A PAW Patrol Exclusive Event	2022-06-24	74.0	Animation, Family	When Mayor Humdinger transforms his robot cat ...	NaN	Cat P A F Pa Exclu Ev
...	...	...	...	...	...	...	
9750	Alice Under the Table	2015-10-15	61.0	Fantasy	We don't have an overview translated in Englis...	NaN	A Under Ta
10011	Perfumed Garden	2000-06-03	53.0	NaN	Imagine a world of pleasure, where passion is ...	Ivan Baccarat, Michael, Amy Lindsay, Lisa, Raj...	Perfur Gar
10025	The Girl and the Wooden Horse Torture	1982-12-03	50.0	NaN	Nami is a masochistic high school student who ...	Serina Nishikawa, Nami Tsuchiya, Waka Oda, , A...	団自 少女 責
10076	The Shoga (Glass and Gas) Company	1990-09-07	37.0	NaN	"I have not been very active as a social filmm...	NaN	Sherka Shisheh

	names	date_x	score	genre	overview	crew	orig_t
10079	Save The Tree	2021-10-22	44.0	Animation	In the forests of the Pyrenees, there are stil...	NaN	Salva ár

126 rows × 12 columns

In [127…

```
# There are 126 rows of missing values, which is 1.24 % of the total rows removi
# hence i have decided to remove these many rows

missing_values = round(((126/10178) * 100),2)
missing_values
```

Out[127…

```
1.24
```

In [128…

```
10178 - 126
```

Out[128…

```
10052
```

In [129…

```
df = df.dropna()
df
```

Out[129…

	names	date_x	score	genre	overvi
0	Creed III	2023-03-02	73.0	Drama, Action	Af dominati the boxi wo Ado Cre
1	Avatar: The Way of Water	2022-12-15	78.0	Science Fiction, Adventure, Action	Set m tha decade af the events th
2	The Super Mario Bros. Movie	2023-04-05	76.0	Animation, Adventure, Family, Fantasy, Comedy	Wh worki undergrou to fix a wa mai
3	Mummies	2023-01-05	70.0	Animation, Comedy, Family, Adventure, Fantasy	Throug series unfortun events, th
4	Supercell	2023-03-17	61.0	Action	Goo heart teena Willi always liv i
...	...	...	...	...	
10173	20th Century Women	2016-12-28	73.0	Drama	In 19 Sa Barba Califor Dorothea
10174	Delta Force 2: The Colombian Connection	1990-08-24	54.0	Action	When D agents tak captive b ruthle
10175	The Russia House	1990-12-21	61.0	Drama, Thriller, Romance	Barley Sc Blai Lisbo based edi of
10176	Darkman II: The Return of Durant	1995-07-11	55.0	Action, Adventure, Science Fiction, Thriller, ...	Darkm and Dura return a they h each
10177	The Swan Princess: A	2020-07-20	70.0	Animation, Family, Fantasy	Princ Odette a

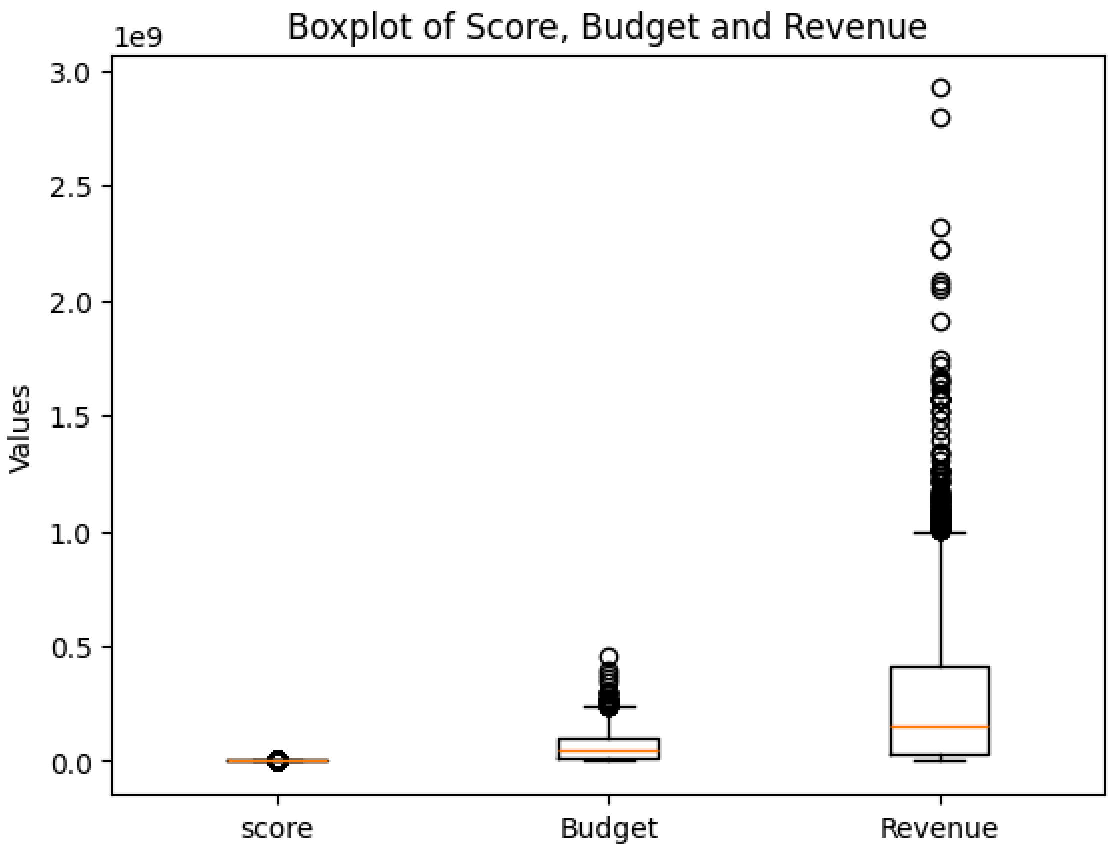
names	date_x	score	genre	overvi
Royal Wedding				Prince De are going

10052 rows × 12 columns

Checking for outliers

In [130...

```
plt.boxplot([df["score"], df["budget_x"], df["revenue"]])
plt.xticks([1,2,3], ["score", "Budget", "Revenue"])
plt.title("Boxplot of Score, Budget and Revenue")
plt.ylabel("Values")
plt.show()
```



In [131...

```
# In the above boxplots "Revenue" has more outliers
```

4. Univariate Analysis: Explore each column individually.

What are the most common genres in the dataset? Use a bar chart to show their distribution ?

In [132...

```
df["genre"]
```

Out[132…
```
0                                             Drama, Action
1                          Science Fiction, Adventure, Action
2             Animation, Adventure, Family, Fantasy, Comedy
3             Animation, Comedy, Family, Adventure, Fantasy
4                                                    Action
                              ...
10173                                                 Drama
10174                                                Action
10175                             Drama, Thriller, Romance
10176    Action, Adventure, Science Fiction, Thriller, ...
10177                           Animation, Family, Fantasy
Name: genre, Length: 10052, dtype: object
```

In [133…
```
# Drop missing values and spliting each individual genre
genre_series = df["genre"].dropna().str.split(",\s*")
```

```
<>:2: SyntaxWarning: invalid escape sequence '\s'
<>:2: SyntaxWarning: invalid escape sequence '\s'
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\924456061.py:2: SyntaxWarning:
invalid escape sequence '\s'
  genre_series = df["genre"].dropna().str.split(",\s*")
```

In [134…
```
# All the individual genres in a list
all_genres = [genre.strip() for sublist in genre_series for genre in sublist]
```

In [135…
```
# Count for each genre
genre_counts = Counter(all_genres)
genre_counts
```

Out[135…
```
Counter({'Drama': 3807,
         'Comedy': 2940,
         'Action': 2750,
         'Thriller': 2605,
         'Adventure': 1888,
         'Romance': 1575,
         'Horror': 1552,
         'Animation': 1454,
         'Family': 1403,
         'Fantasy': 1375,
         'Crime': 1271,
         'Science Fiction': 1258,
         'Mystery': 860,
         'History': 422,
         'War': 281,
         'Music': 275,
         'TV Movie': 211,
         'Documentary': 199,
         'Western': 131})
```

In [136…
```
# The most common genres of movies are "Drama", "Comedy", "Action", "Thriller".
```

In [137…
```
# Creating a data frame out of all the genres and counting each of them.

genre_df = pd.DataFrame(genre_counts.items(), columns = ["Genre", "Count"]).sort
genre_df
```

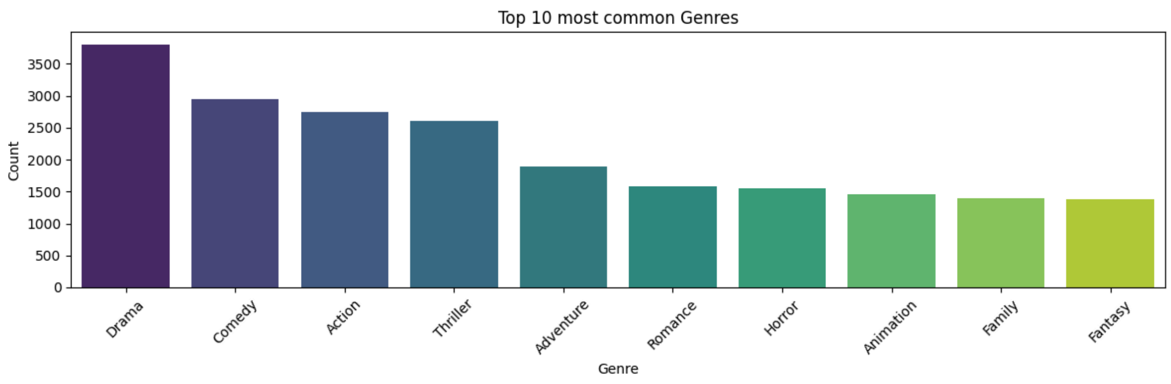
Out[137…

	Genre	Count
0	Drama	3807
7	Comedy	2940
1	Action	2750
8	Thriller	2605
3	Adventure	1888
15	Romance	1575
10	Horror	1552
4	Animation	1454
5	Family	1403
6	Fantasy	1375
9	Crime	1271
2	Science Fiction	1258
11	Mystery	860
12	History	422
13	War	281
16	Music	275
18	TV Movie	211
14	Documentary	199
17	Western	131

In [138…

```
# Ploting a bar plot for top 10 most common genres

top_genres = genre_df.head(10)

plt.figure(figsize = (12,4))

sns.barplot(x = "Genre", y = "Count", data = top_genres, palette = "viridis")

plt.xticks(rotation = 45)
plt.title("Top 10 most common Genres")
plt.xlabel("Genre")
plt.ylabel("Count")
plt.tight_layout()
plt.show()
```

```
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\2682309159.py:7: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v
0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effe
ct.

  sns.barplot(x = "Genre", y = "Count", data = top_genres, palette = "viridis")
```



5. Bivariate Analysis: Explore relationships between two variables.

How do ratings vary by genre? Use a boxplot to visualize the differences in ratings across genres.

In [139…

```
# Here im trying to create a dataframe that contains each genre and the score as

# keep both genre and score, drop missing values
df_genre_score = df[["genre", "score"]].dropna()

# spliting the "genre" col
df_genre_score["genre"] = df_genre_score["genre"].str.split(",\s*")

# Spliting the comma separated string values into single values as a individual
df_genre_score = df_genre_score.explode("genre")
df_genre_score["genre"] = df_genre_score["genre"].str.strip()

# Calculating average score by genres
avg_score_by_genre = df_genre_score.groupby("genre")["score"].mean().sort_values
avg_score_by_genre
```

```
<>:7: SyntaxWarning: invalid escape sequence '\s'
<>:7: SyntaxWarning: invalid escape sequence '\s'
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\3346293591.py:7: SyntaxWarning:
invalid escape sequence '\s'
  df_genre_score["genre"] = df_genre_score["genre"].str.split(",\s*")
```

Out[139…

```
genre
History            69.158768
War                69.099644
Animation          69.044704
Music              68.996364
Western            68.007634
Family             66.184604
Drama              65.982926
Fantasy            65.805091
Adventure          65.266419
Crime              65.129032
Documentary        65.120603
Mystery            64.413953
TV Movie           64.199052
Comedy             63.918367
Action             63.625091
Science Fiction    63.425278
Thriller           62.649520
Romance            62.644444
Horror             59.807990
Name: score, dtype: float64
```

In [140…

```
avg_score_by_genre_df = pd.DataFrame(avg_score_by_genre.items(), columns = ["Gen
avg_score_by_genre_df
```

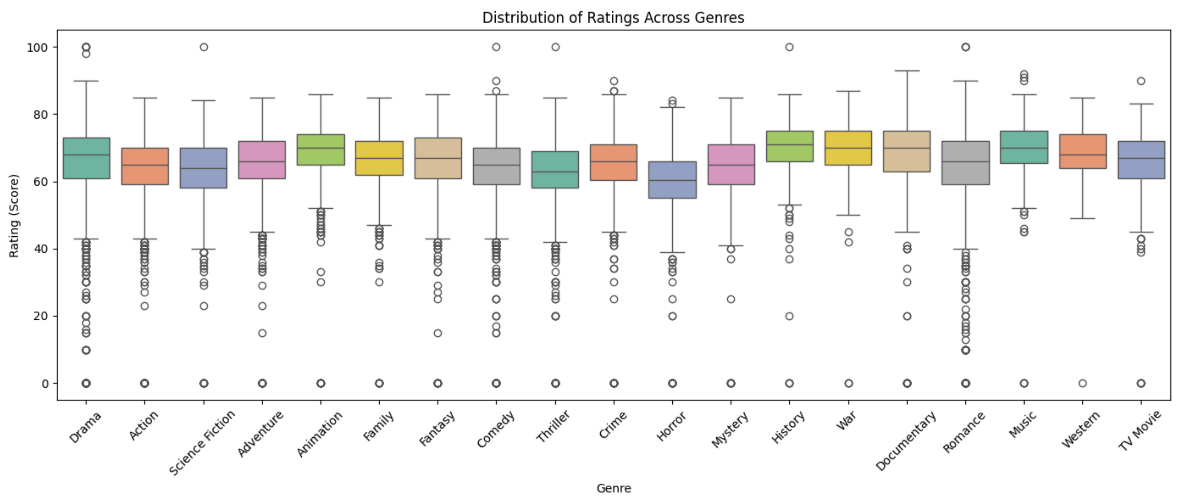
Out[140…

	Genre	Avg_Score
0	History	69.158768
1	War	69.099644
2	Animation	69.044704
3	Music	68.996364
4	Western	68.007634
5	Family	66.184604
6	Drama	65.982926
7	Fantasy	65.805091
8	Adventure	65.266419
9	Crime	65.129032
10	Documentary	65.120603
11	Mystery	64.413953
12	TV Movie	64.199052
13	Comedy	63.918367
14	Action	63.625091
15	Science Fiction	63.425278
16	Thriller	62.649520
17	Romance	62.644444
18	Horror	59.807990

In [141…

```
# Average rating across genres

plt.figure(figsize = (14, 6))
sns.boxplot(x = "genre", y = "score", data = df_genre_score, palette = "Set2")
plt.title("Distribution of Ratings Across Genres")
plt.xlabel("Genre")
plt.ylabel("Rating (Score)")
plt.xticks(rotation = 45)
plt.tight_layout()
plt.show()
```

```
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\3446008364.py:4: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v
0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effe
ct.

  sns.boxplot(x = "genre", y = "score", data = df_genre_score, palette = "Set2")
```



Is there a correlation between the score, budget and revenue? Create a scatter plot and calculate the correlation coefficient. What can you conclude?

In [142…

```
df[["score", "budget_x", "revenue"]]
```

Out[142…

	score	budget_x	revenue
0	73.0	75000000.0	2.716167e+08
1	78.0	460000000.0	2.316795e+09
2	76.0	100000000.0	7.244590e+08
3	70.0	12300000.0	3.420000e+07
4	61.0	77000000.0	3.409420e+08
...	...	...	...
10173	73.0	7000000.0	9.353729e+06
10174	54.0	9145817.8	6.698361e+06
10175	61.0	21800000.0	2.299799e+07
10176	55.0	116000000.0	4.756613e+08
10177	70.0	92400000.0	5.394018e+08

10052 rows × 3 columns

In [143…

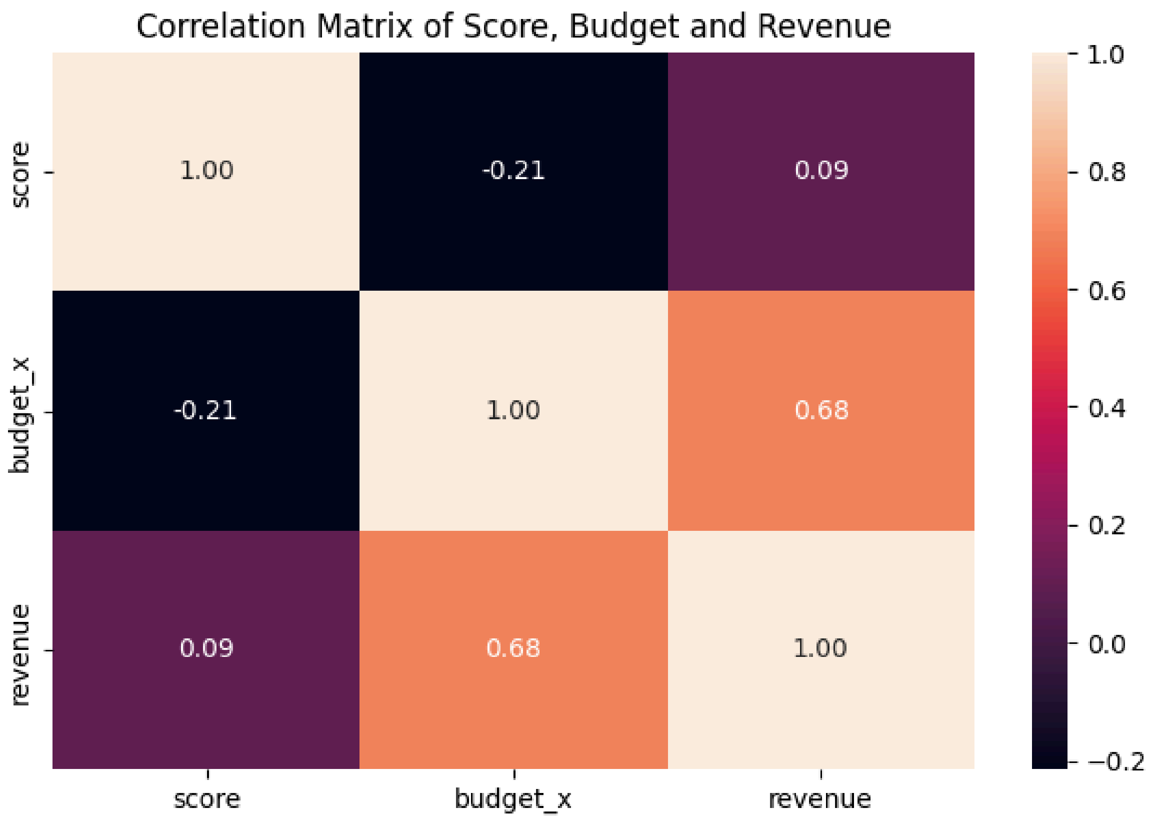
```
# corr_matrix score, budget, revenue

corr_matrix = df[["score", "budget_x", "revenue"]].corr()
corr_matrix
```

Out[143…

	score	budget_x	revenue
score	1.000000	-0.214374	0.090929
budget_x	-0.214374	1.000000	0.682766
revenue	0.090929	0.682766	1.000000

In [144…

```
plt.figure(figsize = (8,5))
sns.heatmap(corr_matrix, annot = True, cmap = "rocket", fmt = ".2f")
plt.title("Correlation Matrix of Score, Budget and Revenue")
plt.show()
```



In [ ]:

Corr Findings

Budget vs Revenue → Moderate Positive Correlation (0.68)

There’s a strong relationship between a movie’s budget and its revenue.

This suggests that higher-budget movies tend to earn more revenue, likely due to better production, marketing, star power, and wide releases.

Score vs Budget → Weak Negative Correlation (-0.21)

There’s a slight inverse relationship between budget and IMDb score.

This may indicate that higher-budget films don't always get better ratings — possibly due to prioritizing spectacle over story or differing audience expectations.

Score vs Revenue → Very Weak Positive Correlation (0.09)

Virtually no meaningful relationship between a movie's rating and how much money it makes.

This shows that popular or high-earning films are not always critically acclaimed, and vice versa.

Summary:

Revenue is influenced by budget, but score is mostly independent of both.

Critics and audiences may appreciate low or mid-budget films, while blockbusters don’t guarantee high ratings.

Financial success and critical success are not strongly linked in the IMDb dataset.

6. Genre-Specific Analysis

Which genre has the highest average rating? Calculate the average rating for each genre and plot the results.

In [145…

```
# Here im trying to create a dataframe that contains each genre and the score as

# keep both genre and score, drop missing values
df_genre_score = df[["genre", "score"]].dropna()

# spliting the "genre" col
df_genre_score["genre"] = df_genre_score["genre"].str.split(",\s*")

# Spliting the comma separated string values into single values as a individual
df_genre_score = df_genre_score.explode("genre")
df_genre_score["genre"] = df_genre_score["genre"].str.strip()

# Calculating average score by genres
avg_score_by_genre = df_genre_score.groupby("genre")["score"].mean().sort_values

# Creating a table
avg_score_by_genre_df = pd.DataFrame(avg_score_by_genre.items(), columns = ["Gen
avg_score_by_genre_df
```

```
<>:7: SyntaxWarning: invalid escape sequence '\s'
<>:7: SyntaxWarning: invalid escape sequence '\s'
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\2266448609.py:7: SyntaxWarning:
invalid escape sequence '\s'
  df_genre_score["genre"] = df_genre_score["genre"].str.split(",\s*")
```

Out[145…

	Genre	Avg_Score
0	History	69.158768
1	War	69.099644
2	Animation	69.044704
3	Music	68.996364
4	Western	68.007634
5	Family	66.184604
6	Drama	65.982926
7	Fantasy	65.805091
8	Adventure	65.266419
9	Crime	65.129032
10	Documentary	65.120603
11	Mystery	64.413953
12	TV Movie	64.199052
13	Comedy	63.918367
14	Action	63.625091
15	Science Fiction	63.425278
16	Thriller	62.649520
17	Romance	62.644444
18	Horror	59.807990

In [146…

```
# "History", "War", "Animation" have the highest average score
```

How does the popularity of genres vary over time ? Plot the number of movies released per genre each year.

In [147…

```
# converting date_x to datetime formart
df["date_x"] = pd.to_datetime(df["date_x"])

# Extracting "year" from the date
df["year"] = df["date_x"].dt.year
```

In [148…

```
# Calling "genre" and "year" droping na
genre_year_df = df[["genre", "year"]].dropna()

# spliting the "genre" col
genre_year_df["genre"] = genre_year_df["genre"].str.split(",\s*")

# Spliting the comma separated string values into single values as a individual
genre_year_df = genre_year_df.explode("genre")
genre_year_df["genre"] = genre_year_df["genre"].str.strip()
```

```
# Grouping and counting
genre_trend = genre_year_df.groupby(["year", "genre"]).size().reset_index(name =

# Filtering top genres
top_genres = genre_trend.groupby("genre")["count"].sum().nlargest(5).index
genre_trend_top = genre_trend[genre_trend["genre"].isin(top_genres)]

genre_trend_top
```

```
<>:5: SyntaxWarning: invalid escape sequence '\s'
<>:5: SyntaxWarning: invalid escape sequence '\s'
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\721480040.py:5: SyntaxWarning:
invalid escape sequence '\s'
  genre_year_df["genre"] = genre_year_df["genre"].str.split(",\s*")
```

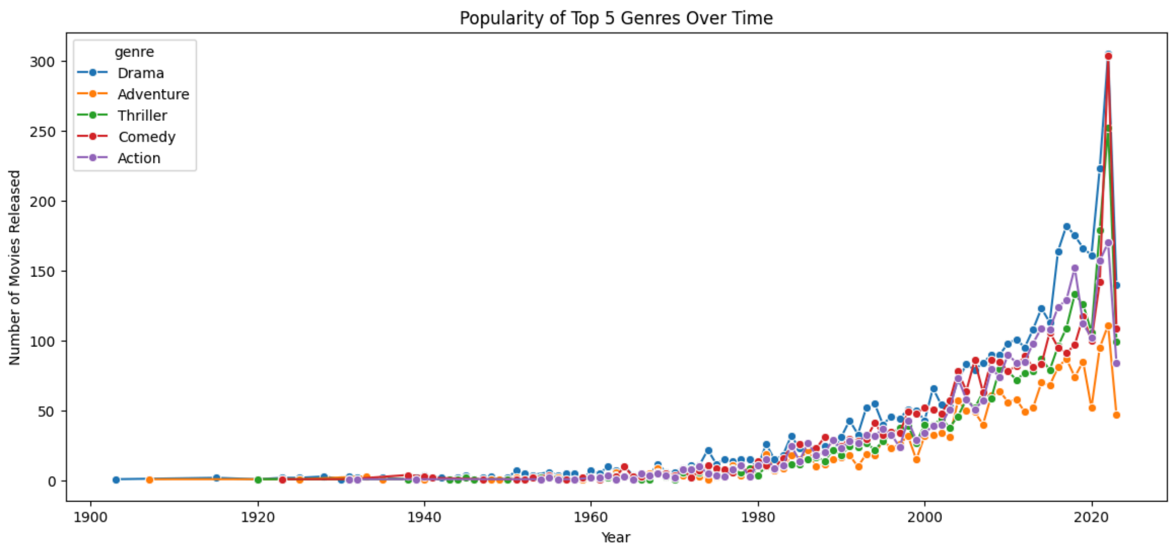
Out[148…

	year	genre	count
0	1903	Drama	1
2	1907	Adventure	1
4	1915	Drama	2
8	1920	Drama	1
10	1920	Thriller	1
...	...	...	...
1281	2023	Action	84
1282	2023	Adventure	47
1284	2023	Comedy	109
1287	2023	Drama	140
1297	2023	Thriller	99

401 rows × 3 columns

In [149…

```
# using a line plot for better visualisation.

plt.figure(figsize = (14,6))
sns.lineplot(data = genre_trend_top, x = "year", y = "count", hue = "genre", mar
plt.title("Popularity of Top 5 Genres Over Time")
plt.xlabel("Year")
plt.ylabel("Number of Movies Released")
plt.show()
```



1. Low Counts Before 1980

- Most genres saw very few releases before 1980 — under 20 per year — due to the limited global reach of cinema.

2. Post-1980 Growth Begins

- Movie production increased notably across all genres in the 1980s and 1990s, with Drama and Comedy starting to lead.

3. Digital Boom Post-2000

- After 2000, there's a steep rise in the number of movies — especially in Drama, Comedy, and Thriller — likely driven by digitization and streaming platforms.

4. Drama Dominates

- Drama consistently has the highest number of releases since the 1990s, showing its universal appeal.

5. Comedy's Comeback

- Comedy caught up significantly post-2010, briefly rivaling Drama in terms of release volume.

6. Action & Adventure Rising

- Action and Adventure saw steady growth, particularly from 2010 onward, aligning with the rise of global blockbuster franchises.

7. Thriller's Stability

- Thriller maintained a consistent rise without major fluctuations — a sign of growing audience interest in suspense and mystery.

8. 2022 Peak

- Almost all genres reached their highest release counts in 2022, with Drama and Comedy nearing 300 releases each.

9. 2023–24 Drop

- A sharp decline in 2023 may point to data incompleteness, production delays, or industry slowdowns.

10. Genre Explosion Era

- Overall, the post-2000s mark a period of genre explosion, highlighting how the film industry became more diverse, accessible, and globalized.

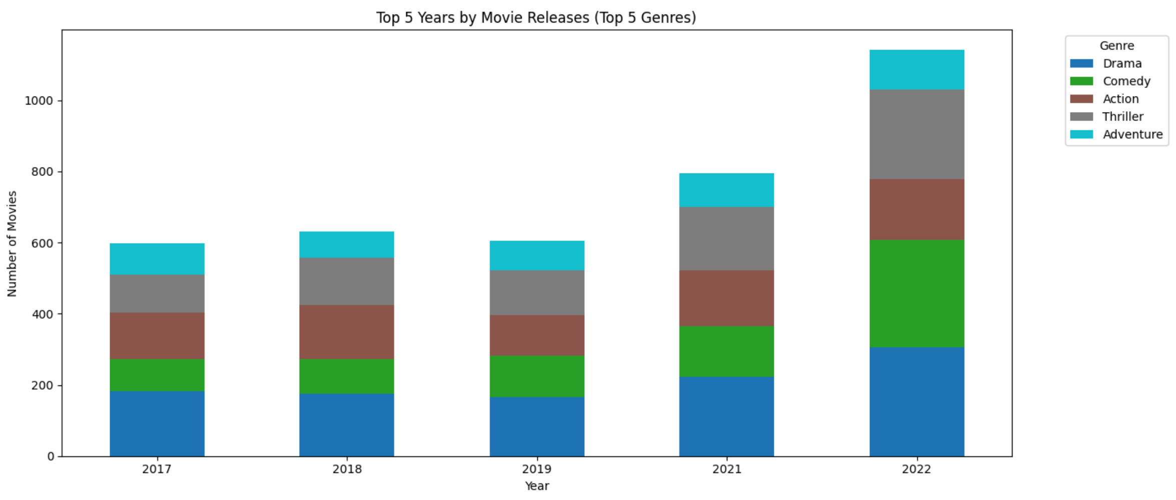
In [ ]:

In [ ]:

Plot the number of movies released per genre each year.

In [150…

```
# Pivot the data
pivot_df = genre_trend.pivot(index = "year", columns = "genre", values = "count"

# Limiting to top 5 genres
top_genres = pivot_df.sum().sort_values(ascending = False).head(5).index
pivot_df = pivot_df[top_genres]

# Limiting to top 5 years based on total genre count
top_years = pivot_df.sum(axis = 1).sort_values(ascending = False).head(5).index
pivot_df = pivot_df.loc[top_years]

# Sorting years chronologically
pivot_df = pivot_df.sort_index()

# Plotting as barplot
pivot_df.plot(kind = "bar", stacked = True, figsize = (14, 6), colormap = "tab10

plt.title("Top 5 Years by Movie Releases (Top 5 Genres)")
plt.xlabel("Year")
plt.ylabel("Number of Movies")
plt.xticks(rotation = 0)
plt.legend(title = "Genre", bbox_to_anchor = (1.05, 1), loc = "upper left")
plt.tight_layout()
plt.show()
```



1. 2022 had the highest total movie releases, crossing **1100** movies among the selected top 5 genres.

- This might suggest a post-COVID production rebound or increased streaming content.

2. Drama is consistently the most dominant genre each year.

- Especially in 2022, it contributed significantly to the total.

3. Comedy and Thriller gained momentum in 2022:

- Notably higher compared to 2017–2019.
- Comedy almost doubled in count from 2019 to 2022.

4. 2019 had the lowest total releases among these five years, slightly below 2017.

- Likely indicating a dip just before the pandemic hit in 2020.

5. Adventure movies remained fairly consistent , contributing a smaller but stable portion across years.

6. Drop in 2020 is evident by its absence, implying production delays or data exclusion for that year (likely pandemic impact).

7. Year and Trend Analysis

Which years had the highest and lowest number of movie releases? Plot the number of movies released each year.

In [151…
```
# Which years had the highest and lowest number of movie releases? Plot the numb

df["status"].value_counts()
```

Out[151…

```
status
Released           10007
Post Production       30
In Production         15
Name: count, dtype: int64
```

In [152…

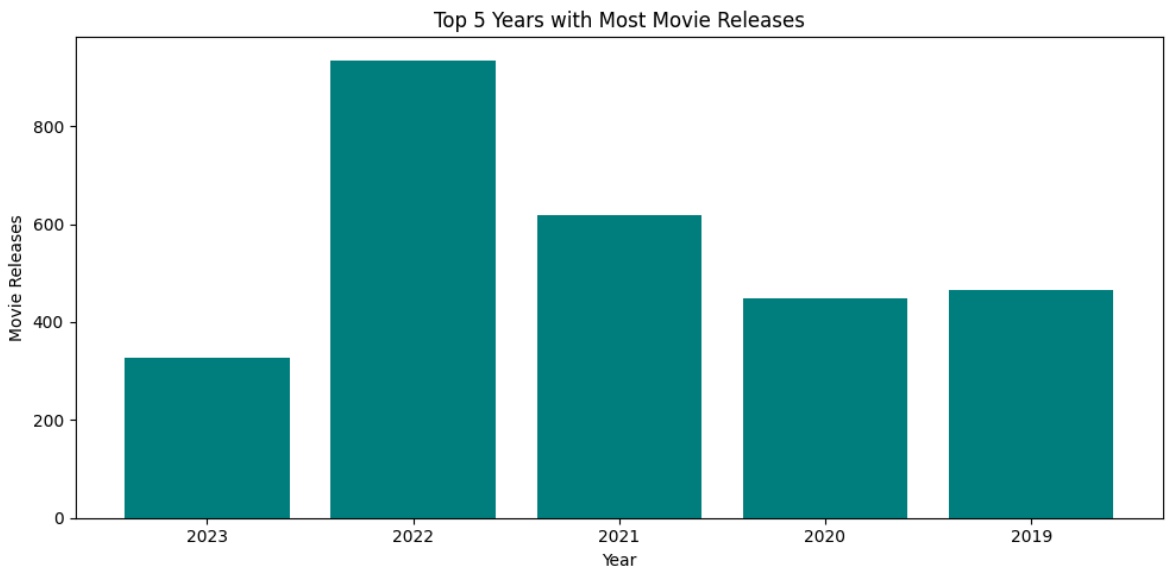
```python
# Filter movies with status = "Released"
released_df = df[df["status"].str.strip().str.lower() == "released"]

# Grouping by year and count
release_per_year = released_df.groupby("year").size().reset_index(name = "releas

# Sorting by year
release_per_year = release_per_year.sort_values(by = "year", ascending = False).
release_per_year
```

Out[152…

	year	released_count
98	2023	328
97	2022	935
96	2021	618
95	2020	448
94	2019	465

In [153…

```python
# Sort and get top 5 years by release count
top_5_years = release_per_year.sort_values(by = "year", ascending = False).head(

# Plotting
plt.figure(figsize=(10, 5))
plt.bar(top_5_years["year"].astype(str), top_5_years["released_count"], color="t
plt.title("Top 5 Years with Most Movie Releases")
plt.xlabel("Year")
plt.ylabel("Movie Releases")
plt.tight_layout()
plt.show()
```



In [154…

```python
# Filter movies with status = "Released"
released_df = df[df["status"].str.strip().str.lower() == "released"]
```

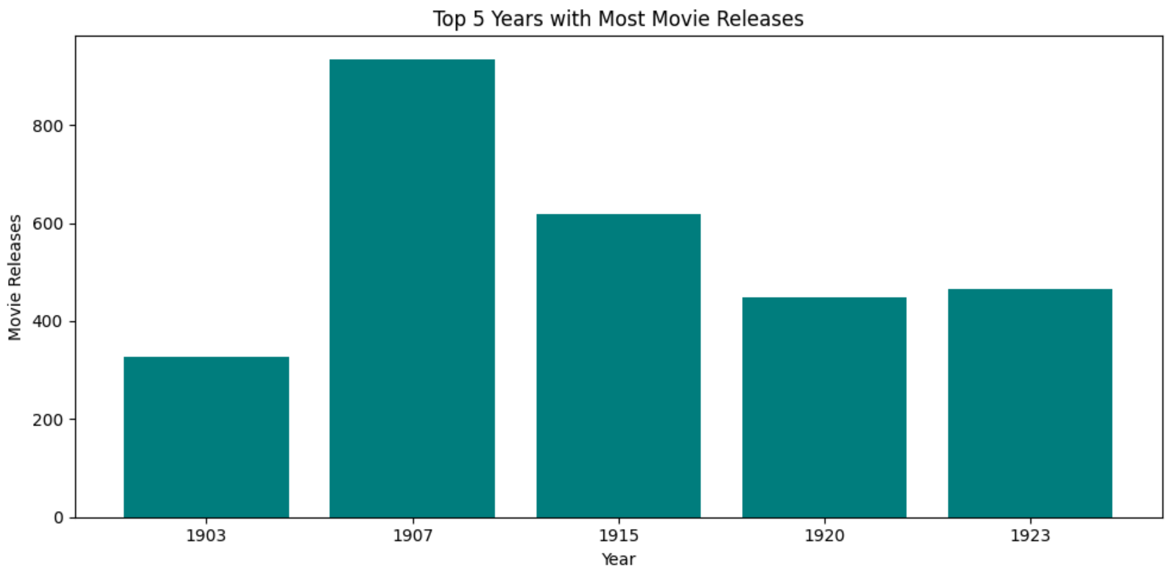
```
# Grouping by year and count
release_per_year = released_df.groupby("year").size().reset_index(name = "releas

# Sorting by year
bottom_release_per_year = release_per_year.sort_values(by = "year", ascending =
bottom_release_per_year
```

Out[154…

	year	released_count
4	1923	3
3	1920	1
2	1915	2
1	1907	1
0	1903	1

In [155…

```
# Sorting by year
bottom_release_per_year = release_per_year.sort_values(by = "year", ascending =

# Sort and get top 5 years by release count
bottom_5_years = bottom_release_per_year.sort_values(by = "year", ascending = Tr

# Plotting
plt.figure(figsize=(10, 5))
plt.bar(bottom_5_years["year"].astype(str), top_5_years["released_count"], color
plt.title("Top 5 Years with Most Movie Releases")
plt.xlabel("Year")
plt.ylabel("Movie Releases")
plt.tight_layout()
plt.show()
```



In [156…

```
# In the year 2022 we can see the highest number of movie releases
# In the year 1903 we can see the least number of movie releases.
```

8. Multivariate Analysis: Analyze multiple variables together.

Which genres are most popular in each decade? Create a bar plot showing the most frequent genres by decade.

In [157…

```
year_df = df["year"]
print(year_df.head(5))
print(year_df.tail(5))
```

```
0     2023
1     2022
2     2023
3     2023
4     2023
Name: year, dtype: int32
10173    2016
10174    1990
10175    1990
10176    1995
10177    2020
Name: year, dtype: int32
```

In [158…

```
# Keep required columns & drop missing values
genre_decade_df = df[["year", "genre", "score"]].dropna()

# Convert year to int and compute decade
genre_decade_df["year"] = genre_decade_df["year"].astype(int)
genre_decade_df["decade"] = (genre_decade_df["year"] // 10) * 10

# Split multiple genres and clean
genre_decade_df["genre"] = genre_decade_df["genre"].astype(str).str.split(",\s*"
genre_decade_df = genre_decade_df.explode("genre")
genre_decade_df["genre"] = genre_decade_df["genre"].str.strip()

# Group by decade and genre: count + avg_score
genre_stats = genre_decade_df.groupby(["decade", "genre"]).agg(count = ("score",

# Compute weighted popularity = count × avg_score
genre_stats["popularity"] = genre_stats["count"] * genre_stats["avg_score"]

# Get the top genre per decade based on popularity
top_genres_by_popularity = genre_stats.sort_values("popularity", ascending=False

# Sort result by decade
top_genres_by_popularity = top_genres_by_popularity.sort_values("decade")
top_genres_by_popularity
```

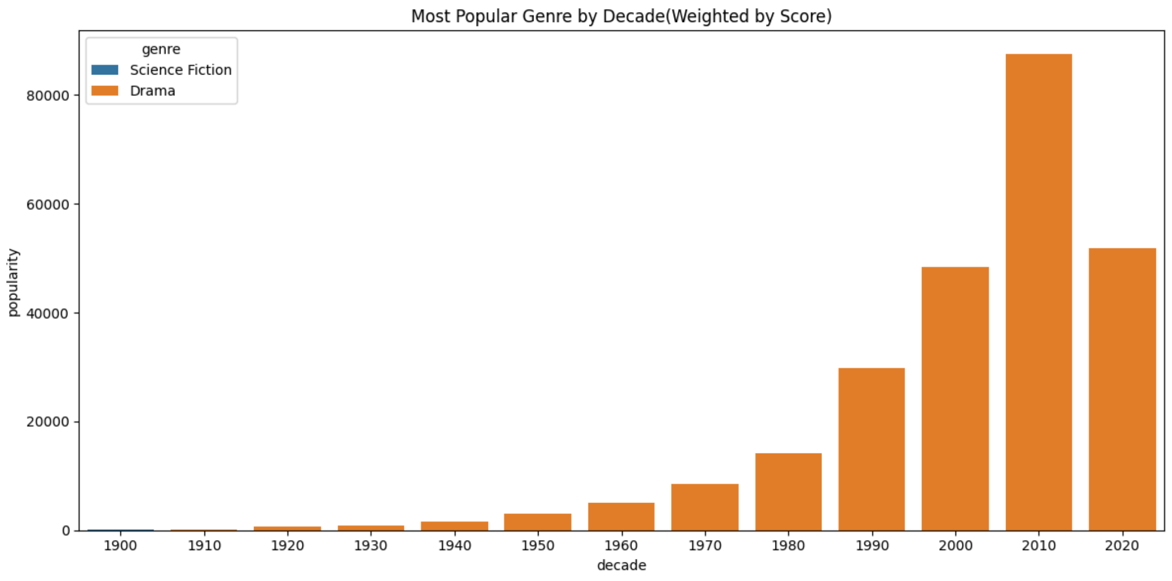
```
<>:9: SyntaxWarning: invalid escape sequence '\s'
<>:9: SyntaxWarning: invalid escape sequence '\s'
C:\Users\BINAY\AppData\Local\Temp\ipykernel_14356\1018501040.py:9: SyntaxWarning:
invalid escape sequence '\s'
  genre_decade_df["genre"] = genre_decade_df["genre"].astype(str).str.split(",\s
*")
```

Out[158…

	decade	genre	count	avg_score	popularity
3	1900	Science Fiction	1	80.000000	80.0
4	1910	Drama	2	61.000000	122.0
10	1920	Drama	8	73.625000	589.0
24	1930	Drama	11	76.545455	842.0
39	1940	Drama	20	76.500000	1530.0
55	1950	Drama	39	76.205128	2972.0
72	1960	Drama	68	73.014706	4965.0
91	1970	Drama	130	65.246154	8482.0
109	1980	Drama	215	65.730233	14132.0
128	1990	Drama	445	67.130337	29873.0
147	2000	Drama	714	67.686275	48328.0
166	2010	Drama	1325	66.026415	87485.0
185	2020	Drama	829	62.501809	51814.0

In [159…

```
# plotting a bar graph for better visualisation

plt.figure(figsize = (12,6))
sns.barplot(data = top_genres_by_popularity, x = "decade", y = "popularity", hue
plt.title("Most Popular Genre by Decade(Weighted by Score)")
plt.xticks(rotation = 0)
plt.tight_layout()
plt.show()
```



In [160…

```
# Looking at the graph we can see "drama" has the highest popularity among the v
```

In [ ]:

9. Insights and Summary

Based on your analysis, what are three major insights you learned about movie trends, popular genres, or movie ratings?

Drama’s Consistent Dominance Drama has been the most released genre since the 1990s, reflecting its strong and enduring global appeal.

Genre Growth Post-2000 After 2000, all major genres — especially Comedy, Thriller, and Action — saw a sharp rise in releases, driven by digital platforms and global distribution.

2023 Decline & 2022 Peak 2022 marked the peak in genre releases, possibly due to a post-COVID backlog, followed by a noticeable dip in 2023, likely due to industry disruptions or incomplete data.

What additional questions could be explored with this dataset, or what other data would be helpful to gain a deeper understanding?

1. Does release season (month or quarter) affect rating or genre ?
2. Do genres with more releases also get higher average ratings ?
3. How have new or niche genres (like Sci-Fi or Documentary) evolved over time ?

```
In [ ]:
```