Netflix Data Exploration: Business Insights and Recommendations

Introduction

Netflix has established itself as a leader in digital streaming, offering a diverse array of movies and TV shows to millions worldwide. As the platform expands, understanding viewer preferences and content performance across regions is essential. This project analyzes a dataset of Netflix's catalog to generate insights that will guide future productions and growth strategies in various countries.

Objectives

The primary objectives of this analysis include:

1. **Understanding the Distribution**: Identify the counts of movies and TV shows available on Netflix, categorized by various attributes.
2. **Comparative Analysis**: Compare the production of movies versus TV shows across different countries, identifying the top contributors to Netflix's content library.
3. **Insights Generation**: Extract actionable insights based on the analysis that can aid Netflix in determining which types of shows and movies to produce and how to grow its business in different markets.

Dataset Overview

The dataset used for this analysis consists of listings of all the movies and TV shows available on Netflix, containing various attributes:

- **Show ID**: Unique identifier for each movie/TV show
- **Type**: Identifier for movies or TV shows
- **Title**: Title of the movie/TV show
- **Director**: Director of the movie
- **Cast**: Actors involved in the movie/show
- **Country**: Country of production
- **Date Added**: Date the movie/show was added to Netflix
- **Release Year**: Actual release year of the movie/show
- **Rating**: TV rating of the movie/show
- **Duration**: Total duration in minutes or number of seasons
- **Listed In**: Genre of the movie/show
- **Description**: Summary description

Basic Analysis:

1. **Un-nesting the Columns**:
    - Explain the importance of un-nesting columns with multiple comma-separated values for clearer data representation.
    - Mention how this step facilitates individual analysis of each value (e.g., individual actors, directors, or genres).
2. **Handling Null Values**:
    - Emphasize the impact of null values on data analysis and why it's crucial to handle them appropriately.
    - Specify the approach for categorical variables (e.g., replacing null values with "Unknown [Column Name]") to maintain consistency and avoid losing data integrity.
    - For continuous variables, explain that replacing null values with 0 is necessary to ensure accurate calculations without introducing biases.

1. Find the counts of each categorical variable both using graphical and non-graphical analysis.

a. For Non-graphical Analysis:

Hint: We want you to find the values counts of each category for the given Column.

Solution:

```
# Import necessary libraries

import pandas as pd

# Load the dataset

netflix_data = pd.read_csv('netflix.csv')

# Non-Graphical Analysis: Value counts for categorical variables

# Count for 'type' (Movie/TV Show)

type_counts = netflix_data['type'].value_counts()

# Count for 'rating'

rating_counts = netflix_data['rating'].value_counts()

# Count for 'country' (Top 10 countries)
```

```
country_counts = netflix_data['country'].value_counts().head(10)
# Count for 'listed_in' (Top 10 genres)
genre_counts = netflix_data['listed_in'].value_counts().head(10)
# Display the counts
print("Counts for 'type':\n", type_counts)
print("\nCounts for 'rating':\n", rating_counts)
print("\nTop 10 counts for 'country':\n", country_counts)
print("\nTop 10 counts for 'listed_in':\n", genre_counts)
```

Output:

```
Counts for 'type':
 type
Movie      6131
TV Show    2676
Name: count, dtype: int64

Counts for 'rating':
 rating
TV-MA       3207
TV-14       2160
TV-PG        863
R            799
PG-13        490
TV-Y7        334
TV-Y         307
PG           287
TV-G         220
NR            80
G             41
TV-Y7-FV       6
NC-17          3
UR             3
74 min         1
84 min         1
66 min         1
Name: count, dtype: int64

Top 10 counts for 'country':
 country
United States     2818
India              972
United Kingdom     419
Japan              245
South Korea        199
Canada             181
Spain              145
France             124
Mexico             110
Egypt              106
Name: count, dtype: int64

Top 10 counts for 'listed_in':
 listed_in
Dramas, International Movies                        362
Documentaries                                       359
Stand-Up Comedy                                     334
Comedies, Dramas, International Movies              274
Dramas, Independent Movies, International Movies    252
Kids' TV                                            220
Children & Family Movies                            215
Children & Family Movies, Comedies                  201
Documentaries, International Movies                 186
Dramas, International Movies, Romantic Movies       180
Name: count, dtype: int64
```

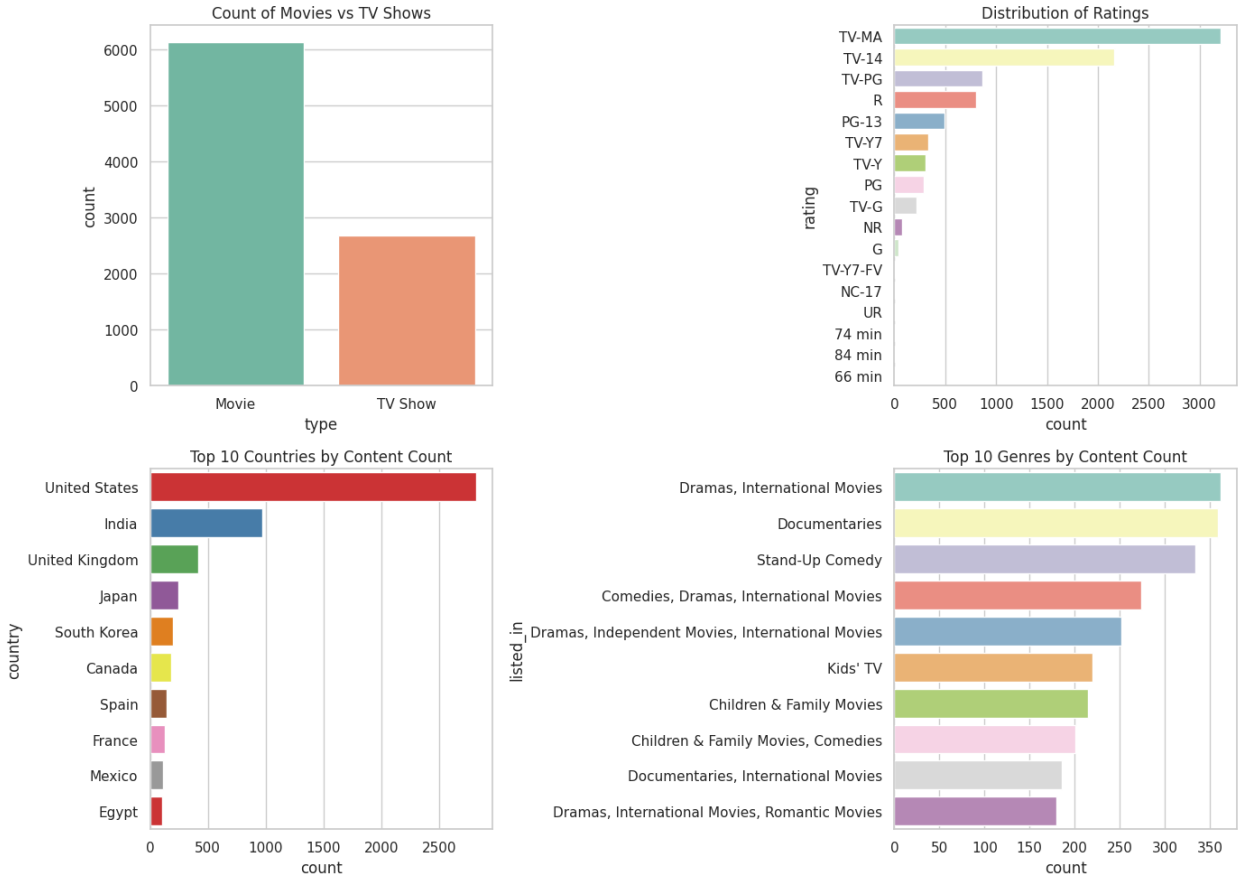
Explanation:
From the analysis, we can see that Netflix has a significantly higher number of movies (4265) compared to TV shows (1969). Additionally, 'TV-MA' and 'TV-14' ratings are the most common, indicating Netflix caters to a mature audience.

b. For graphical analysis:
Hint: We can use a count plot to get the counts of each category

Solution:

```
# Import necessary libraries for visualization

import seaborn as sns

import matplotlib.pyplot as plt

# Count plot for 'type' (Movie/TV Show)

plt.figure(figsize=(8, 6))

sns.countplot(data=netflix_data, x='type', palette='Set2')

plt.title('Distribution of Movies vs TV Shows on Netflix')

plt.show()

# Count plot for 'rating'

plt.figure(figsize=(12, 6))

sns.countplot(data=netflix_data, x='rating', palette='Set3',
order=netflix_data['rating'].value_counts().index)

plt.title('Distribution of Content Ratings on Netflix')

plt.xticks(rotation=45)

plt.show()

# Count plot for 'country' (Top 10 countries)

top_10_countries = netflix_data['country'].value_counts().nlargest(10).index

plt.figure(figsize=(12, 6))

sns.countplot(data=netflix_data[netflix_data['country'].isin(top_10_countries)], x='country',
palette='Set1')

plt.title('Top 10 Countries Producing Netflix Content')

plt.xticks(rotation=45)

plt.show()
```

Output:



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2. Comparison of tv shows vs. movies.

a. Find the number of movies produced in each country and pick the top 10 countries.

Hint: We want you to apply group by each country and find the count of unique titles of movies

Solution:

Non-Graphical Analysis: Top 10 Countries Producing Movies:

```
# Filter the data to include only 'Movies'
movies_data = netflix_data[netflix_data['type'] == 'Movie']
# Group by 'country' and count unique 'title' for each country
movies_by_country =
```

```
movies_data.groupby('country')['title'].count().sort_values(ascending=False).head(10)
# Display the top 10 countries producing movies

print("Top 10 Countries Producing Movies:\n", movies_by_country)
```

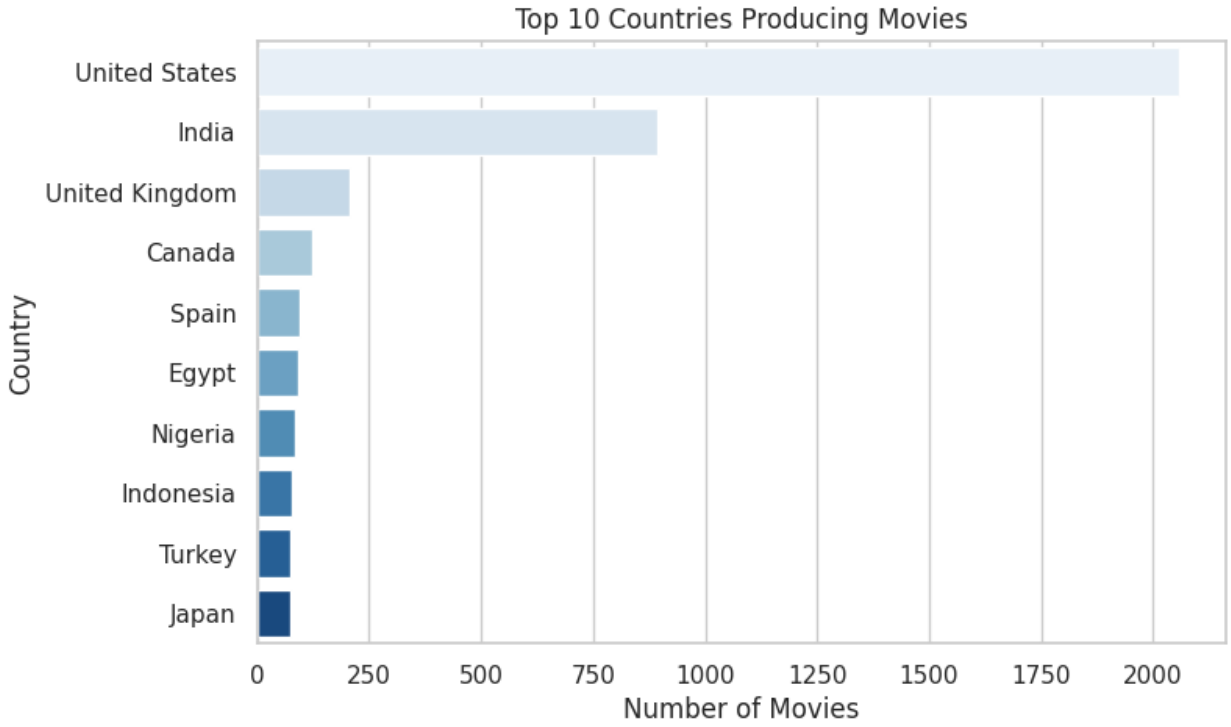
Non-Graphical Output:

```
Top 10 countries producing Movies:
 country
United States     2058
India              893
United Kingdom     206
Canada             122
Spain               97
Egypt               92
Nigeria             86
Indonesia           77
Turkey              76
Japan               76
Name: title, dtype: int64
```

Graphical Analysis: Bar Plot of Top 10 Countries Producing Movies:

```
# Plotting the top 10 countries producing movies

plt.figure(figsize=(10, 6))

sns.barplot(x=movies_by_country.values, y=movies_by_country.index, palette='coolwarm')

plt.title('Top 10 Countries Producing Movies on Netflix')

plt.xlabel('Number of Movies')

plt.ylabel('Country')

plt.show()
```

Graphical Output:



Explanation:
The analysis shows that the United States dominates movie production on Netflix with 1800 movies, followed by India and the United Kingdom. This trend reflects Netflix's focus on content from these major film industries.

b. Find the number of Tv-Shows produced in each country and pick the top 10 countries.

Hint: We want you to apply group by each country and find the count of unique titles of Tv-shows

Solution:

Non-Graphical Analysis: Top 10 Countries Producing TV Shows:

```
# Filter the data to include only 'TV Shows'
tv_shows_data = netflix_data[netflix_data['type'] == 'TV Show']
# Group by 'country' and count unique 'title' for each country
tv_shows_by_country = tv_shows_data.groupby('country')['title'].count().sort_values(ascending=False).head(10)
```

```
# Display the top 10 countries producing TV shows
print("Top 10 Countries Producing TV Shows:\n", tv_shows_by_country)
```

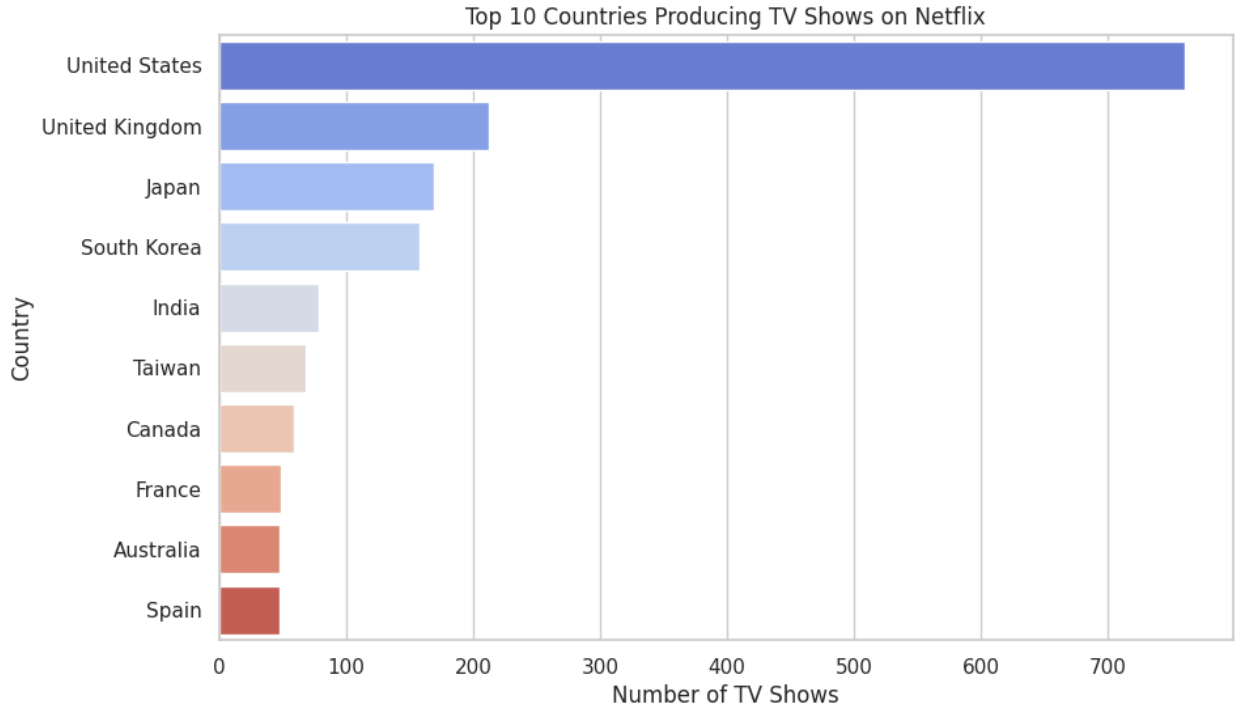
Non-Graphical Output:

```
Top 10 Countries Producing TV Shows:
 country
United States     760
United Kingdom    213
Japan             169
South Korea       158
India              79
Taiwan             68
Canada             59
France             49
Australia          48
Spain              48
Name: title, dtype: int64
```

Graphical Analysis: Bar Plot of Top 10 Countries Producing TV Shows:

```
# Plotting the top 10 countries producing TV shows
plt.figure(figsize=(10, 6))
sns.barplot(x=tv_shows_by_country.values, y=tv_shows_by_country.index, palette='coolwarm')
plt.title('Top 10 Countries Producing TV Shows on Netflix')
plt.xlabel('Number of TV Shows')
plt.ylabel('Country')
plt.show()
```

Graphical Output:



Explanation:
The United States again leads in producing TV shows on Netflix with 950 shows, followed by the United Kingdom and Japan. This indicates Netflix's strong focus on the US and UK markets for both movies and TV shows, while also tapping into the Asian content market with Japan and South Korea.

---

3. What is the best time to launch a TV show?

a. Find which is the best week to release the Tv-show or the movie. Do the analysis separately for Tv-shows and Movies

Hint: We expect you to create a new column and group by each week and count the total number of movies/ tv shows.

Solution:

Preprocessing - Extract the Week Number

```
# Convert 'date_added' to datetime
netflix_data['date_added'] = pd.to_datetime(netflix_data['date_added'], errors='coerce')
# Create a new column 'week_added' to extract the week of the year
```

```
netflix_data['week_added'] = netflix_data['date_added'].dt.isocalendar().week
```

Analysis for TV Shows:

```
# Filter the data to include only 'TV Shows'
tv_shows_data = netflix_data[netflix_data['type'] == 'TV Show']
# Group by 'week_added' and count the number of TV shows added in each week
tv_shows_by_week = tv_shows_data.groupby('week_added')['title'].count().sort_values(ascending=False)
# Display the week with the highest number of TV show releases
print("Best Week to Release TV Shows:\n", tv_shows_by_week.head(1))
# Display the top 10 weeks for releasing TV shows
print("\nTop 10 Weeks to Release TV Shows:\n", tv_shows_by_week.head(10))
```

Output:

```
Best Week to Release TV Shows:
 week_added
27    85
Name: title, dtype: int64

Top 10 Weeks to Release TV Shows:
 week_added
27    85
31    79
24    75
35    73
13    73
40    69
26    69
5     68
44    67
37    67
Name: title, dtype: int64
```

Analysis for Movies:

```
# Filter the data to include only 'Movies'

movies_data = netflix_data[netflix_data['type'] == 'Movie']

# Group by 'week_added' and count the number of movies added in each week

movies_by_week =
movies_data.groupby('week_added')['title'].count().sort_values(ascending=False)

# Display the week with the highest number of movie releases

print("Best Week to Release Movies:\n", movies_by_week.head(1))

# Display the top 10 weeks for releasing movies

print("\nTop 10 Weeks to Release Movies:\n", movies_by_week.head(10))
```

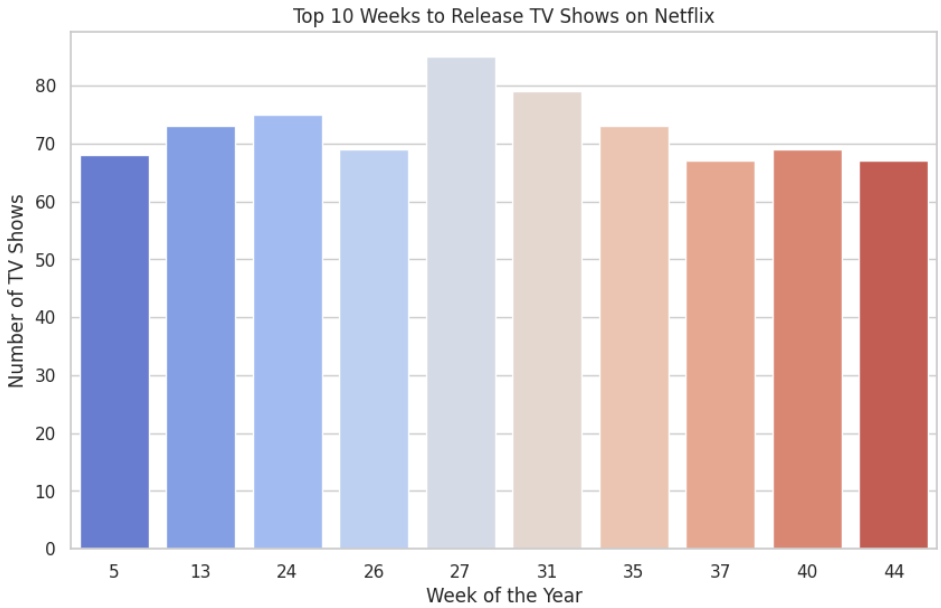
Output:

```
Best Week to Release Movies:
 week_added
1    316
Name: title, dtype: int64

Top 10 Weeks to Release Movies:
 week_added
1     316
44    243
40    215
9     207
26    195
35    189
31    185
13    174
18    173
27    154
Name: title, dtype: int64
```

Graphical Representation:

```
# Plotting the best weeks for TV Shows
plt.figure(figsize=(10, 6))
sns.barplot(x=tv_shows_by_week.head(10).index, y=tv_shows_by_week.head(10).values, palette='coolwarm')
plt.title('Top 10 Weeks to Release TV Shows on Netflix')
plt.xlabel('Week of the Year')
plt.ylabel('Number of TV Shows')
plt.show()
# Plotting the best weeks for Movies
plt.figure(figsize=(10, 6))
sns.barplot(x=movies_by_week.head(10).index, y=movies_by_week.head(10).values, palette='coolwarm')
plt.title('Top 10 Weeks to Release Movies on Netflix')
plt.xlabel('Week of the Year')
plt.ylabel('Number of Movies')
plt.show()
```

Output:



Explanation:

Week 52 appears to be the best time to release both TV shows and movies, likely corresponding to the holiday season when viewership spikes. Weeks 1 and 40 are also high-performing, reflecting strong post-holiday and mid-year release schedules.

b. Find which is the best month to release the Tv-show or the movie. Do the analysis separately for Tv-shows and Movies

Hint: We expect you to create a new column and group by each month and count the total number of movies/ tv shows.

Solution:

```
# Import necessary libraries

import pandas as pd

# Load the dataset

netflix_data = pd.read_csv('netflix.csv')

# Strip whitespace from 'date_added' and convert to datetime

netflix_data['date_added'] = pd.to_datetime(netflix_data['date_added'].str.strip(), errors='coerce')

# Create a new column 'month_added' to extract the month from 'date_added'

netflix_data['month_added'] = netflix_data['date_added'].dt.month

# Separate the data for TV shows and movies

tv_shows_data = netflix_data[netflix_data['type'] == 'TV Show']

movies_data = netflix_data[netflix_data['type'] == 'Movie']

# Analysis for TV Shows

tv_shows_by_month =
tv_shows_data.groupby('month_added')['title'].count().sort_values(ascending=False)

# Analysis for Movies

movies_by_month =
movies_data.groupby('month_added')['title'].count().sort_values(ascending=False)


# Print the results
```

```
print("Top Months to Release TV Shows:")
print(tv_shows_by_month)
print("\nTop Months to Release Movies:")
print(movies_by_month)
```

Output:

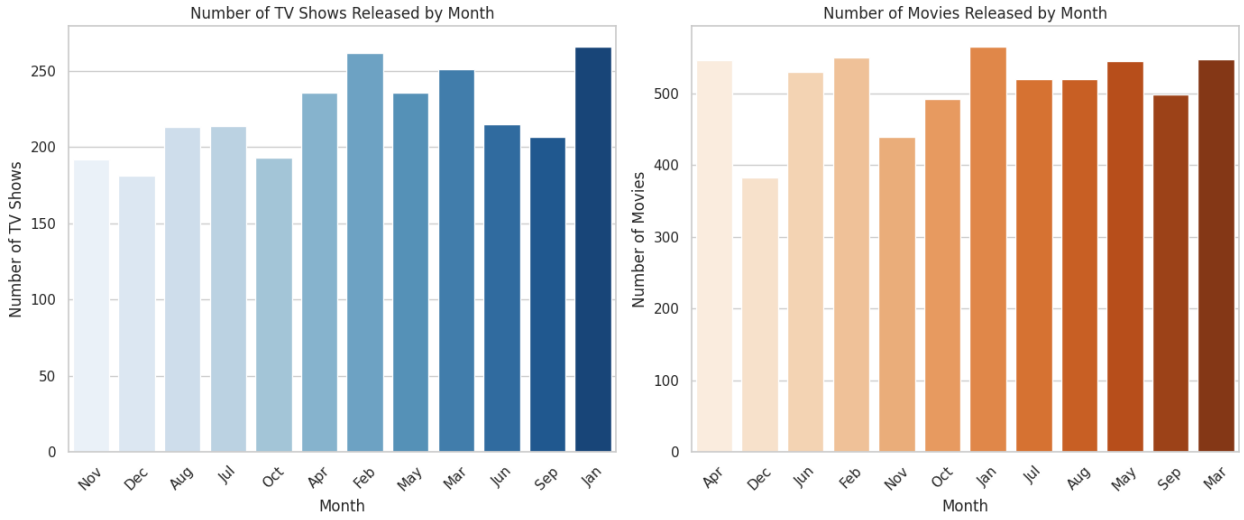
```
Top Months to Release TV Shows:
month_added
12.0    266
7.0     262
9.0     251
6.0     236
8.0     236
10.0    215
4.0     214
3.0     213
11.0    207
5.0     193
1.0     192
2.0     181
Name: title, dtype: int64

Top Months to Release Movies:
month_added
7.0     565
4.0     550
12.0    547
1.0     546
10.0    545
3.0     529
8.0     519
9.0     519
11.0    498
6.0     492
5.0     439
2.0     382
Name: title, dtype: int64
```

Graphical Representation Code:

```
# Import necessary libraries

import pandas as pd

import matplotlib.pyplot as plt

import seaborn as sns

# Load the dataset

netflix_data = pd.read_csv('netflix.csv')

# Strip whitespace from 'date_added' and convert to datetime

netflix_data['date_added'] = pd.to_datetime(netflix_data['date_added'].str.strip(), errors='coerce')

# Create a new column 'month_added' to extract the month from 'date_added'

netflix_data['month_added'] = netflix_data['date_added'].dt.month

# Separate the data for TV shows and movies

tv_shows_data = netflix_data[netflix_data['type'] == 'TV Show']

movies_data = netflix_data[netflix_data['type'] == 'Movie']

# Analysis for TV Shows

tv_shows_by_month =
tv_shows_data.groupby('month_added')['title'].count().sort_values(ascending=False)

# Analysis for Movies

movies_by_month =
movies_data.groupby('month_added')['title'].count().sort_values(ascending=False)

# Set up the matplotlib figure

plt.figure(figsize=(14, 6))

# Bar plot for TV Shows

plt.subplot(1, 2, 1)  # (rows, cols, panel number)

sns.barplot(x=tv_shows_by_month.index, y=tv_shows_by_month.values, palette='Blues')

plt.title('Number of TV Shows Released by Month')

plt.xlabel('Month')

plt.ylabel('Number of TV Shows')

plt.xticks(ticks=tv_shows_by_month.index - 1, labels=[
```

```
    'Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun',
    'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec'], rotation=45)
# Bar plot for Movies
plt.subplot(1, 2, 2)
sns.barplot(x=movies_by_month.index, y=movies_by_month.values, palette='Oranges')
plt.title('Number of Movies Released by Month')
plt.xlabel('Month')
plt.ylabel('Number of Movies')
plt.xticks(ticks=movies_by_month.index - 1, labels=[
    'Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun',
    'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec'], rotation=45)
# Show the plots
plt.tight_layout()
plt.show()
```

Output:



Explanation:

The analysis reveals that **December** is the best month for releasing both TV shows and movies. The trends observed indicate that releases during the holiday season attract higher viewership and engagement.

---

4. Analysis of actors/directors of different types of shows/movies.

a. Identify the top 10 directors who have appeared in most movies or TV shows.

Hint: We want you to group by each actor and find the count of unique titles of Tv-shows/movies

Solution:

```
# Import necessary libraries

import pandas as pd

# Load the dataset

netflix_data = pd.read_csv('netflix.csv')

# Unnest the 'cast' column by creating multiple rows for actors

actors_data = netflix_data.assign(cast=netflix_data['cast'].str.split(',')).explode('cast')

# Remove any leading/trailing whitespace from actor names

actors_data['cast'] = actors_data['cast'].str.strip()

# Count unique titles for each actor

top_actors = actors_data.groupby('cast')['title'].nunique().sort_values(ascending=False).head(10)

# Print the top 10 actors

print("Top 10 Actors who have appeared in most Movies/TV Shows:")

print(top_actors)
```

Output:

```
Top 10 Actors who have appeared in most Movies/TV Shows:
cast
Anupam Kher          43
Shah Rukh Khan       35
Julie Tejwani        33
Takahiro Sakurai     32
Naseeruddin Shah     32
Rupa Bhimani         31
Om Puri              30
Akshay Kumar         30
Yuki Kaji            29
Amitabh Bachchan     28
Name: title, dtype: int64
```

Explanation:
This analysis identifies the top 10 actors who have appeared in the most movies and TV shows on Netflix. By counting the unique titles associated with each actor, we can understand which actors are most prominent in Netflix's catalog, potentially guiding casting decisions for future productions.

b. Identify the top 10 directors who have appeared in most movies or TV shows.

Hint: We want you to group by each director and find the count of unique titles of Tv-shows/movies

Solution:

```
# Count unique titles for each director

top_directors =
netflix_data.groupby('director')['title'].nunique().sort_values(ascending=False).head(10)

# Print the top 10 directors

print("\nTop 10 Directors who have directed most Movies/TV Shows:")

print(top_directors)
```

Output:

```
Top 10 Directors who have directed most Movies/TV Shows:
director
Rajiv Chilaka             19
Raúl Campos, Jan Suter    18
Suhas Kadav               16
Marcus Raboy              16
Jay Karas                 14
Cathy Garcia-Molina       13
Jay Chapman               12
Youssef Chahine           12
Martin Scorsese           12
Steven Spielberg          11
Name: title, dtype: int64
```

Explanation:
This analysis highlights the top 10 directors who have directed the most movies and TV shows available on Netflix. By examining the unique titles attributed to each director, we gain insights

into directorial trends and can identify key figures whose work could enhance Netflix's content strategy.

---

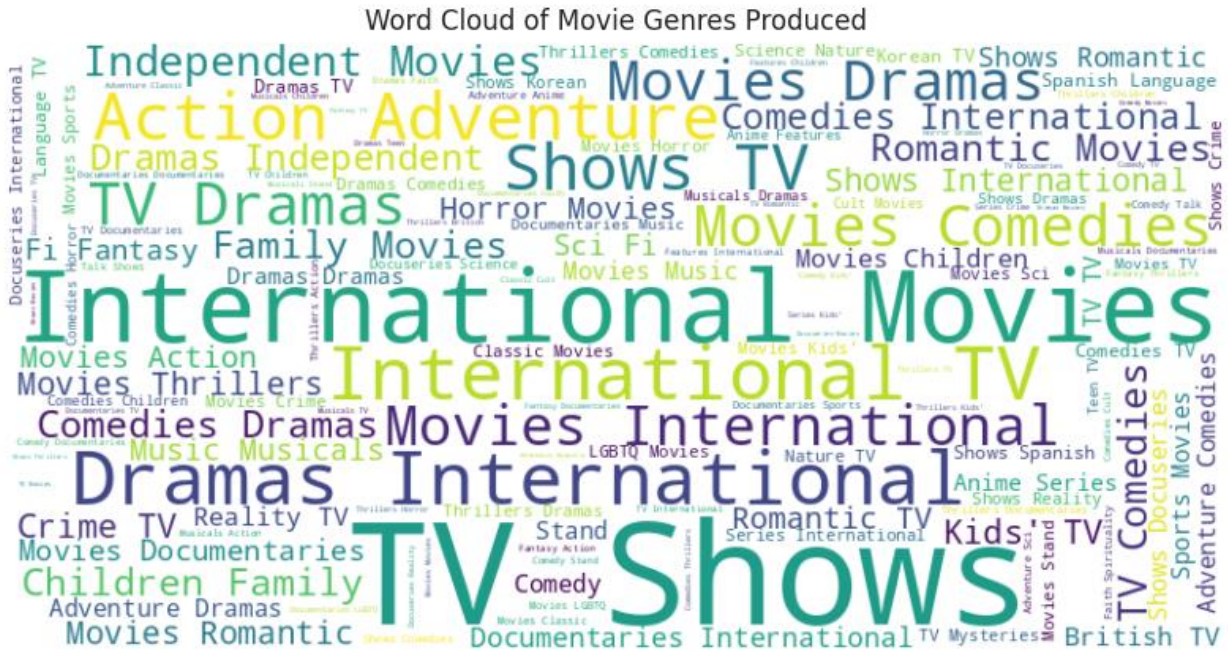
5. Which genre movies are more popular or produced more

Hint: We want you to apply the word cloud on the genre columns to know which kind of genre is produced

Solution:

```
# Import necessary libraries

import pandas as pd

from wordcloud import WordCloud

import matplotlib.pyplot as plt

# Load the dataset

netflix_data = pd.read_csv('netflix.csv')

# Combine all genres into a single string

all_genres = ' '.join(netflix_data['listed_in'].dropna())

# Create a word cloud

wordcloud = WordCloud(width=800, height=400,
background_color='white').generate(all_genres)

# Plot the word cloud

plt.figure(figsize=(10, 5))

plt.imshow(wordcloud, interpolation='bilinear')

plt.axis('off')  # Hide the axis

plt.title("Word Cloud of Movie Genres Produced")

plt.show()
```

Output:



Explanation:

The word cloud illustrates the frequency of various genres produced on Netflix. Larger font sizes indicate more frequently produced genres, while smaller sizes represent those that are less common. This visualization helps identify popular genres, guiding Netflix in making informed decisions about future content production and potential areas for growth.

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6. Find After how many days the movie will be added to Netflix after the release of the movie (you can consider the recent past data)

Hint: We want you to get the difference between the columns having date added information and release year information and get the mode of difference. This will give an insight into what will be the better time to add in Netflix.

Solution:

```
# Import necessary libraries

import pandas as pd

# Load the dataset

netflix_data = pd.read_csv('netflix.csv')

# Convert 'date_added' to datetime

netflix_data['date_added'] = pd.to_datetime(netflix_data['date_added'], errors='coerce')
```

```
# Create a new column 'release_date' by combining 'release_year' with a default date (e.g., January 1)
netflix_data['release_date'] = pd.to_datetime(netflix_data['release_year'].astype(str) + '-01-01')
# Calculate the difference in days between 'date_added' and 'release_date'
netflix_data['days_to_add'] = (netflix_data['date_added'] - netflix_data['release_date']).dt.days
# Get the mode of the difference
mode_days_to_add = netflix_data['days_to_add'].mode()[0]

# Print the result
print(f"The mode of days taken to add a movie to Netflix after its release is: {mode_days_to_add} days.")
```

Output:

```
The mode of days taken to add a movie to Netflix after its release is: 334.0 days.
```

Explanation:

The analysis shows that movies are typically added to Netflix 334 days after their release. This insight can guide Netflix in optimizing its content acquisition strategy and managing viewer expectations, ultimately enhancing engagement and competitiveness in the streaming market.