Import the CSV file

```
1 from google.colab import files
2 import pandas as pd
3
4 uploaded = files.upload()
```

Choose Files no files selected Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving all-weeks-countries.csv to all-weeks-countries.csv
```

```
file_name = list(uploaded.keys())[0]
top10 = pd.read_csv(file_name)

top10 = pd.DataFrame(top10)

top10.info()
top10.describe()
```

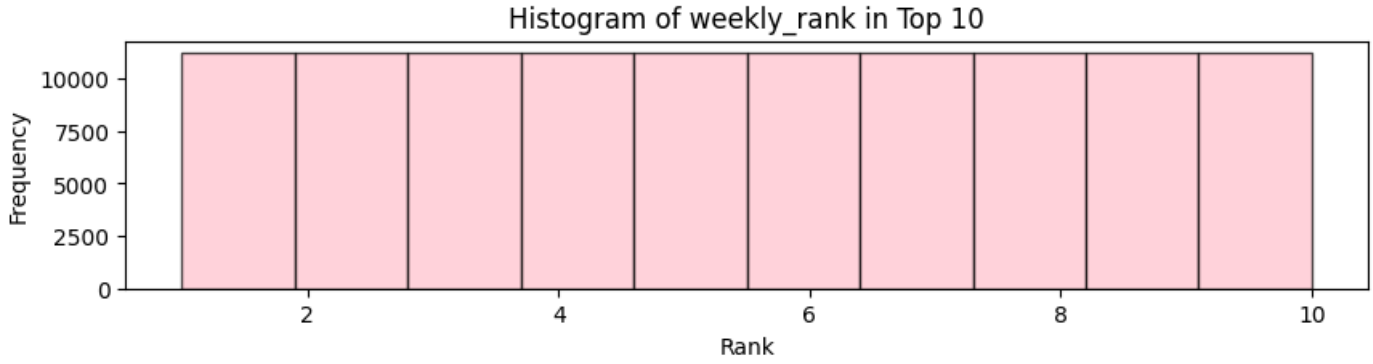
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 112300 entries, 0 to 112299
Data columns (total 8 columns):
 #   Column                      Non-Null Count   Dtype 
---  ------                      --------------   ----- 
 0   country_name                112300 non-null  object
 1   country_iso2                112300 non-null  object
 2   week                        112300 non-null  object
 3   category                    112300 non-null  object
 4   weekly_rank                 112300 non-null  int64 
 5   show_title                  112300 non-null  object
 6   season_title                54668 non-null   object
 7   cumulative_weeks_in_top_10  112300 non-null  int64 
dtypes: int64(2), object(6)
memory usage: 6.9+ MB
```

	weekly_rank	cumulative_weeks_in_top_10
count	112300.000000	112300.000000
mean	5.500000	3.468281
std	2.872294	5.518189
min	1.000000	1.000000
25%	3.000000	1.000000
50%	5.500000	2.000000
75%	8.000000	3.000000
max	10.000000	60.000000

Preliminary analysis

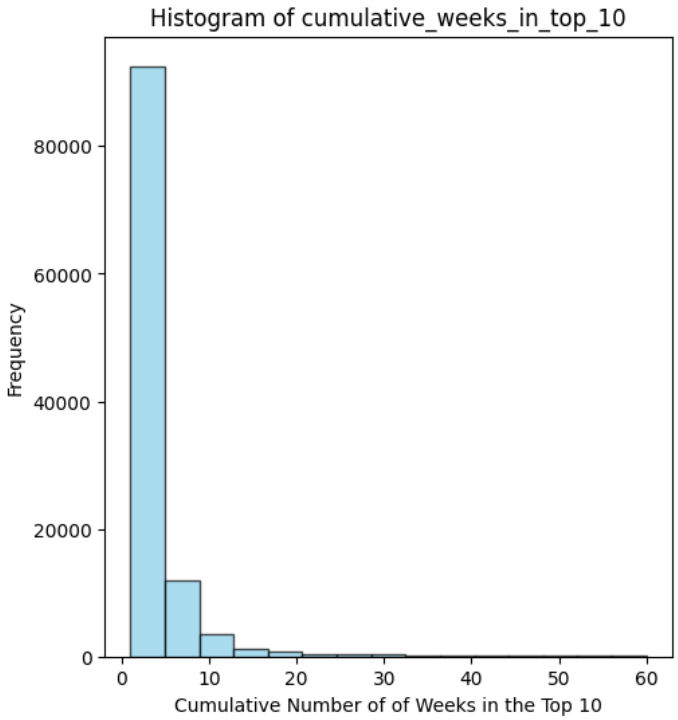
```
import matplotlib.pyplot as plt

plt.figure(figsize=(10, 2))
plt.hist(top10['weekly_rank'], bins=10, edgecolor='black', alpha=0.7, color='p
plt.title('Histogram of weekly_rank in Top 10')
plt.xlabel('Rank')
plt.ylabel('Frequency')

```

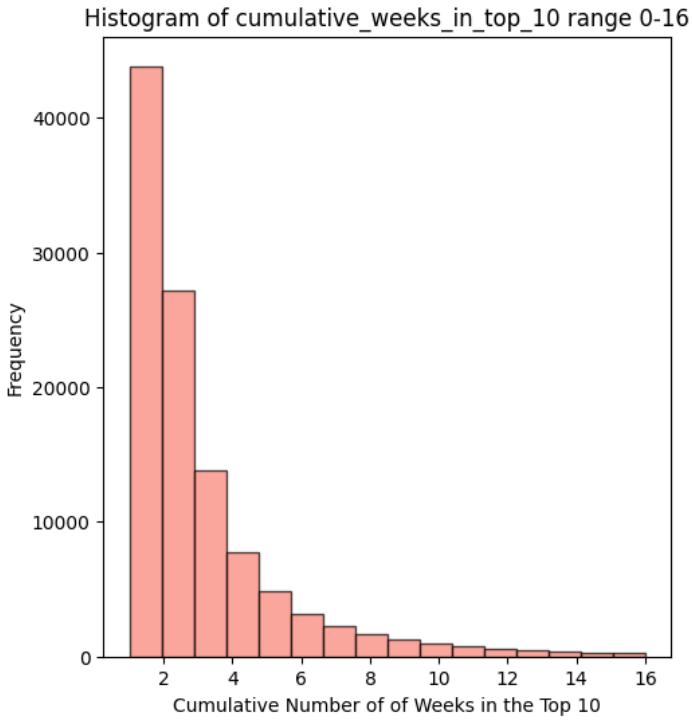
```
Text(0, 0.5, 'Frequency')
```



```
fig, axes = plt.subplots(nrows=1, ncols=2, figsize=(12, 6))

axes[0].hist(top10['cumulative_weeks_in_top_10'], bins=15, edgecolor='black', 
axes[0].set_title('Histogram of cumulative_weeks_in_top_10')
axes[0].set_xlabel('Cumulative Number of of Weeks in the Top 10')
axes[0].set_ylabel('Frequency')

axes[1].hist(top10['cumulative_weeks_in_top_10'], bins=16, range=(1, 16), edge
axes[1].set_title('Histogram of cumulative_weeks_in_top_10 range 0-16')
axes[1].set_xlabel('Cumulative Number of of Weeks in the Top 10')
axes[1].set_ylabel('Frequency')

```

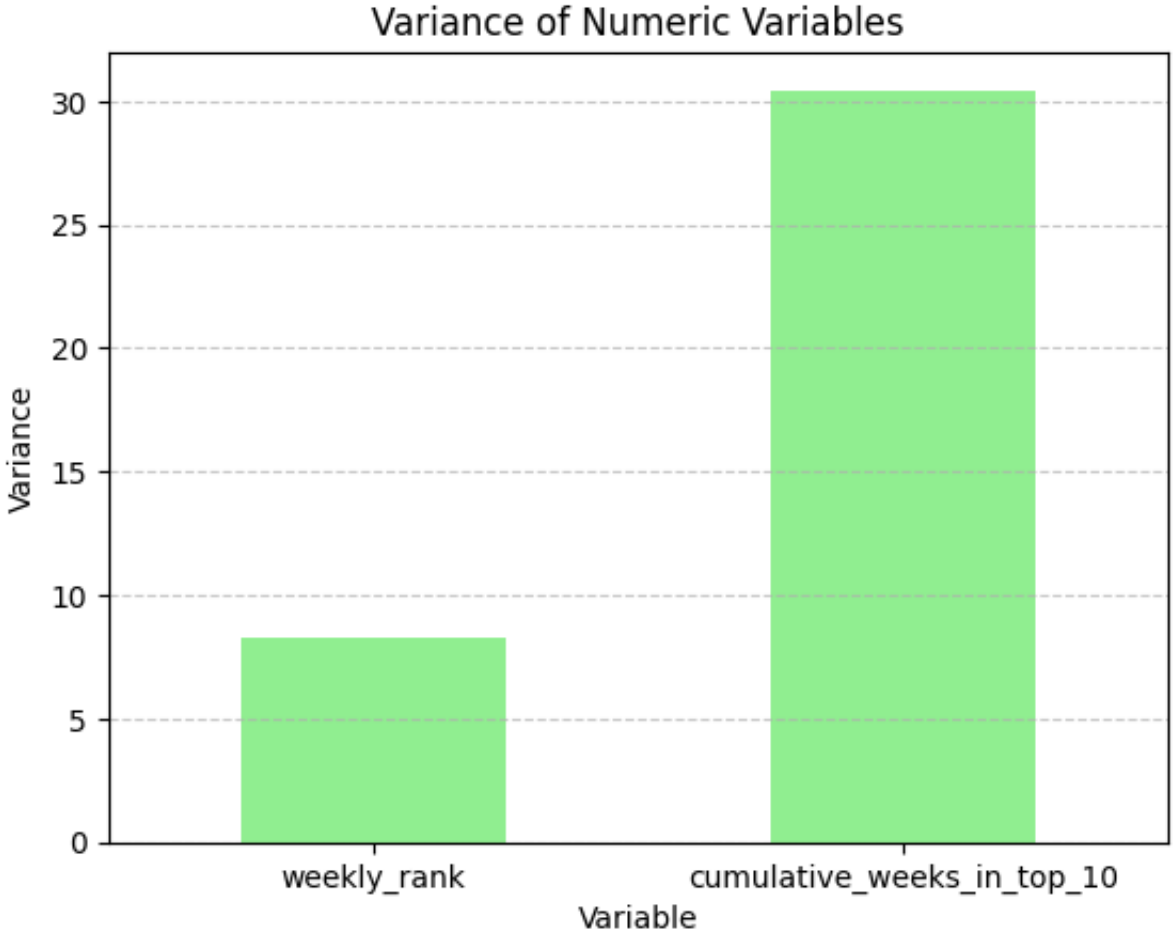
```
Text(0, 0.5, 'Frequency')
```



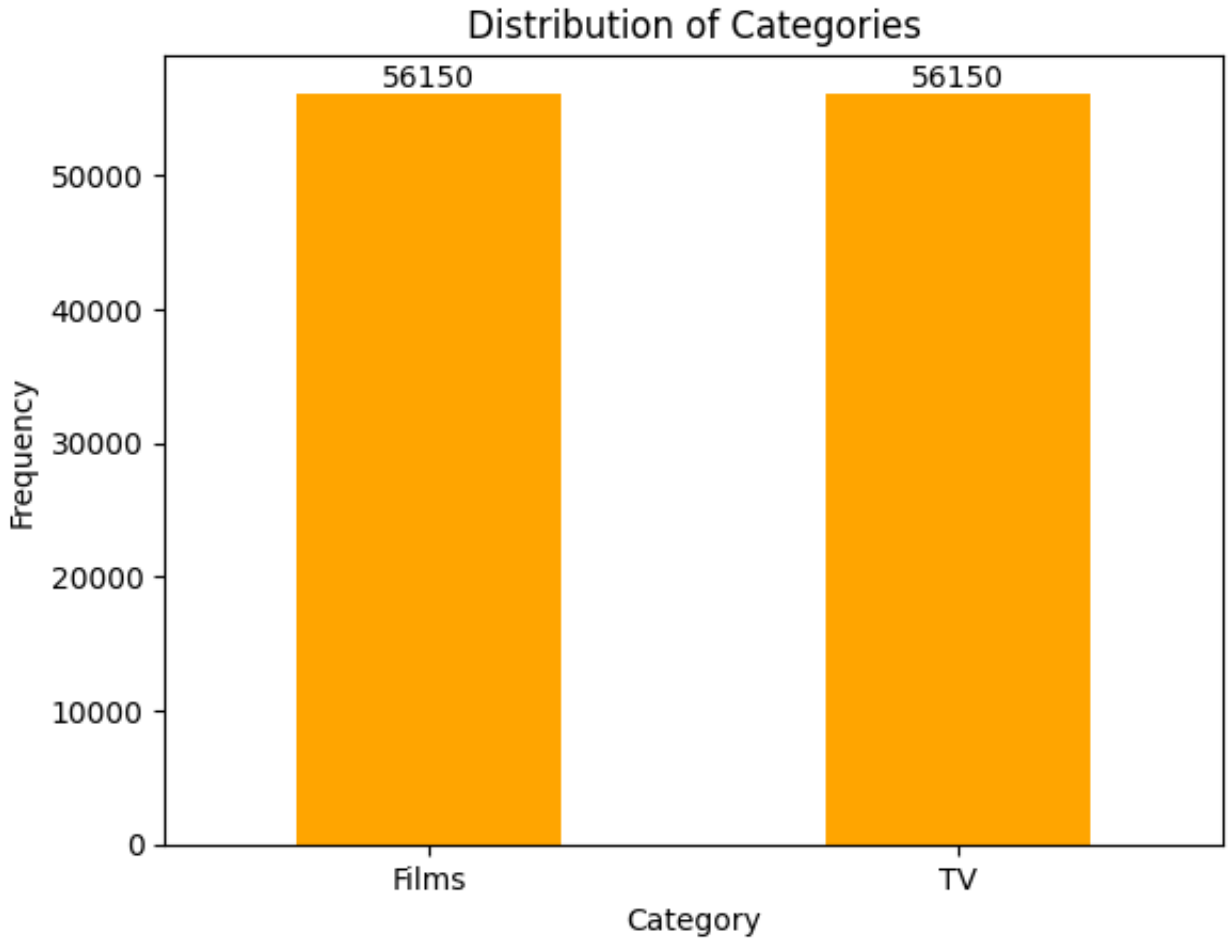


```
variances = top10.var()

variances.plot(kind='bar', color='lightgreen')
plt.title('Variance of Numeric Variables')
plt.xlabel('Variable')
plt.ylabel('Variance')
plt.xticks(rotation=0)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```

```
<ipython-input-5-4c8b6dacff89>:1: FutureWarning: The default value of numeric_
  variances = top10.var()
```

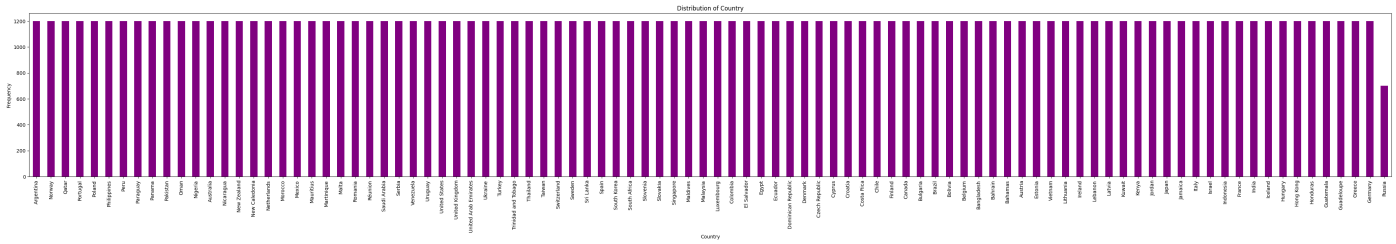


```
category_counts = top10['category'].value_counts()
category_counts.plot(kind='bar', color='orange')

for i, count in enumerate(category_counts):
    plt.text(i, count, str(count), ha='center', va='bottom')

plt.title('Distribution of Categories')
plt.xlabel('Category')
plt.ylabel('Frequency')
plt.xticks(rotation=0)
plt.show()
```



```
plt.figure(figsize=(50, 6))
top10['country_name'].value_counts().plot(kind='bar', color='purple')
plt.title('Distribution of Countries')
plt.xlabel('Country')
plt.ylabel('Frequency')

print(top10['country_name'].nunique())

plt.title('Distribution of Country')
plt.xticks(rotation=90)
plt.show()
```

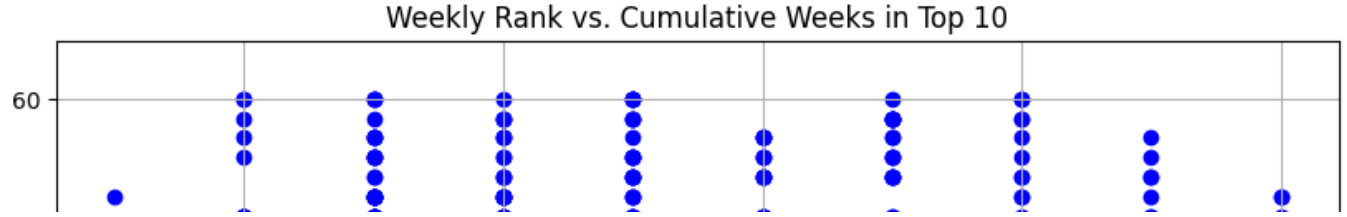
```
94
```

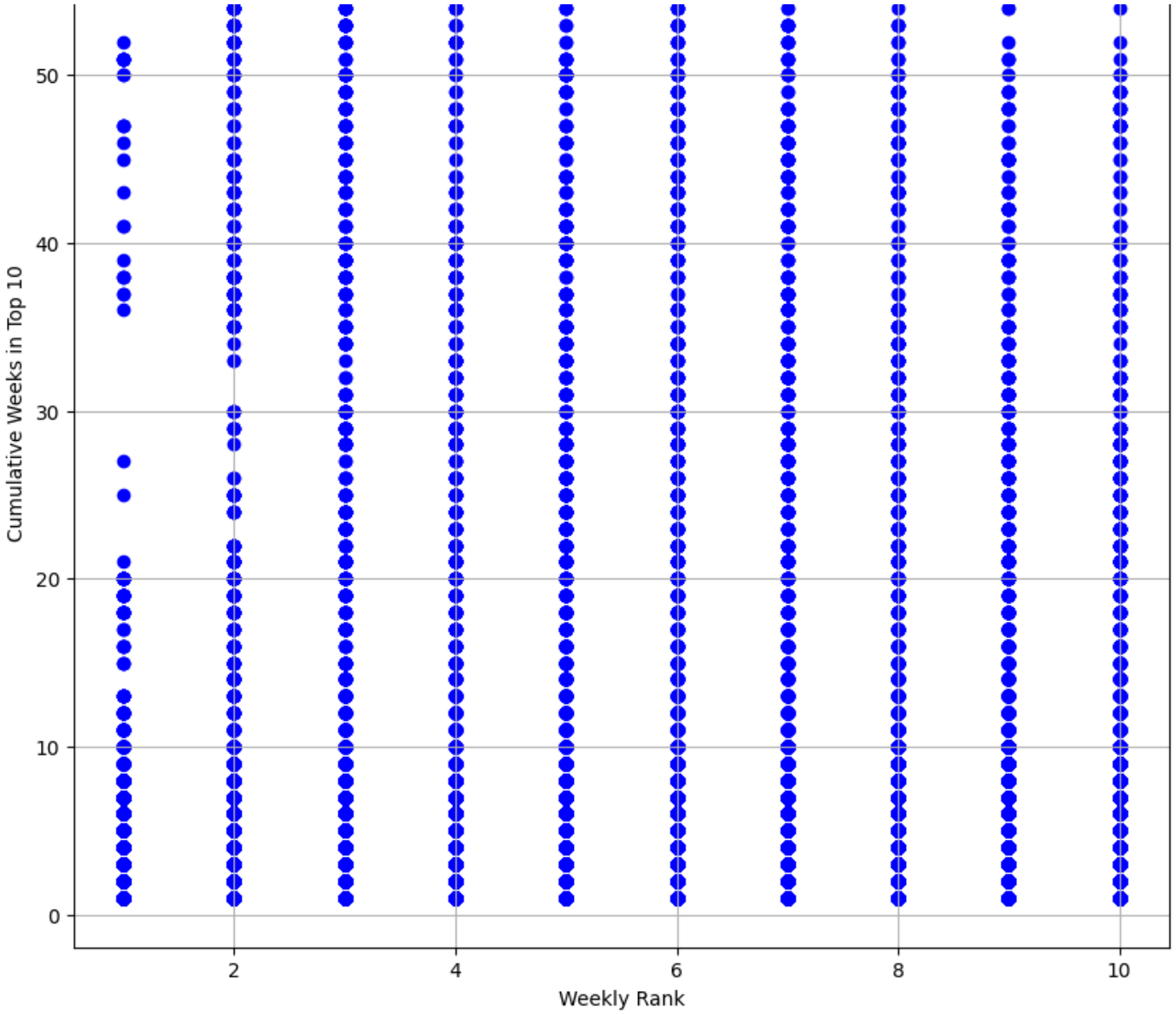



```
spearman_corr = top10[['weekly_rank', 'cumulative_weeks_in_top_10']].corr(meth
print(spearman_corr)
```

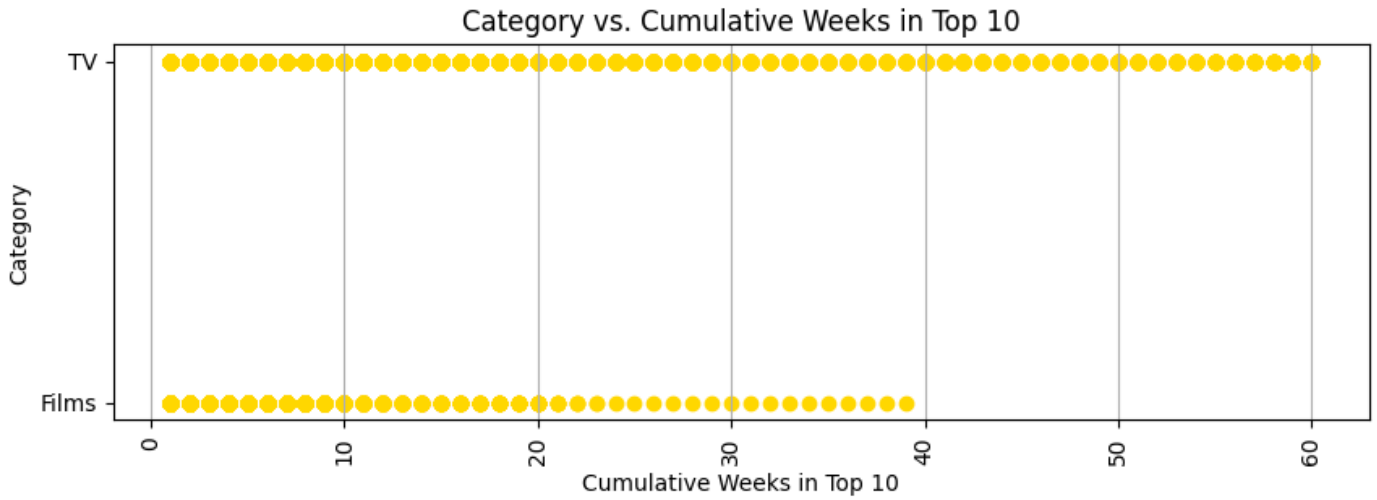
```
                          weekly_rank  cumulative_weeks_in_top_10
weekly_rank                  1.000000                    0.028064
cumulative_weeks_in_top_10   0.028064                    1.000000
```

```
plt.figure(figsize=(10, 10))
plt.scatter(top10['weekly_rank'], top10['cumulative_weeks_in_top_10'], color='
plt.title('Weekly Rank vs. Cumulative Weeks in Top 10')
plt.xlabel('Weekly Rank')
plt.ylabel('Cumulative Weeks in Top 10')
plt.grid(True)
plt.show()
```

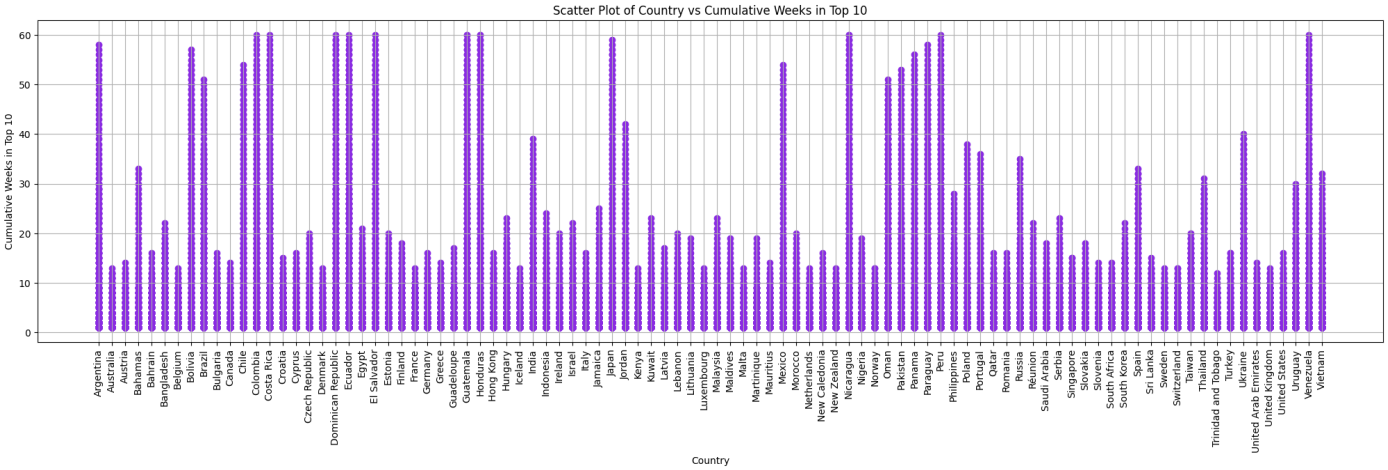



Cumulative Weeks in Top 10
0
10
20
30
40
50
2
4
6
8
10
Weekly Rank

```
plt.figure(figsize=(10, 3))
plt.scatter(top10['cumulative_weeks_in_top_10'], top10['category'], color='gol
plt.xlabel('Cumulative Weeks in Top 10')
plt.ylabel('Category')
plt.title('Category vs. Cumulative Weeks in Top 10')
plt.xticks(rotation=90)
plt.grid(axis='x')
plt.show()
```



```
plt.figure(figsize=(25, 6))
plt.scatter(top10['country_name'], top10['cumulative_weeks_in_top_10'], color=
plt.xlabel('Country')
plt.ylabel('Cumulative Weeks in Top 10')
plt.title('Scatter Plot of Country vs Cumulative Weeks in Top 10')
plt.xticks(rotation=90)
plt.grid(True)
plt.show()
```



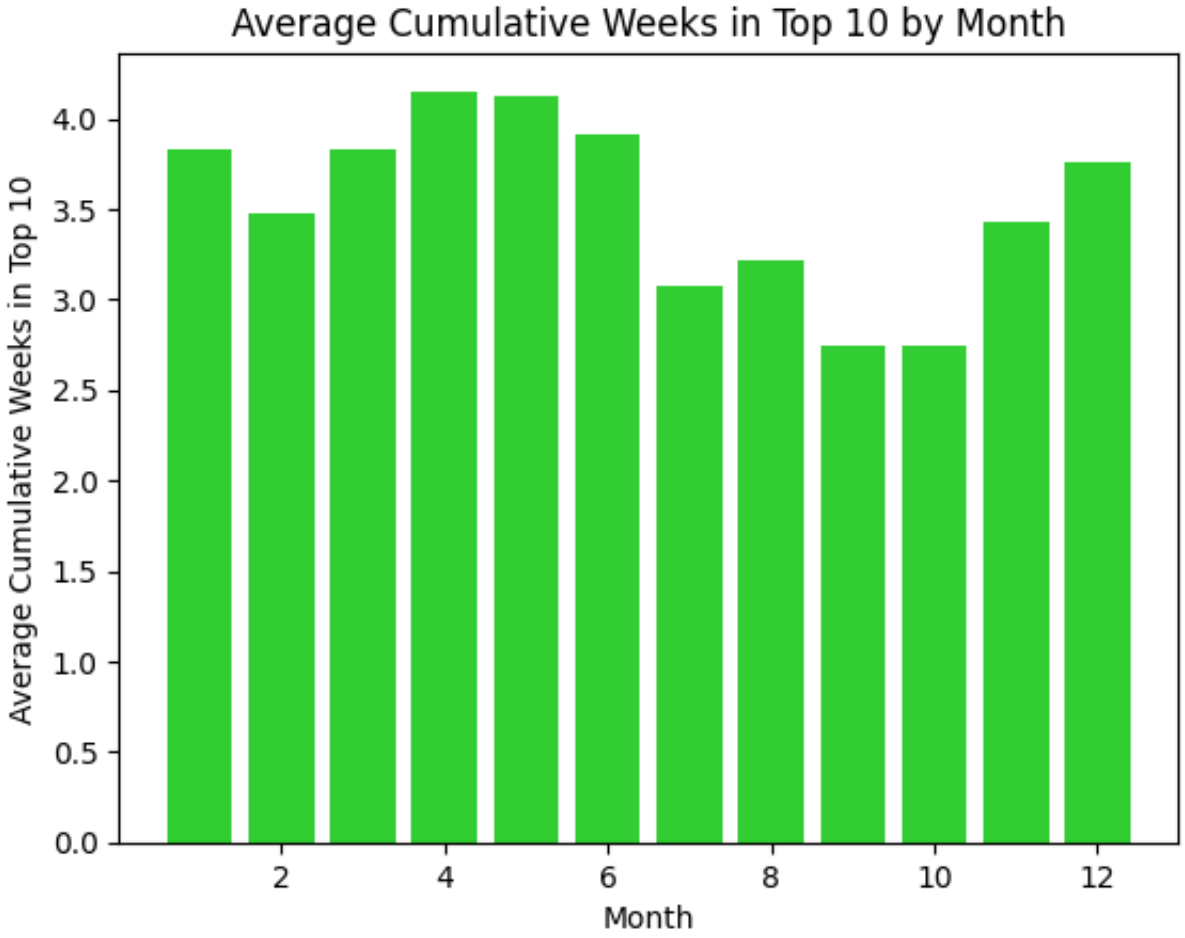
Initial Results and Code

Does date correlate with shows that have larger cumulative weeks in Top 10?

```
#Calculate the average cumulative_weeks_in_top_10 for each month
top10['week'] = pd.to_datetime(top10['week'])
top10['month'] = top10['week'].dt.month

average_weeks_top_10_monthly = top10.groupby('month')['cumulative_weeks_in_top
print(average_weeks_top_10_monthly)

```

```
#view distribution of the average cumulative_weeks_in_top_10 for each month
plt.bar(average_weeks_top_10_monthly.index, average_weeks_top_10_monthly.value
plt.xlabel('Month')
plt.ylabel('Average Cumulative Weeks in Top 10')
plt.title('Average Cumulative Weeks in Top 10 by Month')
plt.show()

#The data is non-normally distributed thus we must use non-parametric statisti
#determine the significance of the relationship between month and cumulative w
from scipy.stats import kruskal

data_by_month = [group.values for name, group in top10.groupby('month')['cumul
print(data_by_month)

kruskal_result = kruskal(*data_by_month)
print(kruskal_result)
```

```
month
1     3.827766
2     3.475399
3     3.834274
4     4.151882
5     4.122366
6     3.916801
7     3.080856
8     3.216422
9     2.750665
10    2.745319
11    3.424202
12    3.754388
Name: cumulative_weeks_in_top_10, dtype: float64
```




```
[array([ 2,  3,  1, ..., 21,  1,  3]), array([1, 2, 1, ..., 3, 1, 3]), array([
KruskalResult(statistic=798.6599409998698, pvalue=3.674882741765935e-164)
```

```
1 from itertools import combinations
2 from scipy.stats import ttest_ind
3
```

```
months = top10['month'].unique()

#Assuming the dataset is sufficiently large, we can perform t-tests on the
#average cumualtive weeks in top 10 between each month

''' from these results we can infer which months have significant relationship
whether there is a TV consumption trend'''

for month1, month2 in combinations(months, 2):
    data_month1 = top10[top10['month'] == month1]['cumulative_weeks_in_top_10'
    data_month2 = top10[top10['month'] == month2]['cumulative_weeks_in_top_10'

    t_statistic, p_value = ttest_ind(data_month1, data_month2)

    print(f"t-test between month {month1} and month {month2}:")
    print("t-statistic:", t_statistic)
    print("p-value:", p_value)
    print()
```

```
t-test between month 2 and month 1:
t-statistic: -4.324591639625354
p-value: 1.5368926723105155e-05

t-test between month 2 and month 12:
t-statistic: -3.346798922724639
p-value: 0.0008195082287091936

t-test between month 2 and month 11:
t-statistic: 0.6517315835823291
p-value: 0.5145843041182403

t-test between month 2 and month 10:
t-statistic: 10.887232607818243
p-value: 1.636175202464997e-27

t-test between month 2 and month 9:
t-statistic: 10.160535665984233
p-value: 3.560190557251464e-24

t-test between month 1 and month 12:
t-statistic: 0.9766721429985747
p-value: 0.3287454555099556

t-test between month 1 and month 11:
t-statistic: 5.6946452915759895
p-value: 1.2568120167180884e-08
```

```
t-test between month 1 and month 10:
t-statistic: 17.878055935482745
p-value: 6.756436741720882e-71

t-test between month 1 and month 9:
t-statistic: 16.708487267559864
p-value: 3.5808423797454773e-62

t-test between month 12 and month 11:
t-statistic: 4.703586237878578
p-value: 2.5790393231842418e-06

t-test between month 12 and month 10:
t-statistic: 17.0504933145285
p-value: 1.2016725795091587e-64

t-test between month 12 and month 9:
t-statistic: 16.187596910486995
p-value: 1.9232420848985566e-58

t-test between month 11 and month 10:
t-statistic: 12.650184174461105
p-value: 1.6333181222166085e-36

t-test between month 11 and month 9:
t-statistic: 12.162578595087783
p-value: 7.093872323563874e-34

t-test between month 10 and month 9:
t-statistic: -0.11913295030528707
```

Are shows that make the top 10 in the United States more likely to make the top 10 in other countries? Western countries? English speaking countries?

```
# A list of every country for which top 10 data is included in the dataset
countries = top10["country_name"].unique()
print(countries)

print("\n")

num_countries = len(countries)
print(num_countries)
```

```
['Argentina' 'Australia' 'Austria' 'Bahamas' 'Bahrain' 'Bangladesh'
 'Belgium' 'Bolivia' 'Brazil' 'Bulgaria' 'Canada' 'Chile' 'Colombia'
 'Costa Rica' 'Croatia' 'Cyprus' 'Czech Republic' 'Denmark'
 'Dominican Republic' 'Ecuador' 'Egypt' 'El Salvador' 'Estonia' 'Finland'
 'France' 'Germany' 'Greece' 'Guadeloupe' 'Guatemala' 'Honduras'
 'Hong Kong' 'Hungary' 'Iceland' 'India' 'Indonesia' 'Ireland' 'Israel'
 'Italy' 'Jamaica' 'Japan' 'Jordan' 'Kenya' 'Kuwait' 'Latvia' 'Lebanon'
 'Lithuania' 'Luxembourg' 'Malaysia' 'Maldives' 'Malta' 'Martinique'
 'Mauritius' 'Mexico' 'Morocco' 'Netherlands' 'New Caledonia'
 'New Zealand' 'Nicaragua' 'Nigeria' 'Norway' 'Oman' 'Pakistan' 'Panama'
 'Paraguay' 'Peru' 'Philippines' 'Poland' 'Portugal' 'Qatar' 'Romania'
 'Russia' 'Réunion' 'Saudi Arabia' 'Serbia' 'Singapore' 'Slovakia'
 'Slovenia' 'South Africa' 'South Korea' 'Spain' 'Sri Lanka' 'Sweden'
 'Switzerland' 'Taiwan' 'Thailand' 'Trinidad and Tobago' 'Turkey'
 'Ukraine' 'United Arab Emirates' 'United Kingdom' 'United States'
 'Uruguay' 'Venezuela' 'Vietnam']


94
```

```
#The shows/movies that make the Top 10 in the United States
us_shows = top10[top10['country_name'] == 'United States']

#count the frequency of how many times each show_title appears in the Top 10 f
us_show_frequency = us_shows.groupby('show_title').size()
us_show_frequency_sorted = us_show_frequency.sort_values(ascending=False)

#the top 10 most frequently occuring shows/movies that make the top 10 in the
us_top10 = us_show_frequency_sorted.head(10)
print(us_top10)

```

```
show_title
CoComelon          52
Stranger Things    43
Ozark              23
Manifest           20
All American       18
Virgin River       15
Bridgerton         12
You                11
The Witcher        11
Squid Game         11
dtype: int64
```

```
#The shows/movies that make the Top 10 in Canada
can_shows = top10[top10['country_name'] == 'Canada']

#count the frequency of how many times each show_title appears in the Top 10 f
can_show_frequency = can_shows.groupby('show_title').size()
can_show_frequency_sorted = can_show_frequency.sort_values(ascending=False)

#the top 10 most frequently occuring shows/movies that make the top 10 in Cana
can_top10 = can_show_frequency_sorted.head(10)
print(can_top10)
```

```
show_title
Stranger Things    37
Ozark              21
Blindspot          21
Manifest           14
Young Sheldon      13
Maid               12
Bridgerton         12
The Witcher        11
Love Is Blind      11
You                11
dtype: int64
```

```
'''Count the number of times Top 10 US shows/movies make the Top 10 in other c

top10_frequency_by_country = {}

#Compute frequency of each show in the top 10 for each country that is not the
for country in top10['country_name'].unique():
    if country != 'United States':
        country_shows = top10[top10['country_name'] == country]
        country_show_frequency = country_shows['show_title'].value_counts().he
        top10_frequency_by_country[country] = country_show_frequency

#DataFrame to store contingency table
contingency_table = pd.DataFrame(index=us_top10.index, columns=top10_frequency_

#Fill the contingency table with frequency counts
for country, country_frequency in top10_frequency_by_country.items():
    for show in us_top10.index:
        # Fill in the frequency count for each show in the top 10 for the curr
        contingency_table.loc[show, country] = country_frequency.get(show, 0)

#Fill the contingency table for the US
```

```
for show in us_top10.index:
    contingency_table.loc[show, 'United States'] = us_show_frequency.get(show,

print(contingency_table)
```

```
                Argentina Australia Austria Bahamas Bahrain Bangladesh  \
show_title
CoComelon               0         0       0      17       0          0
Stranger Things        24        41      40      30      36         44
Ozark                   0        14       0      13       0          0
Manifest               15        26      20      16       0         21
All American            0         0       0       0       0          0
Virgin River            0        13       0      12       0          0
Bridgerton              0        14      13      11      13          0
You                     0        12      15       0      11          0
The Witcher             0         0      12       0      12          0
Squid Game             11        11      12       0      16         22

                Belgium Bolivia Brazil Bulgaria  ... Thailand  \
show_title                                       ...
CoComelon             0       0      0        0  ...        0
Stranger Things      41      27     31       46  ...       21
Ozark                 0       0      0        0  ...        0
Manifest             15       0      0       20  ...        0
All American          0       0      0        0  ...        0
Virgin River         12       0      0        0  ...        0
Bridgerton           14       0      0       15  ...        0
You                  12       0      0       15  ...        0
The Witcher          11       0      0       15  ...        0
Squid Game           11       0     10       16  ...        0

                Trinidad and Tobago Turkey Ukraine United Arab Emirates  \
show_title
CoComelon                         0      0       0                    0
Stranger Things                  34     34      46                   34
Ozark                            12      0      28                   10
Manifest                         16      0       0                    0
All American                      0      0       0                    0
Virgin River                     12      0       0                    0
Bridgerton                       13      0      35                   13
You                              13     19      21                   10
The Witcher                      11      0      27                   11
Squid Game                        0     16       0                   14

                United Kingdom Uruguay Venezuela Vietnam United States
show_title
CoComelon                    0       0         0       0          52.0
Stranger Things             46      21        19      25          43.0
Ozark                       17       0         0       0          23.0
```

```
Manifest                    0      16       15       0          20.0
All American                0       0        0       0          18.0
Virgin River               12       0        0       0          15.0
Bridgerton                 13       0        0       0          12.0
You                        13      12        0       0          11.0
The Witcher                 0       0        0       0          11.0
Squid Game                 10       0        0       0          11.0

[10 rows x 94 columns]
```

```
'''Calculate whether the results in the contingency table above are significan

import numpy as np
from scipy.stats import chi2_contingency

p_values = {}

for country in contingency_table.columns:
    # Extract observed frequencies for the current country
    observed_frequencies = contingency_table[country].values.astype(float)
    row_totals = contingency_table.sum(axis=1)
    column_totals = contingency_table.sum(axis=0)
    expected_frequencies = np.outer(row_totals, column_totals) / row_totals.su
    expected_frequencies = expected_frequencies[:, contingency_table.columns.g

    chi2_stat, p_value, _, _ = chi2_contingency([observed_frequencies, expecte

    p_values[country] = p_value


for country, p_value in p_values.items():
    print(f"{country}: {p_value}")


print("\n")

'''Here, significant countries suggests that in these countries, a show/movie 
the Top 10 in the US is likely to make the Top 10 in the listed country. Possi
influence the markets in these other countries.'''

significant_countries = [country for country, p_value in p_values.items() if p
print("List of Significant Countries", significant_countries)
```

```
Jordan: 2.9884026444445108e-05
Kenya: 0.0505726389320982
```

```
Kuwait: 0.00012518788664030034
Latvia: 0.0036623239495632374
Lebanon: 0.00014233708594856714
Lithuania: 0.01013552331735906
Luxembourg: 0.03257002315611079
Malaysia: 0.014188477714176969
Maldives: 0.004153869248331972
Malta: 0.0008714551433422026
Martinique: 0.034957038135512285
Mauritius: 0.015399724013805837
Mexico: 0.0027843972455754208
Morocco: 0.000611412614606106
Netherlands: 5.587868575947894e-05
New Caledonia: 0.021102821293318457
New Zealand: 1.9388276955265418e-05
Nicaragua: 0.04409396244769613
Nigeria: 0.0019520571297548723
Norway: 3.034455861014874e-05
Oman: 0.005268137544786315
Pakistan: 0.0003658332893763554
Panama: 0.01326424107608904
Paraguay: 0.015316351845605206
Peru: 0.0206159800194768
Philippines: 0.015008299565895349
Poland: 0.03306371588803032
Portugal: 0.0017040677828814136
Qatar: 0.0005453804935978162
Romania: 0.0037403045996279014
Russia: 6.145670330520167e-16
Réunion: 0.033139093941267496
Saudi Arabia: 1.9679226758956863e-05
Serbia: 3.818540781175382e-07
Singapore: 0.029370495562954648
Slovakia: 1.0532719195131897e-05
Slovenia: 0.008692652331488748
South Africa: 0.04623109664188473
South Korea: 0.004584812871061249
Spain: 0.005239982027083498
Sri Lanka: 0.018355977793873757
Sweden: 0.004804139909884401
Switzerland: 0.05878084007392329
Taiwan: nan
Thailand: 0.039870176610579594
Trinidad and Tobago: 0.0007869445378556762
Turkey: 1.0088783514926642e-05
Ukraine: 8.185745238206755e-16
United Arab Emirates: 0.0008636492796893472
United Kingdom: 4.8371130152199034e-06
Uruguay: 0.004888806769799585
Venezuela: 0.026938079134912037
```

```
Vietnam: 0.012766005229262795
United States: 1.919391971704617e-17


List of Significant Countries ['Bahamas', 'Bahrain', 'Bangladesh', 'Bolivia',
/usr/local/lib/python3.10/dist-packages/scipy/stats/contingency.py:134: Runtim
```

```
print("Number of significant countries: ", len(significant_countries))

#English language countries as per The University of Tennessee Knoxville
#Note this list does not include the UK, Australia but I have added them in

#strong limitation is the definition of english-language country
#not every country is listed and not every country was checked against the 94
'''https://gradschool.utk.edu/future-students/office-of-graduate-admissions/ap
admission-requirements/testing-requirements/countries-with-english-as-official-

english_speaking_countries = [
    'Anguilla', 'Antigua and Barbuda', 'Bahamas', 'Barbados', 'Belize', 'Belgi
    'British Virgin Islands', 'Burundi', 'Cameroon', 'Canada', 'Cayman Islands
    'Dominica', 'Fiji', 'Gambia', 'Ghana', 'Grenada', 'Guyana', 'Hong Kong', '
    'Liberia', 'Malawi', 'Malta', 'Marshall Islands', 'Micronesia', 'Namibia',
    'Nigeria', 'Niue', 'Norfolk Island', 'Northern Mariana Islands', 'Pakistan
    'Philippines', 'Pitcairn Islands', 'Rwanda', 'Saint Kitts and Nevis', 'Sai
    'Sierra Leone', 'Singapore', 'Sint Maarten', 'Solomon Islands', 'Somalia',
    'Swaziland', 'Tanzania', 'Tonga', 'Trinidad and Tobago', 'Turks and Caicos
    'Zimbabwe', 'United Kingdom', 'Australia']

# Of the significant countries, which are english-speaking?
num_significant_english_speaking_countries = 0

for country in significant_countries:
    if country in english_speaking_countries:
        num_significant_english_speaking_countries = num_significant_english_s

print("Number of significant english speaking countries: ", num_significant_en
```

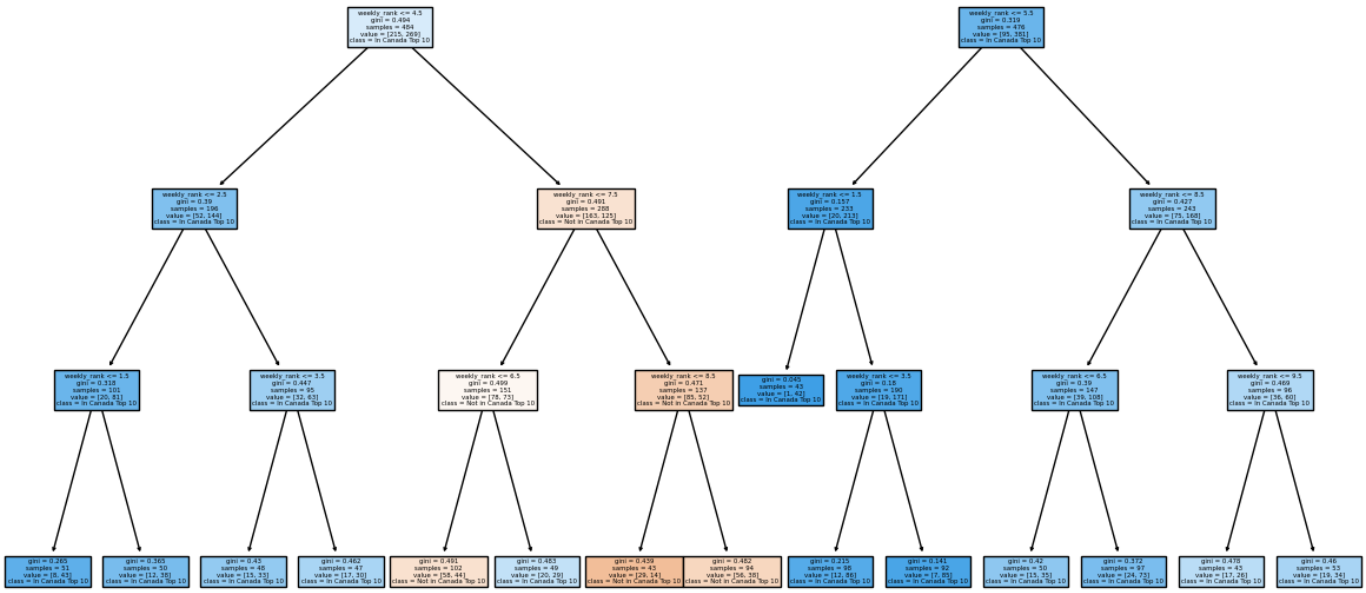
```
Number of significant countries:  52
Number of significant english speaking countries:  10
```

```
'''Can we use classification to predict whether Top 10 US shows make the Top 1

from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier, plot_tree
```

```
from sklearn.metrics import confusion_matrix, classification_report
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.preprocessing import OneHotEncoder

us_shows = top10[top10['country_name'] == 'United States']

# Determine target variable indicating whether the show made it to the top 10
target_variable = (us_shows['show_title'].isin(top10[top10['country_name'] ==

# Combine features and target variable into a dataset
prepared_dataset = pd.concat([us_shows[['show_title', 'category', 'weekly_rank
prepared_dataset.columns = ['show_title', 'category', 'weekly_rank', 'country_

print(prepared_dataset)

prepared_dataset['category'] = prepared_dataset['category'].map({'Films': 0, '
X = prepared_dataset[['weekly_rank', 'category']]
y = prepared_dataset['is_top_10_canada']

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, rando

# Instantiate the decision tree classifier
classifier = DecisionTreeClassifier(max_depth=4, random_state=42)

# Train the decision tree classifier on the training data
classifier.fit(X_train, y_train)

# Make predictions on the testing data
y_pred = classifier.predict(X_test)

# Print confusion matrix and classification report
conf_matrix = confusion_matrix(y_test, y_pred)
class_report = classification_report(y_test, y_pred)

print("Confusion Matrix:")
print(conf_matrix)
print("\nClassification Report:")
print(class_report)

# Visualize the decision tree
plt.figure(figsize=(15, 10))
plot_tree(classifier, feature_names=X.columns, class_names=["Not in Canada Top
plt.show()
```

```
50
```

```
                                    show_title category  weekly_rank  \
107500                                Day Shift    Films            1
107501                            Look Both Ways    Films            2
107502  Untold: The Girlfriend Who Didn't Exist    Films            3
107503                                Uncharted    Films            4
107504                                   Sing 2    Films            5
...                                         ...      ...          ...
108695                                CoComelon       TV            6
108696                  Newly Rich, Newly Poor       TV            7
108697                               Sweet Tooth       TV            8
108698                                CoComelon       TV            9
108699                                CoComelon       TV           10

        country_name  is_top_10_canada
107500  United States                 1
107501  United States                 1
107502  United States                 1
107503  United States                 0
107504  United States                 0
...                ...               ...
108695  United States                 0
108696  United States                 0
108697  United States                 0
108698  United States                 0
108699  United States                 0

[1200 rows x 5 columns]
Confusion Matrix:
[[ 35  48]
 [ 26 131]]

Classification Report:
              precision    recall  f1-score   support

           0       0.57      0.42      0.49        83
           1       0.73      0.83      0.78       157

    accuracy                           0.69       240
   macro avg       0.65      0.63      0.63       240
weighted avg       0.68      0.69      0.68       240
```

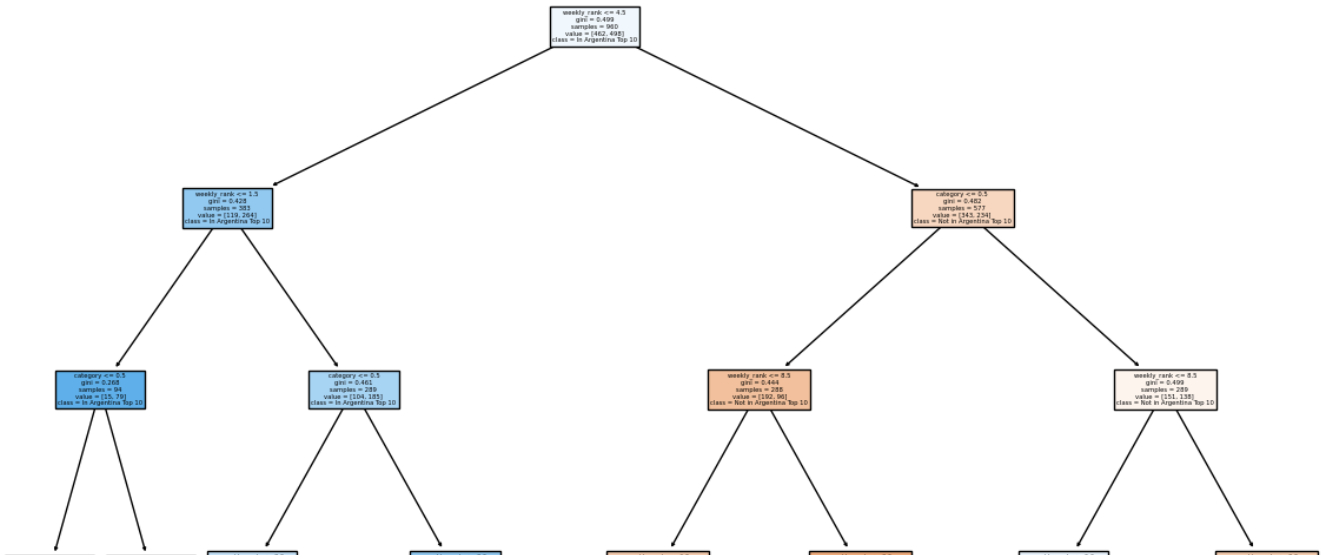


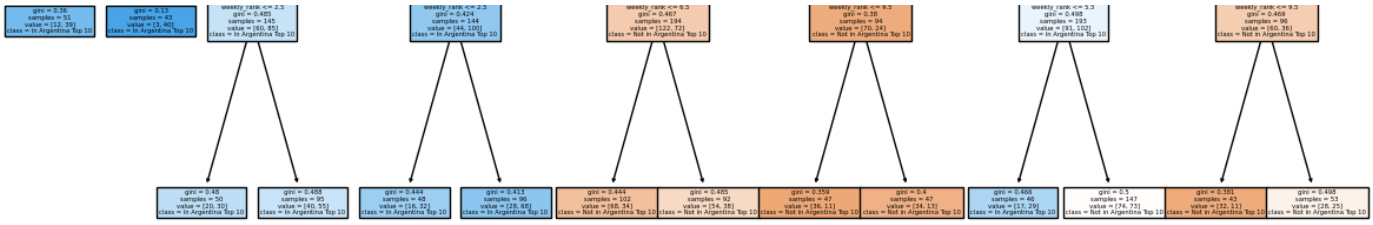
```
'''Can we use classification to predict whether Top 10 US shows make the Top 1

from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.metrics import confusion_matrix, classification_report
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.preprocessing import OneHotEncoder

us_shows = top10[top10['country_name'] == 'United States']

# Determine target variable indicating whether the show made it to the top 10
target_variable = (us_shows['show_title'].isin(top10[top10['country_name'] ==
```

```
14
15 # Combine features and target variable into a dataset
16 prepared_dataset = pd.concat([us_shows[['show_title', 'category', 'weekly_rank
17 prepared_dataset.columns = ['show_title', 'category', 'weekly_rank', 'country_
18
19 print(prepared_dataset)
20
21 prepared_dataset['category'] = prepared_dataset['category'].map({'Films': 0, '
22 X = prepared_dataset[['weekly_rank', 'category']]
23 y = prepared_dataset['is_top_10_Argentina']
24
25 # Split the data into training and testing sets
26 X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, rando
27
28 # Instantiate the decision tree classifier
29 classifier = DecisionTreeClassifier(max_depth=4, random_state=42)
30
31 # Train the decision tree classifier on the training data
32 classifier.fit(X_train, y_train)
33
34 # Make predictions on the testing data
35 y_pred = classifier.predict(X_test)
36
37 # Print confusion matrix and classification report
38 conf_matrix = confusion_matrix(y_test, y_pred)
39 class_report = classification_report(y_test, y_pred)
40
41 print("Confusion Matrix:")
42 print(conf_matrix)
43 print("\nClassification Report:")
44 print(class_report)
45
46 # Visualize the decision tree
47 plt.figure(figsize=(15, 10))
48 plot_tree(classifier, feature_names=X.columns, class_names=["Not in Argentina
49 plt.show()
50
```

```
                                    show_title category  weekly_rank  \
107500                               Day Shift    Films            1
107501                           Look Both Ways    Films            2
107502  Untold: The Girlfriend Who Didn't Exist    Films            3
107503                               Uncharted    Films            4
107504                                  Sing 2    Films            5
...                                        ...      ...          ...
108695                               CoComelon       TV            6
```

```
108696                  Newly Rich, Newly Poor       TV            7
108697                             Sweet Tooth       TV            8
108698                               CoComelon       TV            9
108699                               CoComelon       TV           10

        country_name  is_top_10_Argentina
107500  United States                    1
107501  United States                    1
107502  United States                    0
107503  United States                    0
107504  United States                    0
...               ...                  ...
108695  United States                    0
108696  United States                    1
108697  United States                    0
108698  United States                    0
108699  United States                    0

[1200 rows x 5 columns]
Confusion Matrix:
[[80 40]
 [49 71]]

Classification Report:
              precision    recall  f1-score   support

           0       0.62      0.67      0.64       120
           1       0.64      0.59      0.61       120

    accuracy                           0.63       240
   macro avg       0.63      0.63      0.63       240
weighted avg       0.63      0.63      0.63       240
```





Do TV shows with more seasons make the top 10 list more often? Have larger number of cumulative weeks in Top 10?

```
#subset data to include rows where season_title is included
subset = top10[top10['season_title'].notnull()]
print(subset.info())
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 54668 entries, 10 to 112299
Data columns (total 9 columns):
 #   Column                     Non-Null Count  Dtype         
---  ------                     --------------  -----         
 0   country_name               54668 non-null  object        
 1   country_iso2               54668 non-null  object        
 2   week                       54668 non-null  datetime64[ns]
 3   category                   54668 non-null  object        
 4   weekly_rank                54668 non-null  int64         
 5   show_title                 54668 non-null  object        
 6   season_title               54668 non-null  object        
 7   cumulative_weeks_in_top_10  54668 non-null  int64         
 8   month                      54668 non-null  int64         
dtypes: datetime64[ns](1), int64(3), object(5)
memory usage: 4.2+ MB
None
```

```
#view format of season_title entries
print(subset['season_title'].head(60))

#add column season_number of the numeric part of season_title
subset['season_number'] = subset['season_title'].str.extract(r'(\d+)')

'''some season_title entries do not include a number'''
print(subset['season_number'].head(60))
```

```
10            Pasión de Gavilanes: Season 2
11                   Another Self: Season 1
12            Pasión de Gavilanes: Season 1
13                       Manifest: Season 1
14                    The Sandman: Season 1
15    Extraordinary Attorney Woo: Season 1
16                      High Heat: Season 1
17                       Manifest: Season 2
18                       Manifest: Season 3
19              Never Have I Ever: Season 3
30            Pasión de Gavilanes: Season 2
31                   Another Self: Season 1
32                    The Sandman: Season 1
33            Pasión de Gavilanes: Season 1
34                       Manifest: Season 1
35    Extraordinary Attorney Woo: Season 1
```

```
36                          Alba: Season 1
37                      Manifest: Season 2
38                      Manifest: Season 3
39              Never Have I Ever: Season 3
50            Pasión de Gavilanes: Season 2
51                      Manifest: Season 1
52                  Another Self: Season 1
53            Pasión de Gavilanes: Season 1
54                          Alba: Season 1
55           Keep Breathing: Limited Series
56                   The Sandman: Season 1
57                      Manifest: Season 2
58                  Virgin River: Season 4
59                      Manifest: Season 3
70            Pasión de Gavilanes: Season 2
71                          Alba: Season 1
72                      Manifest: Season 1
73                  Virgin River: Season 4
74            Pasión de Gavilanes: Season 1
75                      Manifest: Season 2
76                     Stranger Things 4
77           Keep Breathing: Limited Series
78                      Manifest: Season 3
79                  Another Self: Season 1
90                          Alba: Season 1
91            Pasión de Gavilanes: Season 2
92                      Manifest: Season 1
93                  Virgin River: Season 4
94                     Stranger Things 4
95                  Resident Evil: Season 1
96            Pasión de Gavilanes: Season 1
97                      Manifest: Season 2
98         Café con aroma de mujer: Season 1
99                  Rebelde Way: Temporada 1
110                    Stranger Things 4
111                         Alba: Season 1
112                 Resident Evil: Season 1
113             The Longest Night: Season 1
114                     Manifest: Season 1
115           Pasión de Gavilanes: Season 1
116                     Capitani: Season 2
117        Café con aroma de mujer: Season 1
118                    Stranger Things 2
```

```
#subset data to include rows where season_number is included
subset2 = subset[subset['season_number'].notnull()]
print(subset2.info())
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 50640 entries, 10 to 112299
Data columns (total 10 columns):
 #   Column                      Non-Null Count  Dtype         
---  ------                      --------------  -----         
 0   country_name                50640 non-null  object        
 1   country_iso2                50640 non-null  object        
 2   week                        50640 non-null  datetime64[ns]
 3   category                    50640 non-null  object        
 4   weekly_rank                 50640 non-null  int64         
 5   show_title                  50640 non-null  object        
 6   season_title                50640 non-null  object        
 7   cumulative_weeks_in_top_10  50640 non-null  int64         
 8   month                       50640 non-null  int64         
 9   season_number               50640 non-null  object        
dtypes: datetime64[ns](1), int64(3), object(6)
memory usage: 4.2+ MB
None
```

```
'''The method of isolating season_number includes many errors.
For our sake we will look at only entries where season number is 10 or smaller

#many errors exist when isolating season number from season_title
unique_season_numbers = subset2['season_number'].unique()
print(unique_season_numbers)

#convert season_number to int type
subset2.loc[:, 'season_number'] = subset2['season_number'].fillna(-5).astype(i

subset3 = subset2.loc[(subset2['season_number'] > 0) & (subset2['season_number

unique_season_numbers_again = subset3['season_number'].unique()
print(unique_season_numbers_again)
```

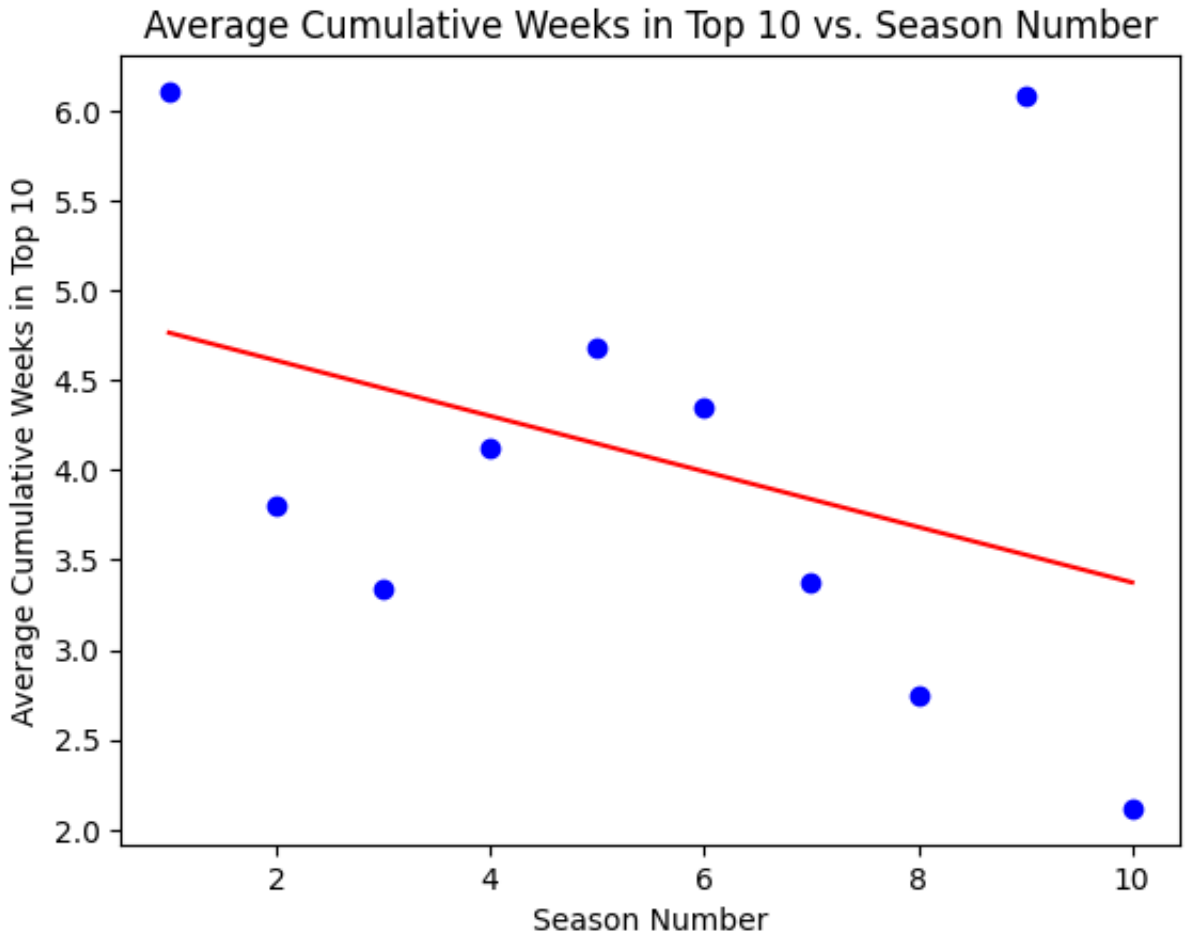
```
['2' '1' '3' '4' '6' '5' '42' '81' '17' '100' '8' '99' '7' '15' '11' '9'
 '14' '245' '101' '1988' '18' '24' '10' '2011' '13' '١' '12' '56' '892'
 '2045' '2020' '20' '97' '2022' '2021' '800' '1867' '60']
[ 2  1  3  4  6  5  8  7  9 10]
<ipython-input-25-4c5af1bdabe4>:9: SettingWithCopyWarning:
A value 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/st
  subset2.loc[:, 'season_number'] = subset2['season_number'].fillna(-5).astype
<ipython-input-25-4c5af1bdabe4>:9: DeprecationWarning: In a future version, `d
  subset2.loc[:, 'season_number'] = subset2['season_number'].fillna(-5).astype
```

```
'''subset3 is our dataset now'''
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import pearsonr

#average cumulative weeks in top 10 for each season number 1 through 10
average_cumulative_weeks = subset3.groupby('season_number')['cumulative_weeks_
average_cumulative_weeks.columns = ['season_number', 'average_cumulative_weeks_
print(average_cumulative_weeks)

#initiliaze variables for statistical analysis
season_number = average_cumulative_weeks['season_number']
average_cumulative_weeks_in_top_10 = average_cumulative_weeks['average_cumulat

'''In this context season number can be numeric instead of rank because
we want to see if higher season number shows higher average cumulative weeks i

```

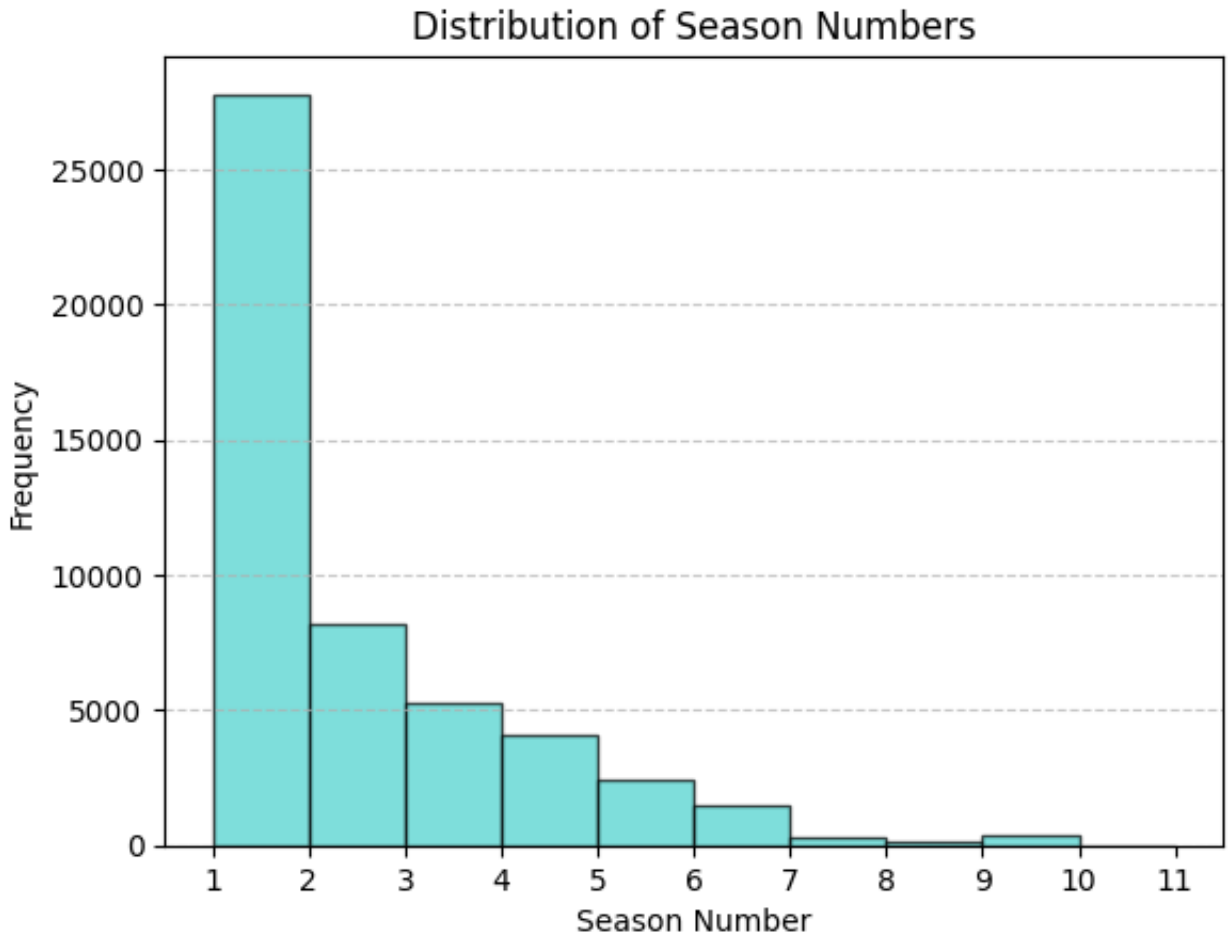
```
correlation_coefficient, p_value = pearsonr(season_number, average_cumulative_
print("Pearson correlation coefficient:", correlation_coefficient)
print("P-value:", p_value)

plt.scatter(season_number, average_cumulative_weeks_in_top_10, color='blue', l
plt.plot(season_number, np.poly1d(np.polyfit(season_number, average_cumulative_
plt.xlabel('Season Number')
plt.ylabel('Average Cumulative Weeks in Top 10')
plt.title('Average Cumulative Weeks in Top 10 vs. Season Number')
plt.show()
```

	season_number	average_cumulative_weeks_in_top_10
0	1	6.106364
1	2	3.799366
2	3	3.333964
3	4	4.119763
4	5	4.675585
5	6	4.346075
6	7	3.378277
7	8	2.740964
8	9	6.077586
9	10	2.117647

```
Pearson correlation coefficient: -0.35851553225279903
P-value: 0.3090139342720427
```



```
'''We can view a histogram of season_number to determine which number of seaso

plt.hist(subset3['season_number'], bins=range(1, 12), edgecolor='black', color
plt.xlabel('Season Number')
plt.ylabel('Frequency')
plt.title('Distribution of Season Numbers')
plt.xticks(range(1, 12))
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```

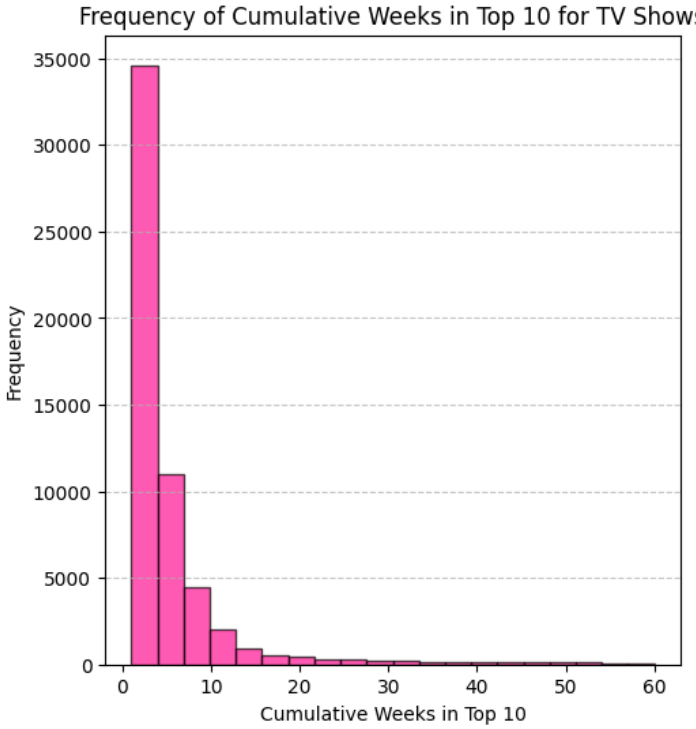


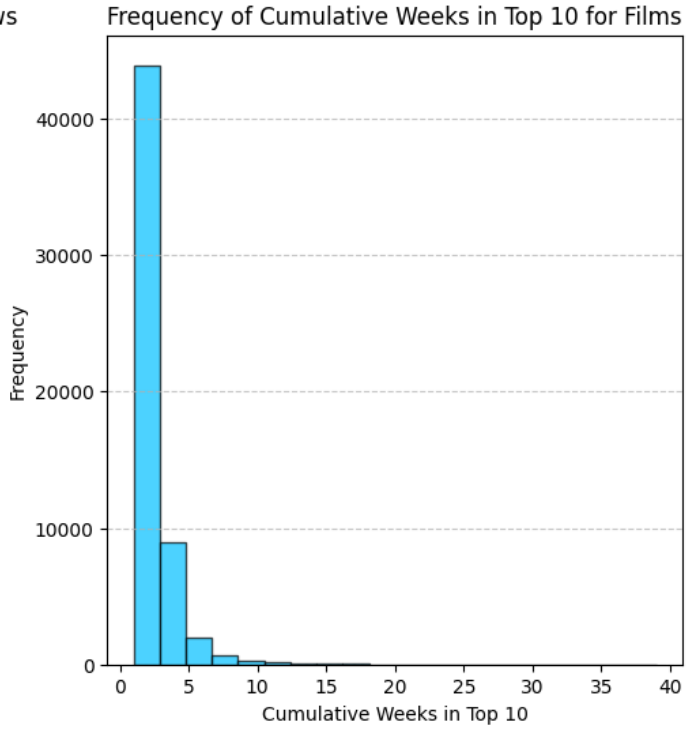
Are TV shows or movies more likely to spend a longer amount of cumulative time on the Top 10 list?

RECALL: Some TV shows made the Top 10 list for up to 60 consecutive weeks, whereas, movies only made the list for up to 40 weeks (yellow scatterplot above)

```
'''lets look at the cumulative weeks on top 10 frequency distribution for TV s
```

```
2
3 tv_shows_subset = top10[top10['category'] == 'TV']
4
5 movies_shows_subset = top10[top10['category'] == 'Films']
6
7 fig, axes = plt.subplots(1, 2, figsize=(12, 6))
8
9 axes[0].hist(tv_shows_subset['cumulative_weeks_in_top_10'], bins=20, edgecolor
10 axes[0].set_xlabel('Cumulative Weeks in Top 10')
11 axes[0].set_ylabel('Frequency')
12 axes[0].set_title('Frequency of Cumulative Weeks in Top 10 for TV Shows')
13 axes[0].grid(axis='y', linestyle='--', alpha=0.7)
14
15 axes[1].hist(movies_shows_subset['cumulative_weeks_in_top_10'], bins=20, edgec
16 axes[1].set_xlabel('Cumulative Weeks in Top 10')
17 axes[1].set_ylabel('Frequency')
18 axes[1].set_title('Frequency of Cumulative Weeks in Top 10 for Films')
19 axes[1].grid(axis='y', linestyle='--', alpha=0.7)
```


Frequency of Cumulative Weeks in Top 10 for TV Shows
Frequency
Cumulative Weeks in Top 10
0
5000
10000
15000
20000
25000
30000
35000
0
10
20
30
40
50
60


Frequency of Cumulative Weeks in Top 10 for Films
Frequency
Cumulative Weeks in Top 10
0
10000
20000
30000
40000
0
5
10
15
20
25
30
35
40

```
#Calculate average cumulative weeks in top 10 for films and TV categories
avg_cumulative_weeks_tv = tv_shows_subset['cumulative_weeks_in_top_10'].mean()
print(avg_cumulative_weeks_tv)

avg_cumulative_weeks_films = movies_shows_subset['cumulative_weeks_in_top_10']
print(avg_cumulative_weeks_films)

#samples are unpaired and non-normally distributed so we will perform wilcoxon
from scipy.stats import mannwhitneyu

statistic, p_value = mannwhitneyu(tv_shows_subset['cumulative_weeks_in_top_10'

print("Wilcoxon Rank Sum test statistic:", statistic)
print("P-value:", p_value)
```

```
4.936420302760463
2.000142475512021
Wilcoxon Rank Sum test statistic: 2152311801.0
P-value: 0.0
```