Are movies being shortened to match lowering attention spans? Lets take a look:

Netflix! What started in 1997 as a DVD rental service has since exploded into the largest entertainment/media company by market capitalization, boasting over 200 million subscribers as of January 2021.

Netlix has a robust data science team themselves, who not only influence business growth but could theoretically also influence production. Given that they have access to data Given the large number of movies and series available on the platform, has the average duration of movies has been declining?

As evidence of this, we've gathered the following information. For the years from 2011 to 2020, the average movie durations are 103, 101, 99, 100, 100, 95, 95, 96, 93, and 90, respectively. We can run an initial test to determine if our hypothesis yields any merit.

In [ ]:
```
# Create the years and durations lists
years = [2011,2012,2013,2014,2015,2016,2017,2018,2019,2020]
durations = [103,101,99,100,100,95,95,96,93,90]

# Create a dictionary with the two lists
movie_dict = {"years": years, "durations": durations}

# Print the dictionary
print(movie_dict)
```

```
{'years': [2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020], 'dur
ations': [103, 101, 99, 100, 100, 95, 95, 96, 93, 90]}
```

In [ ]:
```
# Import pandas under its usual alias
import pandas as pd

# Create a DataFrame from the dictionary
durations_df = pd.DataFrame(movie_dict)

# Print the DataFrame
print(durations_df)
```

	years	durations
0	2011	103
1	2012	101
2	2013	99
3	2014	100
4	2015	100
5	2016	95
6	2017	95
7	2018	96
8	2019	93
9	2020	90

3. A visual inspection of our data

Having a `pandas` DataFrame, the most common way to work with tabular data in Python. A great place to start will be a visualization of the data.

Given that the data is continuous, a line plot would be a good choice, with the dates represented along the x-axis and the average length in minutes along the y-axis. This will allow us to easily spot any trends in movie durations.

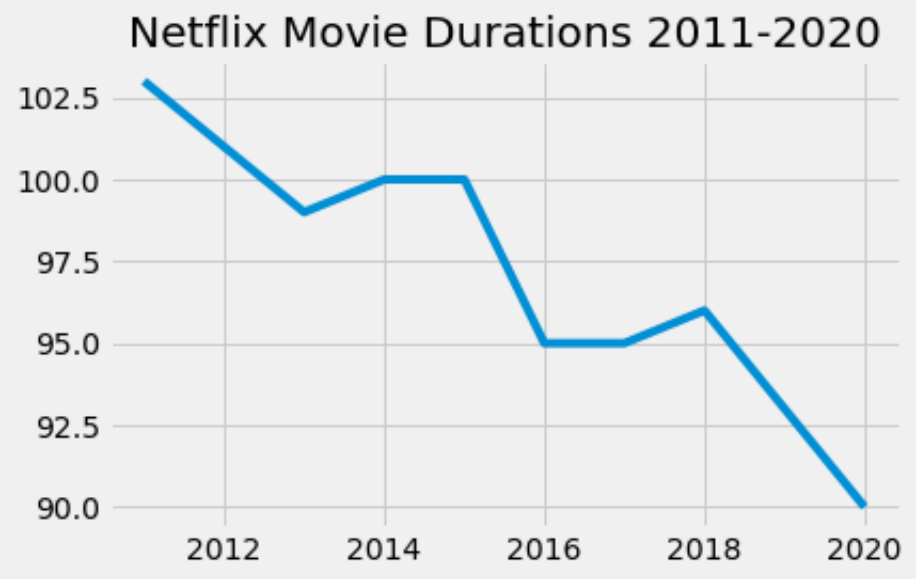
Note: In order for us to correctly test your plot, you will need to initalize a `matplotlib.pyplot`

In [ ]:
```
# Import matplotlib.pyplot under its usual alias and create a figure
import matplotlib.pyplot as plt
fig = plt.figure()

# Draw a line plot of release_years and durations
plt.plot(durations_df['years'],durations)

# Create a title
plt.title('Netflix Movie Durations 2011-2020')

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



4. Loading the rest of the data from a CSV

Our hypothesis testing yields true, movies might have decreased in duration over the years. We're limited in the further explorations we can perform. There are a few questions about this trend that we are currently unable to answer, including:

1. What does this trend look like over a longer period of time?
2. Is this explainable by something like the genre of entertainment?

Hypothesis testing has rendered fruitful. We have a possible trend to analyze. Doing a quick selenium scrape of Netflix's duratiion site through "netflix.com" will render `"datasets/netflix_data.csv"`. We now have all tabular data containing movie lengths, from name to genre to duration, this time with a more detailed scope & view.

In [ ]:
```
# Read in the CSV as a DataFrame
netflix_df = pd.read_csv("datasets/netflix_data.csv")

# Print the first five rows of the DataFrame
print(netflix_df[:5])
```

```
  show_id     type  title           director  \
0      s1  TV Show     3%                NaN
1      s2    Movie   7:19  Jorge Michel Grau
2      s3    Movie  23:59       Gilbert Chan
3      s4    Movie      9        Shane Acker
4      s5    Movie     21     Robert Luketic

                                                cast        country  \
0  João Miguel, Bianca Comparato, Michel Gomes, R...         Brazil
1  Demián Bichir, Héctor Bonilla, Oscar Serrano, ...         Mexico
2  Tedd Chan, Stella Chung, Henley Hii, Lawrence ...      Singapore
3  Elijah Wood, John C. Reilly, Jennifer Connelly...  United States
4  Jim Sturgess, Kevin Spacey, Kate Bosworth, Aar...  United States

          date_added  release_year  duration  \
0    August 14, 2020          2020         4
1  December 23, 2016          2016        93
2  December 20, 2018          2011        78
3  November 16, 2017          2009        80
4    January 1, 2020          2008       123

                                         description             genre
0  In a future where the elite inhabit an island ...  International TV
1  After a devastating earthquake hits Mexico Cit...            Dramas
2  When an army recruit is found dead, his fellow...     Horror Movies
3  In a postapocalyptic world, rag-doll robots hi...            Action
4  A brilliant group of students become card-coun...            Dramas
```

5. Filtering for movies!

Looking at the first five rows of our new DataFrame, we notice a column `type`. Scanning the column, it's clear there are also TV shows in the dataset. Moreover, the `duration` column we planned to use seems to represent different values depending on whether the row is a movie or a show (perhaps the number of minutes versus the number of seasons)?

In response, we have to filter our dataset. We can select rows where `type` is `Movie`. We also don't need information from all of the columns, so let's create a new DataFrame `netflix_movies` containing only `title`, `country`, `genre`, `release_year`, and `duration`.

In [ ]:
```
# Subset the DataFrame for type "Movie"
netflix_df_movies_only =  netflix_df[netflix_df['type'] == 'Movie']

# Select only the columns of interest
netflix_movies_col_subset = netflix_df_movies_only[['title', 'country', 'ger
```

```
# Print the first five rows of the new DataFrame
print(netflix_movies_col_subset[:5])
```

```
   title        country          genre  release_year  duration
1   7:19         Mexico         Dramas          2016        93
2  23:59      Singapore  Horror Movies          2011        78
3      9  United States         Action          2009        80
4     21  United States         Dramas          2008       123
6    122          Egypt  Horror Movies          2019        95
```

6. Creating a scatter plot

Visualizing the data again to inspect the data over a longer range of time.

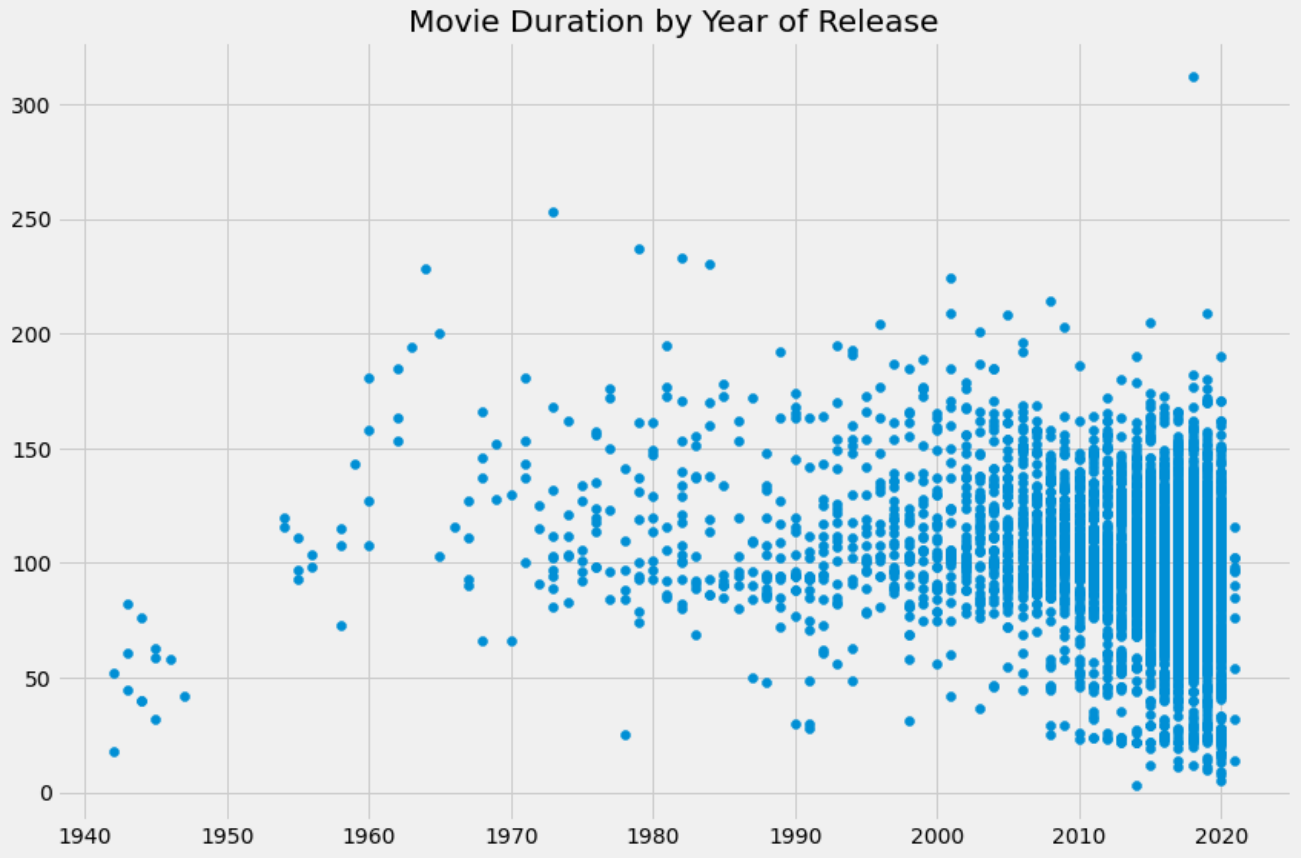
This time, we are no longer working with aggregates but instead with individual movies. A line plot is no longer a good choice for our data, so let's try a scatter plot instead. We will again plot the year of release on the x-axis and the movie duration on the y-axis.

In [ ]:
```
# Create a figure and increase the figure size
fig = plt.figure(figsize=(12,8))

# Create a scatter plot of duration versus year
plt.scatter(netflix_movies_col_subset['release_year'], netflix_movies_col_su


# Create a title
plt.title("Movie Duration by Year of Release")

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



7. Digging deeper

Some of these films are under an hour long! Let's filter our DataFrame for movies with a `duration` under 60 minutes and look at the genres. This might give us some insight into what is dragging down the average.

In [ ]:
```
# Filter for durations shorter than 60 minutes
short_movies = netflix_movies_col_subset[netflix_movies_col_subset['duration

# Print the first 20 rows of short_movies
print(short_movies[:20])
```

```
                                                  title         country  \
35                                              #Rucker50   United States
55                  100 Things to do Before High School   United States
67   13TH: A Conversation with Oprah Winfrey & Ava ...             NaN
101                               3 Seconds Divorce           Canada
146                                  A 3 Minute Hug           Mexico
162  A Christmas Special: Miraculous: Tales of Lady...           France
171                         A Family Reunion Christmas   United States
177                  A Go! Go! Cory Carson Christmas   United States
178                  A Go! Go! Cory Carson Halloween             NaN
179                A Go! Go! Cory Carson Summer Camp             NaN
181           A Grand Night In: The Story of Aardman  United Kingdom
200                           A Love Song for Latasha   United States
220                         A Russell Peters Christmas           Canada
233                              A StoryBots Christmas   United States
237                           A Tale of Two Kitchens   United States
242                          A Trash Truck Christmas             NaN
247                          A Very Murray Christmas   United States
285                             Abominable Christmas   United States
295                               Across Grace Alley   United States
305                Adam Devine: Best Time of Our Lives   United States

            genre  release_year  duration
35   Documentaries          2016        56
55   Uncategorized          2014        44
67   Uncategorized          2017        37
101  Documentaries          2018        53
146  Documentaries          2019        28
162  Uncategorized          2016        22
171  Uncategorized          2019        29
177       Children          2020        22
178       Children          2020        22
179       Children          2020        21
181  Documentaries          2015        59
200  Documentaries          2020        20
220       Stand-Up          2011        44
233       Children          2017        26
237  Documentaries          2019        30
242       Children          2020        28
247       Comedies          2015        57
285       Children          2012        44
295         Dramas          2013        24
305       Stand-Up          2019        59
```

8. Marking non-feature films

It looks as though many of the films that are under 60 minutes fall into genres such as "Children", "Stand-Up", and "Documentaries". This is a logical result, as these types of

films are probably often shorter than 90 minute Hollywood blockbuster.

We could eliminate these rows from our DataFrame and plot the values again. But another interesting way to explore the effect of these genres on our data would be to plot them, but mark them with a different color.

In [ ]:
```
# Define an empty list
colors = []

# Iterate over rows of netflix_movies_col_subset
for index, row in netflix_movies_col_subset.iterrows():
    genre = row['genre']
    if genre == "Children":
        colors.append('red')
    elif genre == "Documentaries":
        colors.append('blue')
    elif genre == "Stand-Up":
        colors.append('green')
    else:
        colors.append('black')

# Inspect the first 10 values in your list
print(colors[:10])
```

```
['black', 'black', 'black', 'black', 'black', 'black', 'black', 'black', 'bl
ack', 'blue']
```

9. Plotting with color!

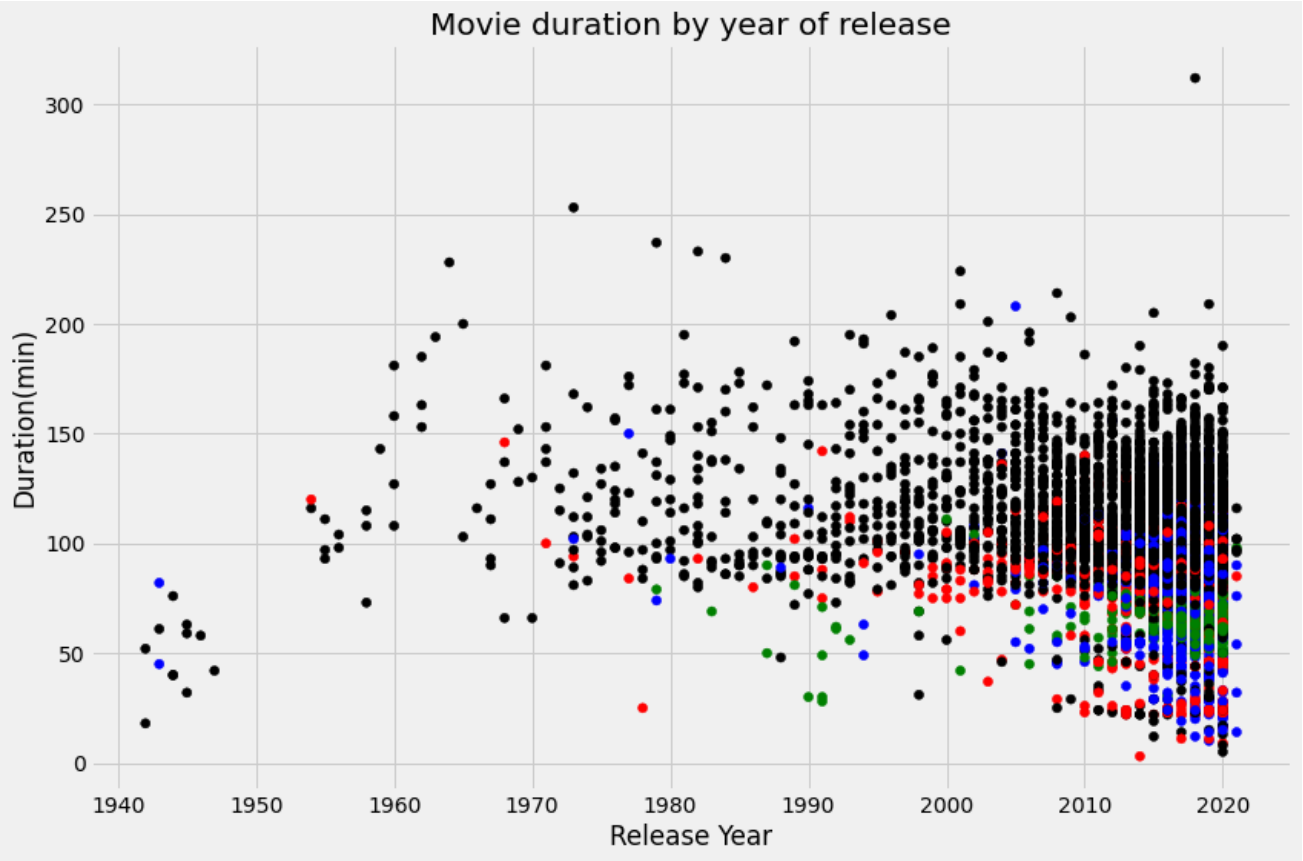
We now have a `colors` list that we can pass to our scatter plot, which should allow us to visually inspect whether these genres might be responsible for the decline in the average duration of movies.

In [ ]:
```
# Set the figure style and initalize a new figure
plt.style.use('fivethirtyeight')
fig = plt.figure(figsize=(12,8))

# Create a scatter plot of duration versus release_year
plt.scatter(netflix_movies_col_subset['release_year'], netflix_movies_col_su

# Create a title and axis labels
plt.title("Movie duration by year of release")
plt.xlabel('Release Year')
plt.ylabel('Duration(min)')

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



We now have a more holistic view of our hypothesis. Movie length has not really changed globally since the 40s and 50s, however the fundamental term for movie has. Movies have not changed in terms of duration, but more childrens movies (that have shorter duration) have been created, more comedy specials (designated as movies) have also been created. As years have gone by, the accessability to movies has increased through technology, and therefore going to watch a movie is less of an event (ie. going to the theater) and more integrated into normal life (popping on the coach and watching movies after work).