

How Long Should You Make Your Movie?

Jeremy Miesch

INFO 2201

Fall 2023

I. Introduction

With movies such as *Avatar: The Way of Water* (3hr 12m), *Babylon* (3hr 9m), *Oppenheimer* (3 hr), and *Killers of the Flower Moon* (3hr 26m) hitting theaters over the last few years, skepticism over whether movies are “becoming too long” is on the rise.

Movie goers and filmmakers alike have had to consider factors such as limited attention span and time between bathroom breaks when releasing movies for years, but has a rise in streaming capabilities or movie making budget contributed to an increase in movie length? Are movie lengths even increasing? Is it necessarily a bad thing, either for filmmakers or the public, if movies are increasing in length?

In this report, I will first look at whether movie lengths are increasing and whether run times are impacted by production budget. Then, I will look at the impact run times have on factors such as critic reviews, public reviews, and movie gross, with a focus on partitioning the data based on the genre of the movie. Finally, I will discuss any challenges that I have faced while compiling the data.

II. Movie Length over Time

It is widely believed that movie run times have increased over the past fifty years, and blockbusters such as those I mentioned in the Introduction are pointed to as an indicator for this.

To test this belief, I looked at a data set of nearly 4,500 random movies from 1915 to 2023 and plotted the average run time of each year’s movies.

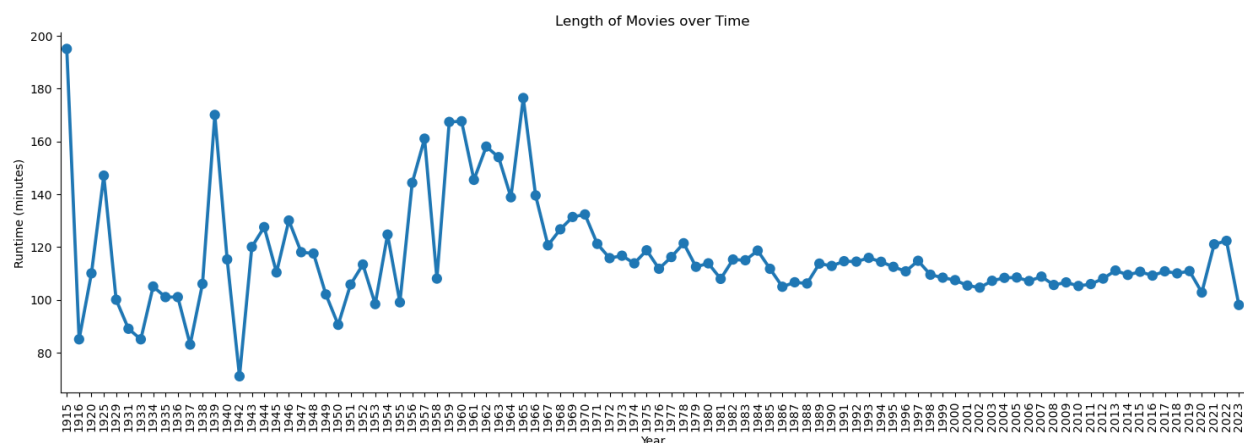


Figure 1: Length of Movies over Time

From Figure 1, no significant increase in run time can be observed. In fact, while data from 1915 to 1970 is inconstant due to the data set having fewer films from those years, the run time of movies since 1970 has stayed around two hours.

The largest increase since 1970, however, was indeed in 2021. Movies in 2021 and 2022 were longer than they have been in 50 years (there is a notable drop back in 2023, but that is because this data set was published in February and there is only one movie in the set from 2023 - *80 for Brady* for some odd reason).

This increase is only observable over the last two years, so it is hard to say if it is significant enough to predict movie run times in the future. However, it is notable that this increase came right after the Coronavirus Pandemic in 2019 and 2020.

III. Production Budget over Time

With people staying at home, more people turned to streaming services while turning away from theaters (I looked for data on this, but apparently streaming platforms do not disclose their user data - more on that in the Challenges section).

Coming out of the Pandemic, therefore, the movie industry needed a way to get people back in theaters. The best way to do this was to bump up the production budgets of movies to levels never before seen, as shown in Figure 2.

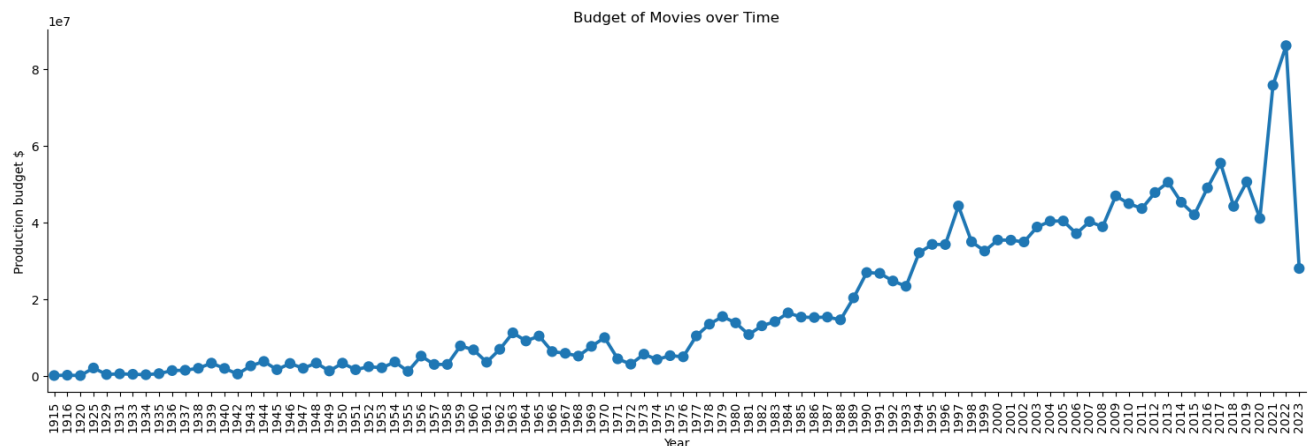


Figure 2: Budget of Movies over Time

Although the production budgets of movies have been increasing steadily since the 1950s, the recent bump in production budget came with the increase in movie times. To see if this is a pattern, I looked at the budget's impact on run times.

IV. Budget impact on Movie Lengths

The relationship between budget and run time is shown in Figure 3 below.

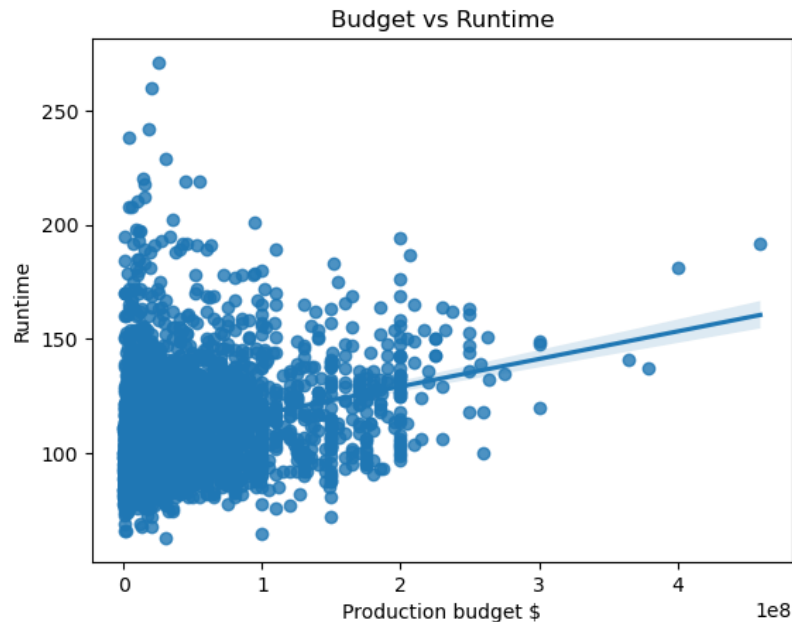


Figure 3: Budget vs. Run time

There is not a perfectly clear correlation here, but, in general it does seem that higher production budget leads to a longer run time. The two highest budgets both clock in at around three hours, and pricier movies are universally higher than around two hours.

V. Movie Length impact on Ratings

In the past few sections, I have shown that although movie lengths have not been gradually increasing, there does seem to be an upward trend just in the past two years. Furthermore, this uptrend could be a result of an increase in production budgets with the intention of bringing people back into theaters after the Pandemic.

I now turn my attention to analyzing whether this is the right approach. Do people actually want longer movies? How does the movie genre play a role in this?

To do this, I will look at three criteria: public ratings, critic ratings (from Oscars data), and movie gross. I am dividing it into these three categories because I believe they represent a movie's success among three different groups of people. Public ratings encompass the reviews of people who actually took the time to review a movie. Cinephiles who watch a lot of movies might be more inclined to watch and rate highly a three hour Indie film than the general public. Critic ratings encompass reviews of people even more familiar with movies and who might be even more likely to watch and rate a three hour Indie film. Movie gross tells the story of the majority of moviegoers, who might not leave a review after seeing a film.

a. Public Ratings

Still using the same data set, which scrapes its rating data from IMDB, I plotted the relationship between movie length and movie ratings in Figure 4.

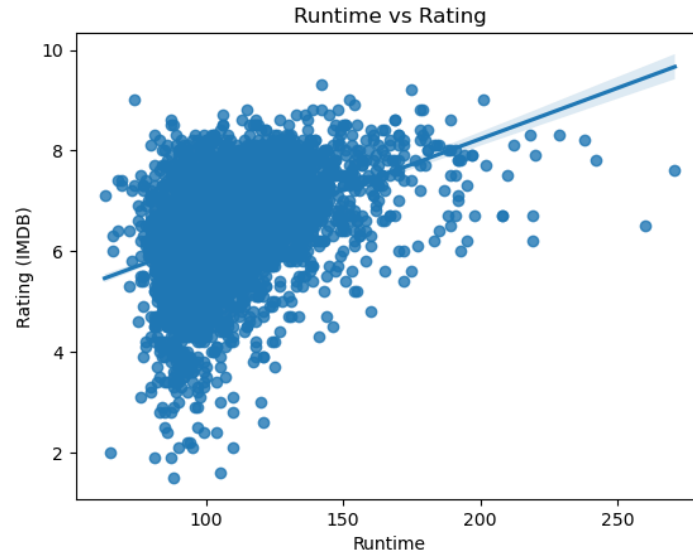


Figure 4: Run time vs Rating

As shown in this graph, there is a pretty direct correlation between a movie's rating and its run time. The lowest ratings are universally for movies under two hours, whereas movies over three hours seem to have a threshold rating of at least 6/10.

To further demonstrate this point, I used a histogram to plot the top 2000 rated movies in the data set in orange (slightly lower than half) and the rest in blue. The results are shown in Figure 5.

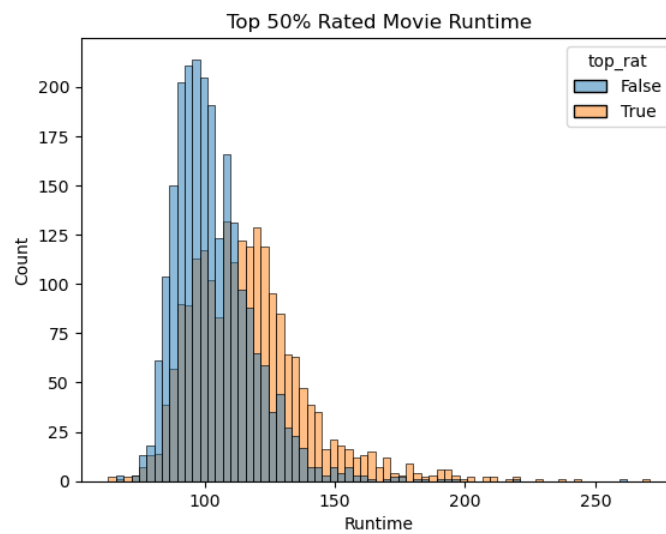


Figure 5: Top 50% Rated Movie Runtime

The peaks of the two histograms differ slightly, with the lower rated movies peaking at about 100 minutes and the higher rated movies peaking at about two hours.

In order to expand upon this, I used the OMDB API. I looped through 600 random films in the original data (I would have done more but did not have enough API calls), and got their Metascore, IMDB, and Rotten Tomatoes ratings. Unfortunately, many of them did not have ratings on OMDB, so after removing these I was left with about 250 films. The results are shown in Figure 6 below.

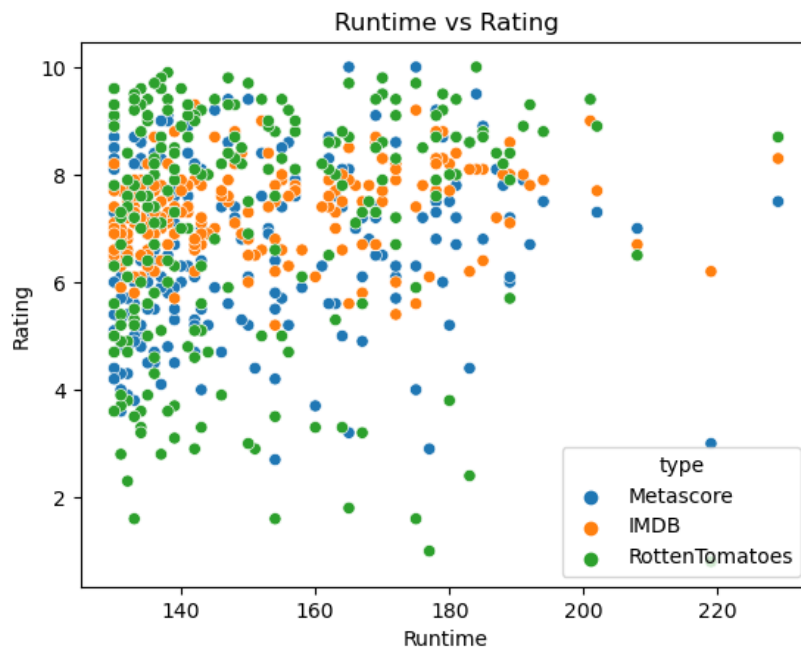


Figure 6: Run time vs Rating across Rating Sites

Interestingly, Metascore and Rotten Tomatoes have both lower ratings in general as well as lower ratings for higher run time movies. In fact, there does not seem to be very many low IMDB ratings at all, despite these existing in Figure 4.

I am not sure as to the cause of this, except that lower rated movies on IMDB might not have metascore ratings at all. I used an “all or nothing” approach, where, if a movie lacked one of the three ratings, it was left out.

b. Critic Ratings

In order to get critic ratings, I used a database consisting of all Oscar nominations. The spread of run times for Oscar nominations in all categories is shown below in Figure 7.

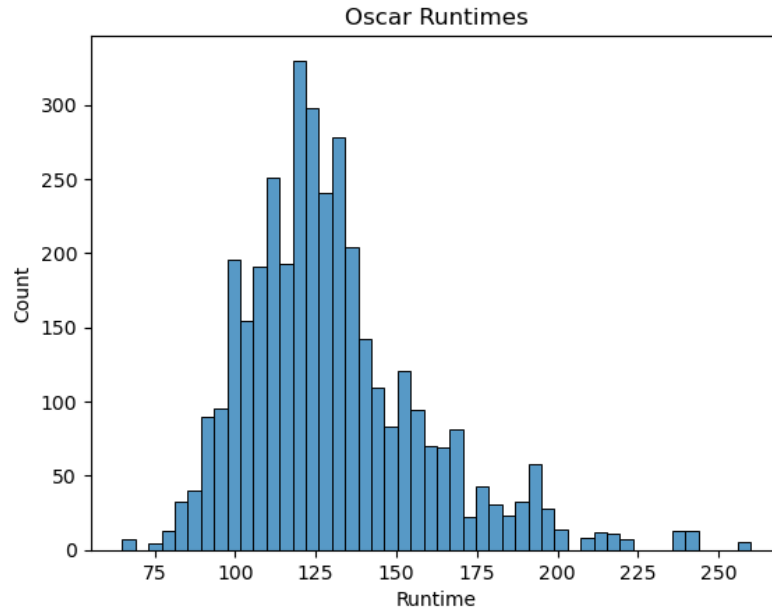


Figure 7: Oscar Run times

Like the top rated IMDB movies in the first dataset in Figure 5, Oscar movies tend to peak at around two hours. This is definitely more than the lower rated movies, but there is not a significant difference between Oscar run times and top IMDB run times, contrary to what I expected.

Figure 8 shows only the Best Picture winners (after 1962 when the category was started), and an even larger peak at the two hour mark.

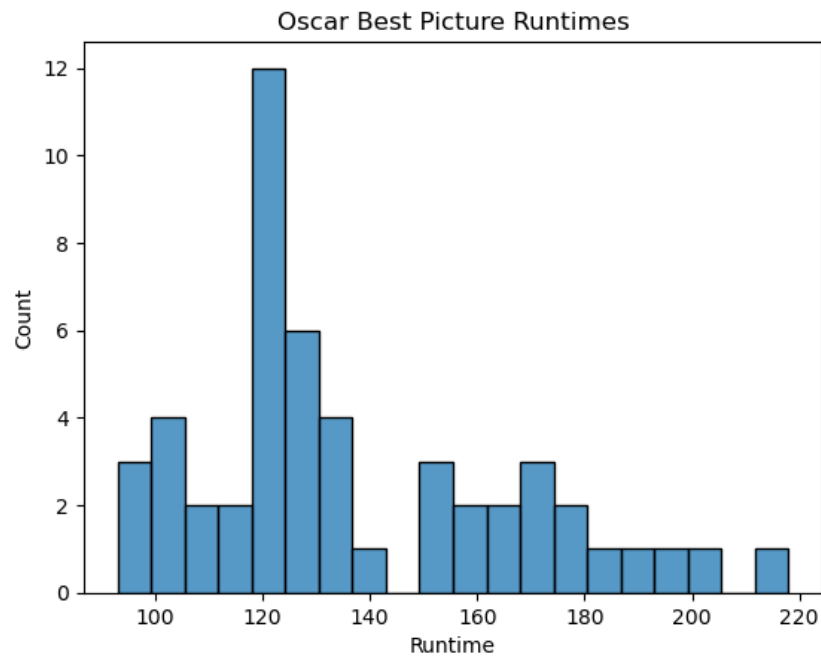


Figure 8: Best Picture Run times

VI. Movie Length Impact on Worldwide Gross

The relationship between movie run time and worldwide gross is shown below in Figure 9.

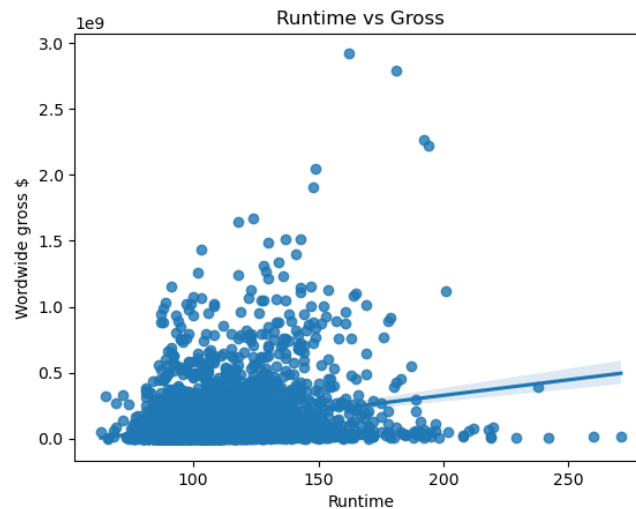


Figure 9: Run time vs Gross

Interestingly, there is not as much of a direct correlation between run time and gross as there was between run time and ratings (Figure 4). The highest grossing movies are all between two and a half and three hours, like the highest rated movies, but there is then a sharp dropoff immediately after. This dropoff is not as stark in Figure 4 or Figure 6. People will rate the longest movies pretty highly, but nobody will go see them in theaters.

The histogram showing the run time of the top 2000 grossing movies is shown in Figure 10.

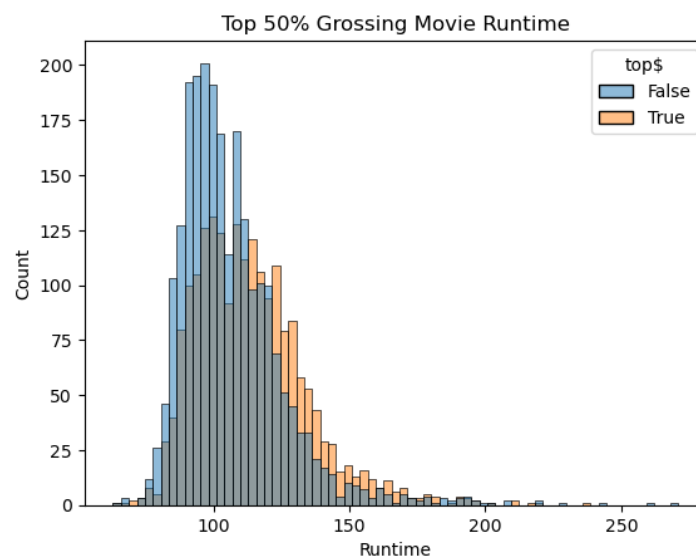


Figure 10: Top 50% Grossing Movie Runtime

This data also reiterates less of a connection between run time and gross. In Figure 5, the peak of the higher rated movies is clearly distinguishable from the peak of the lower rated movies. However, in Figure 10, the peak of the top grossing movies is much wider and closer to the bottom grossing movies. People will go see most movies in theaters, as long as they are less than three and a half hours.

VII. Genre Analysis

The final question I had was whether the relationship between run time, ratings, and gross depended at all on the genre of the movie. For instance, I was curious whether a shorter Sci-Fi movie would do as well as a longer one (due to the tendency for Sci-Fi movies to have more complex backstories or plots than some other genres).

Figure 11 shows the average movie length of each genre in the 4,500 movie data set. Many of the movies were listed with multiple genres, so they are counted multiple times as a part of each.

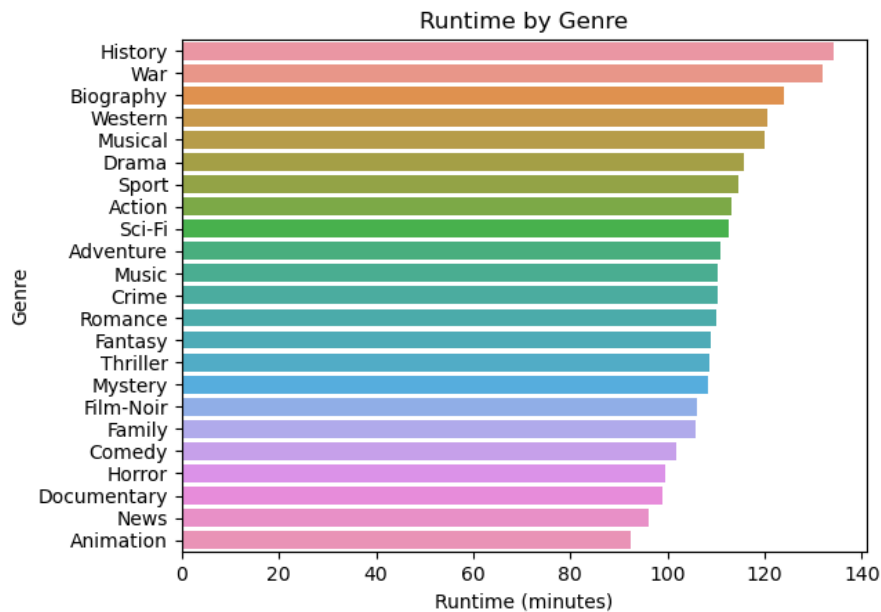


Figure 11: Run time by Genre

A lot of this data makes sense: Animation and Family movies are shorter because kids have shorter attention spans than adults, and History, War, and Biography movies are longer because they are more niche and many viewers already are interested in their subject matter.

a. Ratings

The average rating for each genre is shown in Figure 12. Once again, niche nonfictional topics find themselves at the top because viewers likely seek the movies out due to their own interest.

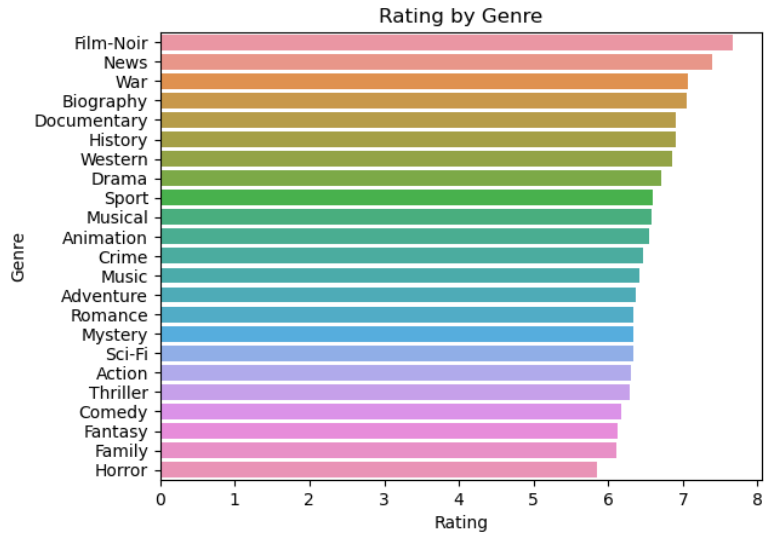


Figure 12: Rating by Genre

It is also important to mention here that there was only one Film-Noir movie, so that data is skewed in its favor.

Plotting the average run time vs the average rating for each movie yields the results in Figure 13. I could not figure out how to do selective genre labels using Python, so I used Google Drawings to edit my graph and add some notable labels.

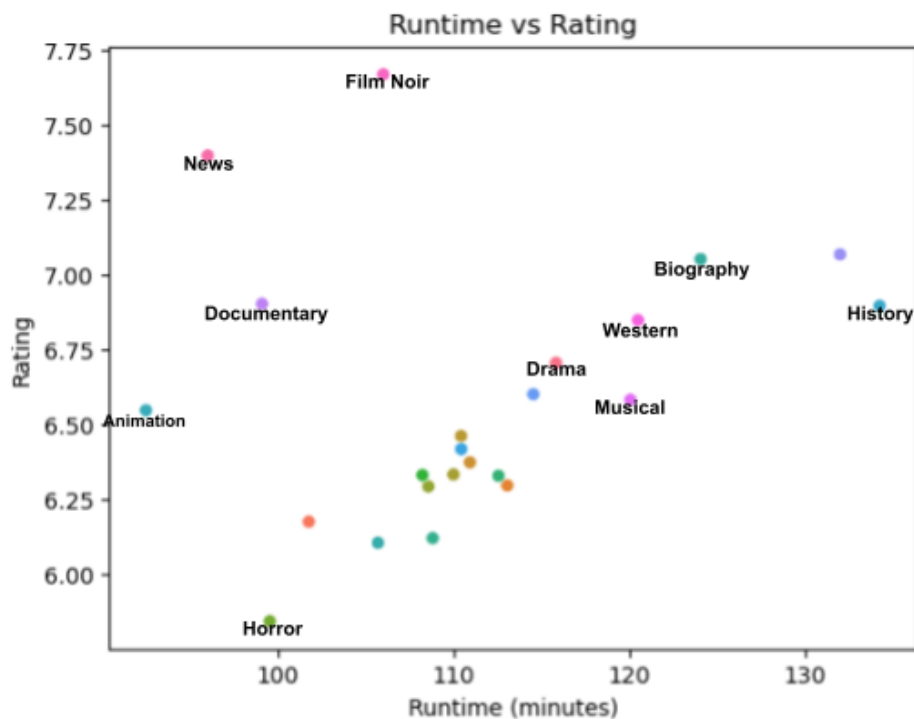


Figure 13: Run time vs Rating for different Genres

The overall relationship shown in Figure 4 is still shown in Figure 13, but some interesting new insights are revealed as well. While many genres follow the pattern, Film-Noir, News, Documentary, and Animation are the exceptions, holding higher ratings compared to their run times. Film Noir and News are rare in the data set, but Animation and Documentary films being here definitely point to the two having a guaranteed market regardless of movie length. Namely, animation movies are for kids and documentaries are for people interested in the subject matter.

b. Gross

Figures 14 and 15 show a similar approach when for average gross between genres. While the nonfiction genres have the highest average ratings, they are all pretty low down in the gross rankings. Meanwhile, Animation takes the top spot by a significant margin despite having the lowest run time.

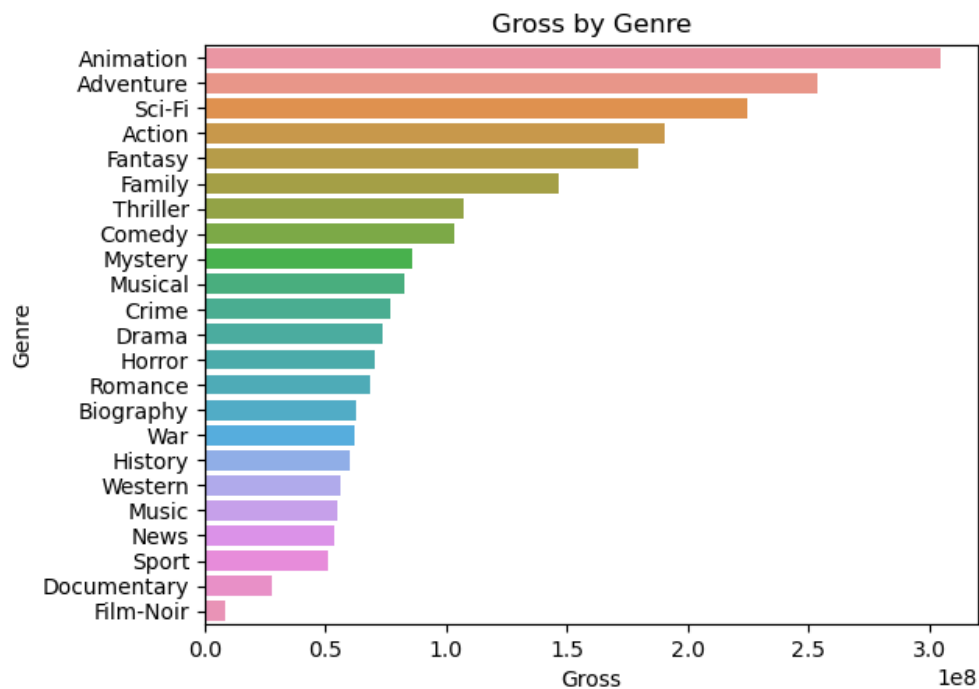


Figure 14: Gross by Genre

When the run time vs the gross is plotted, the mid-length movie genres, as well as animation, rise above the rest.

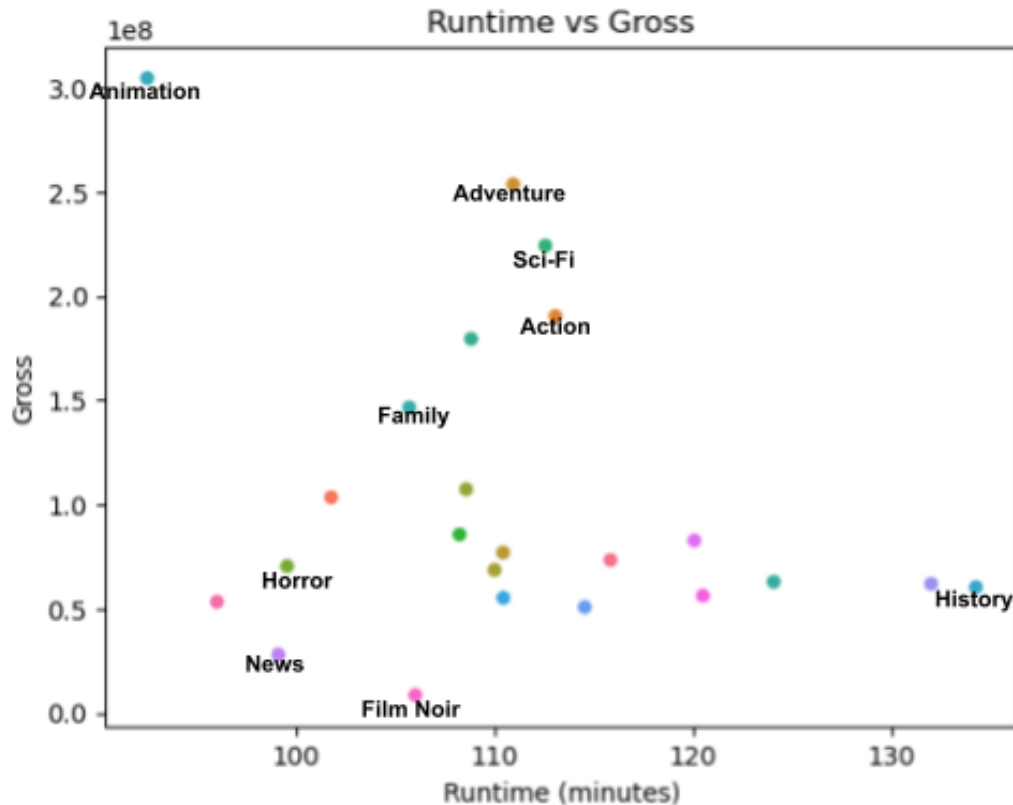


Figure 15: Run time vs Gross for different Genres

VIII. Challenges and Conclusion

Initially, my plan was to do a similar exploration with music rather than with movies - that is what my project proposal is for. However, I found that it was difficult to accurately measure an individual song's popularity (rating) or gross. Analyzing movies instead provided interesting edge cases like Animation or History that I do not think I would have seen with music. It was also easier to find usable data sources for movies.

That being said, I did struggle with finding some of the information I wanted. I initially planned on showing streaming data, comparing which movies were streamed more than they were seen in theaters and vice versa. However, streaming platforms do not disclose their streaming data, and I could not find any useful information about movie theater attendance either.

If streaming data is ever made available, an interesting expansion of this project would be to see how the average streaming movie run time compares with the average theatrical movie run time, and what genres are better suited for which media.

Regardless, this project was successful in answering most of the questions I raised. Movies in recent years are longer than they have been in years, but it is more of a sudden increase than a gradual

one. This increase is shared in movie budgets over time, and might be due to an increase in movie industry spending following the Pandemic. It appears as though two hour films do the best in terms of ratings and gross, but movies longer than three hours do significantly better in their ratings than their gross. Most genres follow the direct correlation between run time and ratings, but Animation and Documentary movies get high ratings despite low run times. Animation, as well as Mid-length movies such as Adventure and Sci Fi, do the best in the box office, while most longer or shorter films do not do as well.