Evolution of Movie Ticket Pricing Throughout History and How Dynamic Pricing is Unused in Movie Theaters

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Imagine you are going to a new movie and you purchase your tickets ahead of one's time. This theater, however, does not require you to pick the seats you wish to purchase the tickets for and so, once you arrive at the theater, all the seats are taken, except for the front row. Now, you must watch the entire movie with an uncomfortable seat and you still paid the same as the other customers, who enjoyed the movie comfortably. Given the number of different conditions, this could lead to an unsatisfactory experience at the theater. For example, it could be the low-quality of the theater, the fact that only bad/undesirable seats are available, or the movie is shown only during non-optimal hours of the day. Regardless of the reason, no person would want to pay for tickets under these conditions.

What if the theater sold those bad seats for a cheaper price? Then, maybe the customers would not consider these tickets or conditions such a loss. Sure, they would not get the seat or will have to watch the movie at a time that they do not prefer, etc. but it would make them happier because they are paying less than people who did get lucky with their conditions. This is a form of dynamic pricing. It was first introduced by American Airlines in 1980 and is now used in several fields in society (Kampakis, 2018). Dynamic pricing is a strategy where prices for a certain product continuously adjust depending on real-time supply and demand. These prices can tend to vary depending on several different variables. Therefore, I adopted this strategy to fix the aforementioned problem with movie ticket pricing.

Implementing dynamic pricing through machine learning will determine an optimal price for movie tickets that will be beneficial for both sides. More people will either go to a movie without getting a bad seat or be content with a bad seat since they got inexpensive tickets for

cheap. The implementation will also increase business for the theater because they will now sell more of the bad seat tickets or gain more revenue if people pay more for good seats.

Literature Review

This research topic is important because it will lead to more revenue for theaters and movie companies, while saving money or increasing the public satisfaction. This will in turn, boost our economy eventually. It will result in a win-win scenario for both parties of the transaction. The anticipated scope is to have this dynamic pricing algorithm implemented at all movie theaters so every customer gets the optimal price, and the theater realizes profits. I do expect this topic to be tightly coupled with my technical project because I can use machine learning to create an algorithm that will get the customers the ideal price for movie tickets. My anticipated outcome for the STS project will be to acquire enough data and research to help create the machine learning algorithm for dynamic pricing. My anticipated outcome for the technical project will be to create the dynamic pricing algorithm to successfully offer a realistic price for tickets that will satisfy both the customer and theater.

Methodology

The STS Topic for this project is movie ticket pricing throughout history. I had a few questions that I aimed to answer in this project but they all were relatively similar questions that connect back to each other. The research question I expected to answer is how has movie ticket pricing changed throughout history and if there are any certain factors (location, timing, seats, etc.) that influence ticket pricing more? From these questions, I also wanted to figure out the reason or cause for why not all movie theaters implement dynamic pricing for their movie ticket

prices, similar to the American Airlines in the Introduction of this paper. I have researched how the pricing for movies has changed over time now that many more factors have been introduced. A few examples of these factors are as follows. Where the location of your movie is seats; is it a comfortable location or is it in one of the front rows? What is the time of the movie; is it during a crowded time or is it during usual work hours? What are the demographics of the customer; are these movies for children/adults based on the rating or is it an international movie? Where is the location of the theater; is it at a low rated theater with bad reviews or is it in a dangerous neighborhood? These are a few examples, but there are many more factors involved with movie ticketing. Therefore, it was necessary to research how the pricing of movie tickets has been impacted by these new variables. Then, it can implement a dynamic pricing algorithm for the technical project.

I approached this question by researching through movie ticket-pricing data from several decades. I acquired datasets of ticket pricing from different times to see how the prices have changed from one time to the next. I also looked at inflation rates over the years to account for this change in ticket pricing as well. Then, I will truly get the change in the pricing. I browsed for research articles talking about inflation rates from those periods and how movie ticket pricing has fluctuated over time. From these sources, I also investigated how pricing varies for movies depending on several factors, described earlier, for the same year. I would stick to the same year to compare ticket prices so that the inflation rate would not factor in the ticket price difference. This would help me to determine whether or not there was a variety in price for individual factors like seat location or time, and so forth. This would give me the standard price for the ticket prices depending on the conditions and then I compared these “standard” movie ticket prices with other years to see how the movie ticket pricing has been affected by inflation. After

collecting all the data, I analyzed the changes in the data to solve my STS research question and start devising a machine-learning algorithm to use in my technical project.

The technical topic that this project was focused on is dynamic pricing. I used dynamic pricing as it relates to purchasing movie tickets. I used machine learning to implement a dynamic pricing algorithm that will make tickets inexpensive depending on several factors associated with watching movies. The current issue with this problem is that at most theaters you have to pay the same amount for all the seats. As a result, if only the bad seats are available, then customers will need to either find a different time or just watch in an undesirable location. Similar to this, sometimes, the movies could be offered at non-optimal locations or viewing times and so the customer has either to adjust their schedule or drive a longer distance to watch/go to an unwelcoming theater, respectively. The pricing of tickets corresponding to these factors will serve as the data that will be used for the actual technical project.

My approach was to examine historical data on prices for movie tickets as they have changed/evolved over time and try to develop a machine-learning algorithm that will deliver the best price depending on several factors that the customer chooses. Through these data, I analyzed and saw if there is a trend for whether a certain time for a movie has ever been cheaper and then tried to have it factor into the dynamic pricing algorithm. Similarly, the other factors mentioned should have historical data that can be used to determine an optimal price for movie tickets that customers will love to buy. These datasets will be easy to find on the internet and through data analysis, a machine-learning algorithm will be found. The period for the project is 3 months given the volume of data to go through in order to create an ideal algorithm that factors in the multiple factors for the pricing. My technical advisors are Farzad F Hassanzadeh and Brad Campbell in the computer science department at the School of Engineering and Applied Science.

Results and Discussion

The annual average ticket price data that I observed and analyzed were from two sources: the National Association of Theatre Owners (NATO) and 24/7 Wall Street. These datasets start from around the 1940s and span until 2019. After analyzing the data over the course of history for average movie ticket prices, we can see just how cheap tickets used to be compared to now. Of course, these prices should be adjusted for inflation to get a true sense of how average ticket prices back in the day compared to current prices. The NATO dataset did adjust one year's average ticket price to make it factor for inflation. The 24/7 Wall Street dataset adjusted each year from 1946 to 2018 to factor for inflation, so it will give more data points for analysis. These datasets adjusted ticket prices for inflation using the 2019 U.S. dollar. For more certainty, I will calculate the average ticket price after inflation for 2019 dollars myself to just see if the adjusted prices are correct. I used the 2019 dollar as opposed to the 2021 dollar because the purpose of this research is just trying to see a trend over history, so the 2019 dollar will be sufficient. In addition, the datasets that are being analyzed also used the 2019 dollar.

Now, it is time to check the comparison over the years of the prices. According to the NATO dataset, the average price of a movie ticket in 2019 was $9.16. In comparison, the average price of a movie ticket back in 1969 was just $1.42. This seems like a very cheap price at first glance, but the price must be adjusted for inflation to get a good read on the price. After adjusting the ticket price in 1969 for inflation over the years, the NATO dataset calculated the average price of a movie ticket in 1969 to be $10.14 in 2019 dollars (Corcoran, 2019). According to the 24/7 Wall Street dataset, the average price of a movie ticket in 2019 was $9.16 and the average movie ticket price in 1969 was $1.42, which was the same as the NATO dataset

(McIntyre, 2021). However, the 1969 price adjusted for inflation was $9.77, which differs from the NATO dataset (Suneson, 2019). Due to these different values, I then had to do the calculation for inflation adjustment myself to see if the NATO and 24/7 Wall St. amounts check out. The U.S. dollar in 2019 is 6.97 times higher than the U.S. dollar in 1969, so the adjusted average movie ticket price in 1969 is actually $9.89 in 2019 dollars (Webster, 2021). Although this amount is greater than the reported amount by the two sources, it is still higher than the 2019 average ticket price, $9.16. Therefore, the data here support a case that movie ticket prices have slightly been decreasing actually, after adjusting for inflation, over history. However, I was not convinced completely just off one year. I needed more data points than just comparing two years.

For the next analysis, I looked at several more years to truly see if there is a trend over history. For this, I only used the 24/7 Wall St. dataset as it has data for the ticket prices after being adjusted for inflation as well. According to the 24/7 Wall Street dataset, the average prices of a movie ticket from 2011-2019 are listed below in the table, as well as the adjusted price for inflation in terms of the 2019 U.S. Dollar from 24/7 Wall St. and my calculations using the calculator.

Table 1.1: Average Movie Ticket Price and Adjusted Inflation Price from 2011-2019

Year	**Price in Specified Year ($)**	**Adjusted Price through 24/7 Wall St. (2019 $)**	**Adjusted Price through Calculator (2019 $)**
2011	7.93	8.82	9.01
2012	7.96	8.60	8.86
2013	8.13	8.65	8.92
2014	8.17	8.56	8.82
2015	8.43	8.84	9.09
2016	8.65	8.94	9.21
2017	8.97	9.16	9.36

2018	9.11	9.11	9.27
2019	9.16	9.16	9.16

As we can see from the above table, the previous statement made is not true. The average movie ticket price does not decrease each year when factoring in inflation. It tends to fluctuate or alternate each year. Sometimes, it increases for some time (2014-2017) and then it dips one year before it increases again. I picked these years (2011-2019) just to disprove the statement made earlier with the ticket price decreasing each year, but it does not give an overall trend for the course of history. Therefore, to get a before look at the overall trend, I checked based on each decade as opposed to just a few years. I selected the 9th year from each decade since 1940 and analyzed the data to see the trend. Just like the above table, the average prices of a movie ticket for each decade from the 1940s to the 2010s are listed below.

Table 1.2: Average Movie Ticket Price and Adjusted Inflation Price for Decades (1949-2019)

Year	**Price in Specified Year ($)**	**Adjusted Price through 24/7 Wall St. (2019 $)**	**Adjusted Price through Calculator (2019 $)**
1949	0.46	4.69	4.94
1959	0.66	5.74	5.80
1969	1.42	9.77	9.89
1979	2.52	9.04	8.87
1989	3.99	8.07	8.23
1999	5.08	7.57	7.80
2009	7.50	8.70	8.94
2019	9.16	9.16	9.16

After this data analysis, I believe it is safe to say that the previous statement I made, after comparing the years 1969 and 2019, was not truly accurate. Movie ticket prices have not been slightly decreasing over time. It is clear that sometime in the 1960s, there was a huge increase in the average movie ticket price that threw the table off the regression. After that, the average movie ticket price was actually decreasing for a while from 1969 - 1999. Then, in the 2000s, there was another sharp increase in the average price and since then the price has increased so far and it looks like it will increase for several years.

Therefore, I believe using a dynamic pricing algorithm to get cheaper and more optimal ticket prices is more needed, as the ticket price will only continue to increase due to the data.

Conclusion

To summarize, the topic for my project will be implementing dynamic pricing through a machine-learning algorithm to obtain the optimal price for movie tickets. This was achieved by conducting research on the history of movie prices throughout time. I investigated how movie ticket prices have changed over the course of history and why movie theaters have not implemented dynamic pricing already when the benefits are very high. I analyzed how the prices vary depending on the different factors discussed in the previous sections. From this research, it helped me to create an accurate algorithm that will yield a price for a ticket that will be both acceptable for customers and for the theater.

The results from my research came to a main conclusion. There seems to be no constant trend for the ticket price when looking at individual years. The trend tended to alternate between increasing one year to decrease the next year. However, when analyzing the average ticket price by decades, the data showed that the average ticket price has been increasing, even after

adjusting for inflation, for the recent decades, from the 2000s to now. These results are seen in table 1.2. From the data, we can also conclude that the ticket prices will most likely continue to increase for years to come. Therefore, movie theaters will most likely need to find a way to bring the prices down so that the quantity of ticket purchases stays high. This is why I propose implementing dynamic pricing through my machine-learning algorithm to save customers money while increasing their satisfaction with the theater experience. It will boost profits for the theaters because more tickets will be sold due to customers getting better deals. My dynamic pricing algorithm will help movie theaters in this quest to cater to the customer and have more movie tickets be purchased. It is the way of the future for the movie cinema industry.

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