

**Developing a Machine Learning Dynamic Pricing Algorithm from Historical Data on  
Movie Tickets and Using it to Acquire Optimal Ticket Prices**  
(Technical Paper)

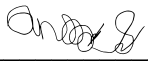
**Evolution of Movie Ticket Pricing Throughout History and How Dynamic Pricing is  
Unused in Movie Theaters**  
(STS Paper)

A Thesis Prospectus Submitted to the  
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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 time. This theater, however, does not ask 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 have to watch the entire movie with an uncomfortable seat and you still paid the same as the other customers, who enjoyed the movie comfortably. Now, suppose that the theater sold those bad seats for a cheaper price. Then maybe it wouldn't be so bad. 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. 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 will be using 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 less expensive tickets for cheap. This 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.

## ***Machine Learning Dynamic Pricing Algorithm for Optimal Ticket Prices***

The technical topic that this project will be focusing on is dynamic pricing. I will be using dynamic pricing as it relates to purchasing movie tickets. I plan to use machine learning to implement a dynamic pricing algorithm that will make tickets less expensive 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 either has to adjust their schedule or drive a long 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 is to examine historical data on prices for movie tickets as they have changed/evolved and try to develop a machine learning algorithm that will deliver the best price depending on several factors that the customer chooses. Through this data, I will see if there is a trend for whether a certain time for a movie has ever been cheaper and will then 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 fairly easy to find on the internet and through data analysis, a machine learning algorithm will be found. The time frame for the project is 3 months given the volume of data to go through to create an ideal algorithm that factors in the multiple factors for the pricing. My technical advisor is Aaron S Bloomfield in the computer science department.

### ***Developing a Machine Learning Dynamic Pricing Algorithm from Historical Data on Movie Tickets and Using it to Acquire Optimal Ticket Prices***

The STS Topic for this project is movie ticket pricing throughout history. The research question I expect to answer is why don't all theaters implement dynamic pricing for their movies. I also expect to research 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 is the location of your movie 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 is the demographic 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 just a few of the examples, but there are many more factors involved with movie ticketing. Therefore, it will be necessary to research how the pricing of the movie tickets has been impacted by these new variables. Then, it can contribute to implementing a dynamic pricing algorithm for the technical project.

This topic is important because it will lead to more revenue for the theaters and movie companies while saving money or increasing the satisfaction for the public. This will, in turn, boost our economy in the long run. 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.

### ***Research Question and Methods***

My STS research question is: How have movie ticket prices changed throughout history and are there certain factors (location, timing, seats) that influence ticket pricing more? I will be approaching this question by researching through movie ticket pricing data from several decades. I will acquire datasets of the ticket pricing from different times to see how the prices have changed from one time period to the next. I will also look at inflation rates over the years to also

account for this change in the ticket pricing. Then, I will truly get the change in the pricing. I will browse for research articles talking about the inflation rates from those periods and how movie ticket prices have fluctuated over time. From these sources, I will also investigate how pricing varies for movies depending on several factors, described earlier, for the same year. After collecting all the data, I will analyze the changes in the data to solve my STS research question and start formulating a machine-learning algorithm to use in my technical project.

### ***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 will be achieved through research on the history of movie prices throughout time. I will see how the prices vary depending on the different factors discussed in the previous sections. This research will help create an accurate algorithm that will yield a price for a ticket that will be both acceptable for customers and the theater. Then, I will investigate why movie theaters have not implemented dynamic pricing already when the benefits are very high. Implementing dynamic pricing through my machine learning algorithm will save customers money while increasing their satisfaction with the theater experience. It will also boost profits for the theaters because more tickets will be sold due to customers getting better deals. My anticipated outcome for the STS project will be to acquire enough data and research to help create the machine learning dynamic pricing algorithm. My anticipated outcome for the technical project will be to create a dynamic pricing algorithm to successfully offer a realistic price for tickets that will satisfy both the customer and the theater.

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