# Guided Capstone Project Report

**Erin Kiffney**

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## Problem Statement

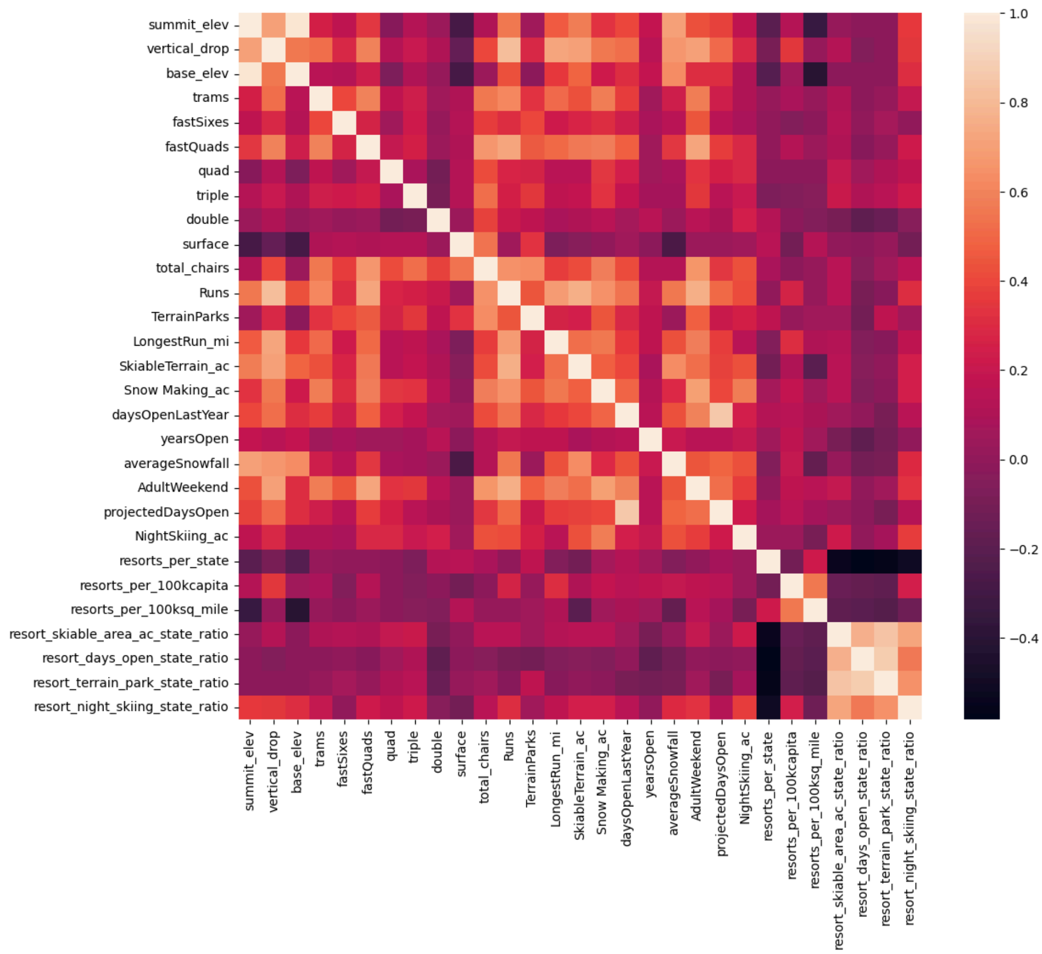
The question we need to answer for Big Mountain ski resort is how much the resort should be charging for tickets. We have information on how much other resorts charge for tickets and what features they offer. If we assume that the resorts included in the data are setting their prices based on how much people value certain features, we can find an appropriate ticket price for Big Mountain given its features. Big Mountain originally charged $81 for a ticket.

## Data Wrangling

In this step we cleaned up our data by removing the Adult Weekday data because it was nearly the same as the Adult Weekend data but with more missing values. We also removed extreme values that were skewing the data and deleted the resorts that did not have any ticket price information.

## Exploratory Data Analysis

In this step we found the average ticket price by state. Then we graphed the correlations between ticket price and Big Mountain’s features to see which was the strongest. Vertical drop, fast quads, runs, and total chairs all had strong correlations. We investigated these relationships further to gain insights into the market. We can theorize that some resorts are exclusive and charge a lot for a few chairs because they can depend on tickets being bought up quickly. Fast quads are strongly correlated with high ticket prices. In this step we found the features that are most influential on ticket price.



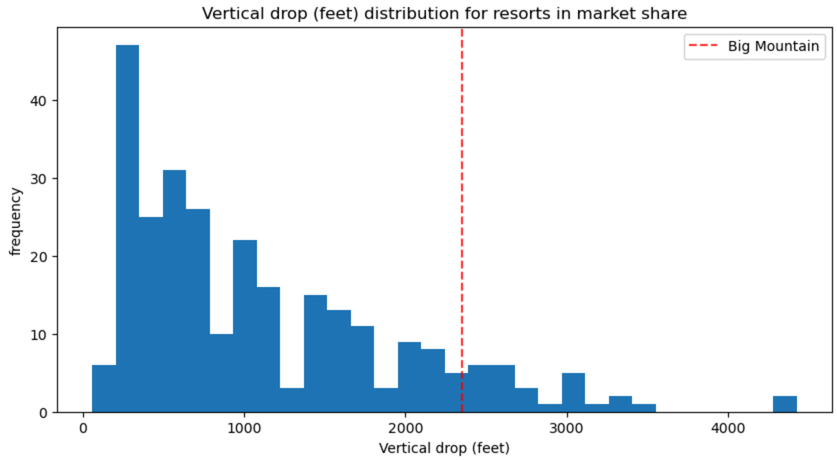

### Model Preprocessing and Evaluation Metric

Our goal in this step is to come up with a simple model that predicts ticket price. We built a best linear model and best random forest model and chose between them. We used the Mean Absolute Error as a metric to measure the accuracy of the models. The smaller the error, the more accurate the model. The random forest model has a lower MAE by almost $1 and it is less variable, so this is the model used to predict ticket price.

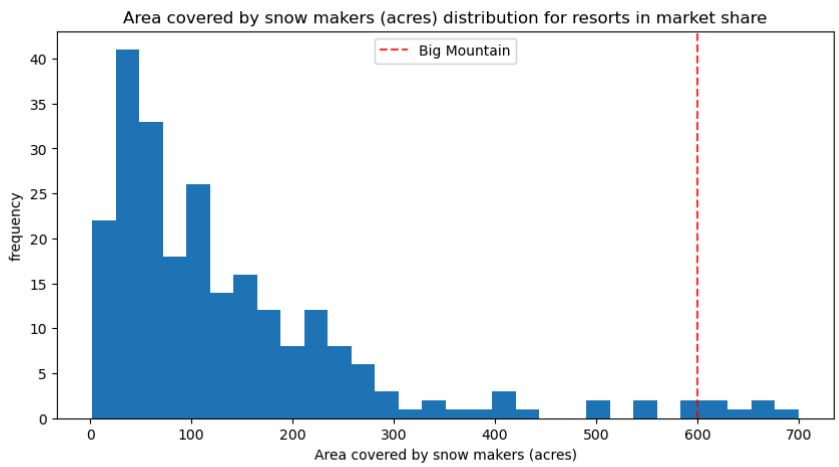
### Big Mountain in the Market

To get a sense of how Big Mountain's features compare to the other resorts in the market, we visualized each feature with a histogram and marked where Big Mountain sits in the distribution. Here is how our resort ranks:

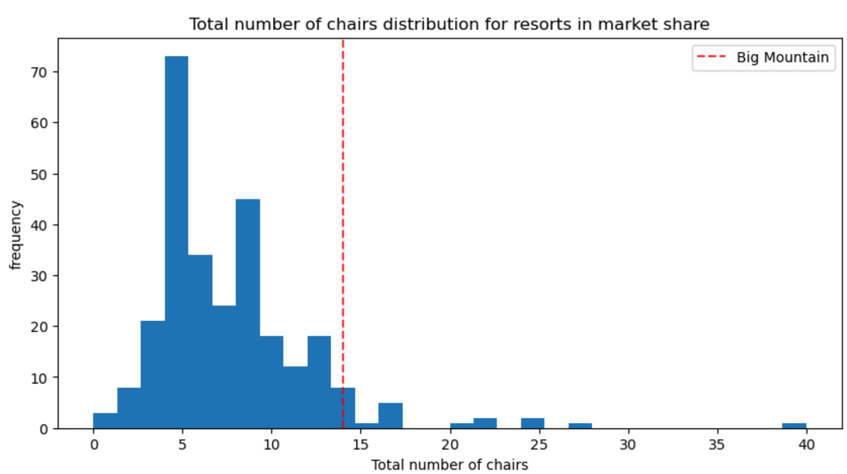
- **Vertical drop**: Big Mountain compares well while some resorts have a larger drop.



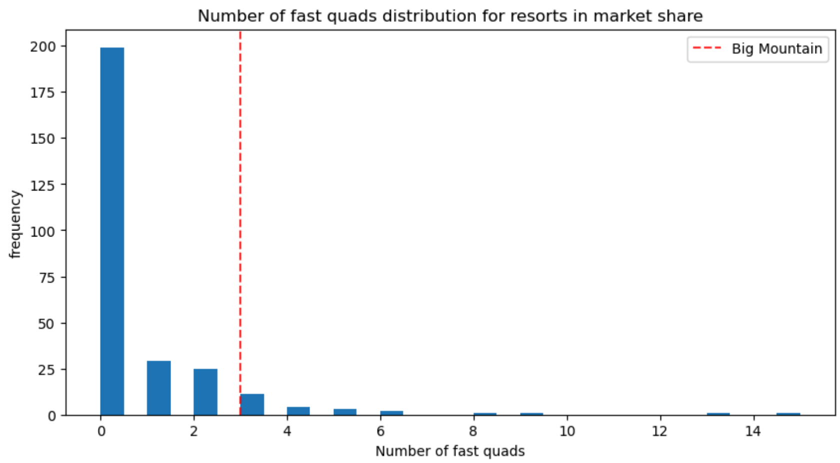

➢ **Snow making area**: Big Mountain has one of the largest areas covered by snowmakers in the market.



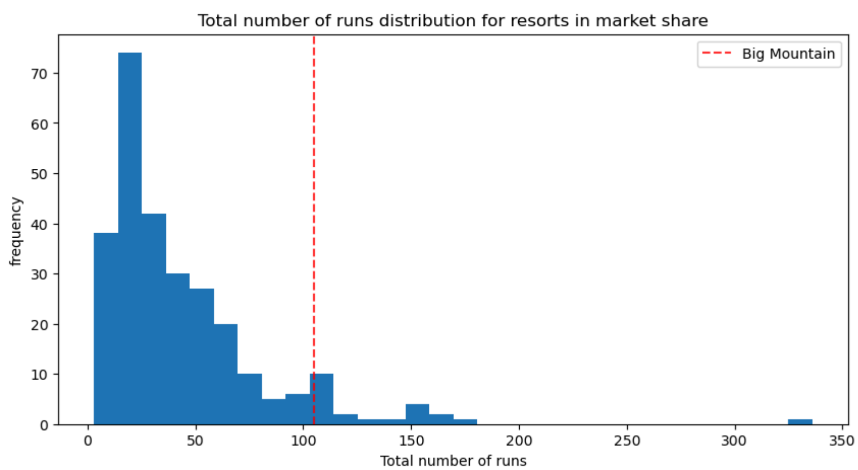

➢ **Total number of chairs**: Big Mountain is among the highest. Any resorts with higher seem to be outliers.



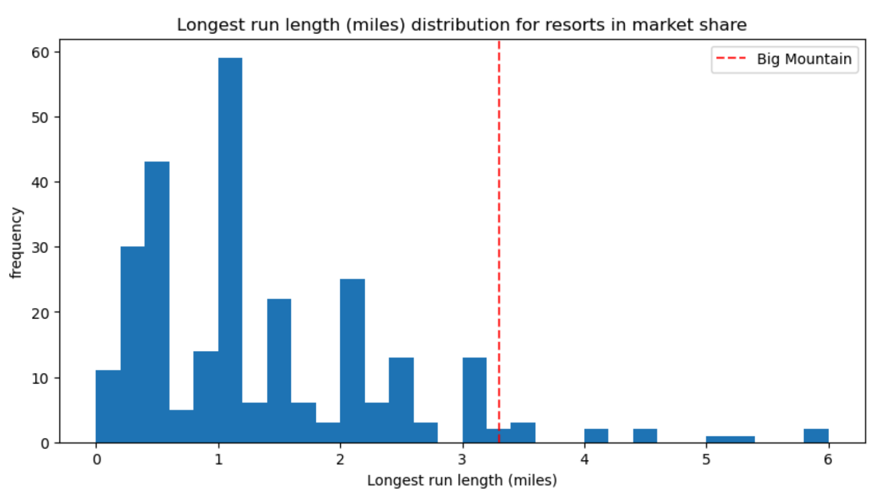
➢ **Fast quads**: Most resorts have no fast quads but Big Mountain has 3.




➢ **Total number of runs**: Big Mountain compares well. There are some, but not many, resorts with more.




➢ **Longest run**: Big Mountain has one of the longest runs.



**Modeled Price**

Our ranking among other resorts in the market suggests that Big Mountain has valuable features. So what ticket price do these features support? Our original price was $81.00 and our modeled price is **$95.87**. We have a mean absolute error of $10.39 which indicates our modeled price could be off by that amount. Our modeled price minus the error is still greater than our original price, which suggests the need for a price increase.

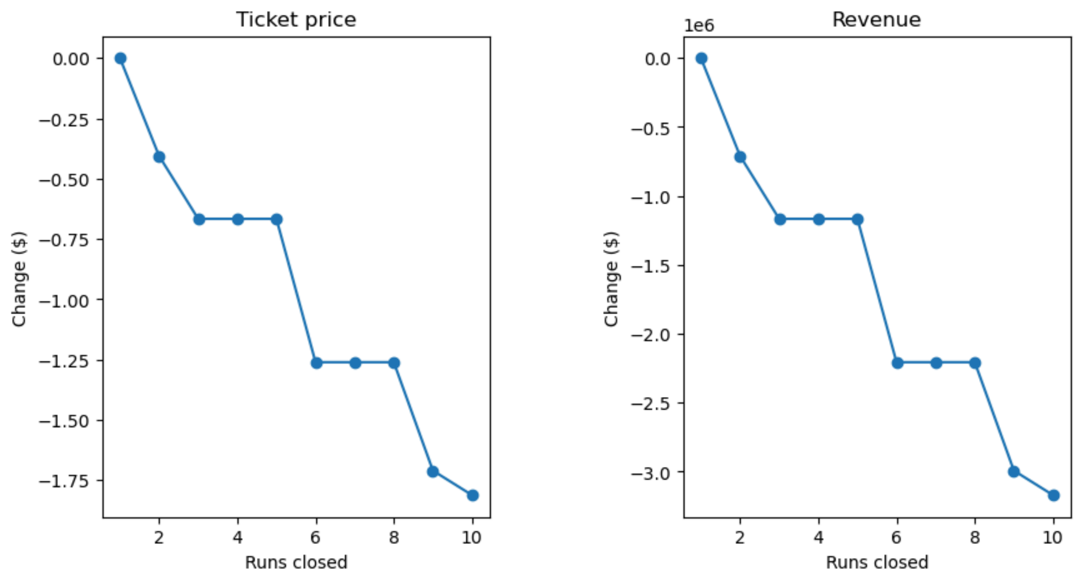
**Modeling Scenarios**

We also explored how changes to Big Mountain's facilities might increase profits in the next season. This has the added benefit of providing us with a sense of which facilities support the ticket price and which have less of an effect. Here are the options suggested by the business:

- **Scenario 1:** Permanently closing the 10 least used runs.
- **Scenario 2:** Add a run and increase the vertical drop by 150 ft by installing another chair lift.
- **Scenario 3:** Same as scenario 2 but add 2 acres of snow making cover.
- **Scenario 4:** Increase the longest run by 0.2 miles and add 4 acres of snow making coverage.

I suggest the implementation of scenario 2, where Big Mountain adds a run, increases vertical drop by 150 ft, and installs an additional chair lift. These additional features support an increase in ticket price by $1.99 and would increase revenue by $3,474,638 per season. The other scenarios do not increase revenue without raising expenses as effectively. For example, scenario 3 is the same as scenario 2 but with 2 additional acres of snow making cover. This feature does not have as much influence on ticket price and therefore revenue, so the modeled revenue and ticket price increase is not affected.

Also, removing 2 to 5 runs as suggested in scenario 1 would reduce operating costs without substantially reducing ticket prices. As we can see in the graph, Big Mountain may as well close 5 runs as 3 runs because there is no further loss in ticket price.




**Conclusion**

My analysis has confirmed the need to adjust ticket prices to support the facilities offered at Big Mountain. The facilities support increasing ticket prices from $81.00 to $95.87. We have a margin for error of $10.39, which means that our modeled price could be off by that amount. Big Mountain needs to increase from its current price because the modeled price minus the error is more than the current. I have also suggested two ways to increase revenue and reduce operational costs.