

Caitriona O'Donohoe

## Big Mountain - Guided Capstone Project Report

### Background

Big Mountain Resort, a ski resort in Montana that sees about 350,000 people each year is currently basing their pricing on market average, charging slightly above the average. Despite charging more than most of their competitors, there is concern that BMR is not taking advantage of everything that makes them marketable, like desirable amenities and improvements being made to the resort. Recently, the resort has installed a new chair lift that has increased their operating costs by \$1.54M per season.

### Problem

What opportunities are there this season for Big Mountain Ski Resort to capitalize on their facilities that set them apart from their competition, to justify an above market average premiums and increase revenue by at least \$1.54M to compensate for increase in operating costs?

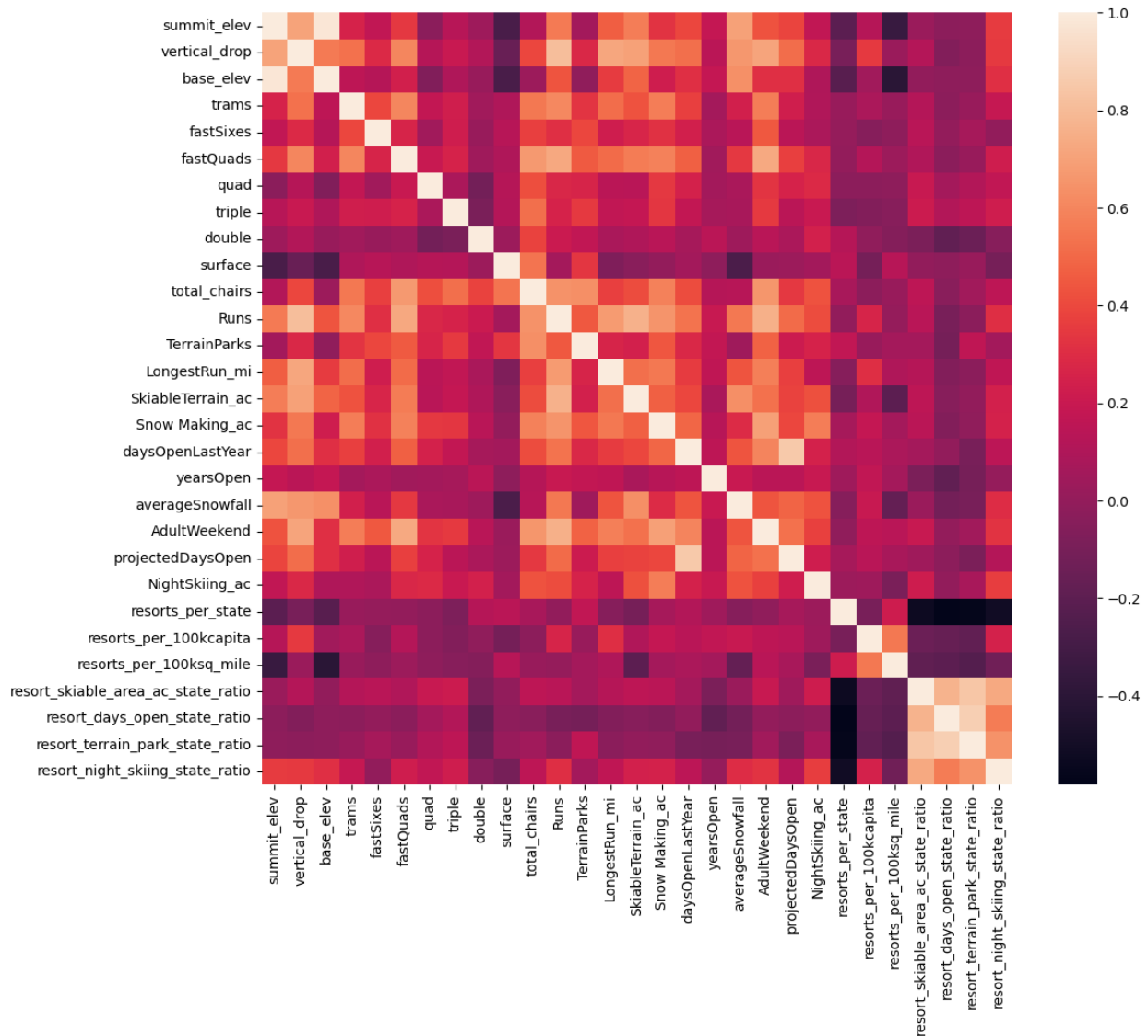
### Data Wrangling

From a CSV file shared by our database manager, we were provided data on qualities of Big Mountain Resort and competitors, including Name, Region, state, AdultWeekday, AdultWeekend, daysOpenLastYear, projectedDaysOpen, SkiableTerrain\_ac, total\_chairs, Runs, vertical\_drop, and more.

During this step, we compared adult weekend price and adult weekday price, finding that most resorts did not have different prices for weekend vs. weekday. In fact, no resorts within Montana did. So, this column was ultimately dropped from our data. Several other columns of our data were dropped due to too many missing values, like the fastEight column, which had the most missing values of our dataset. Ultimately, the dataset which started with 330 rows, finished with 277 rows.

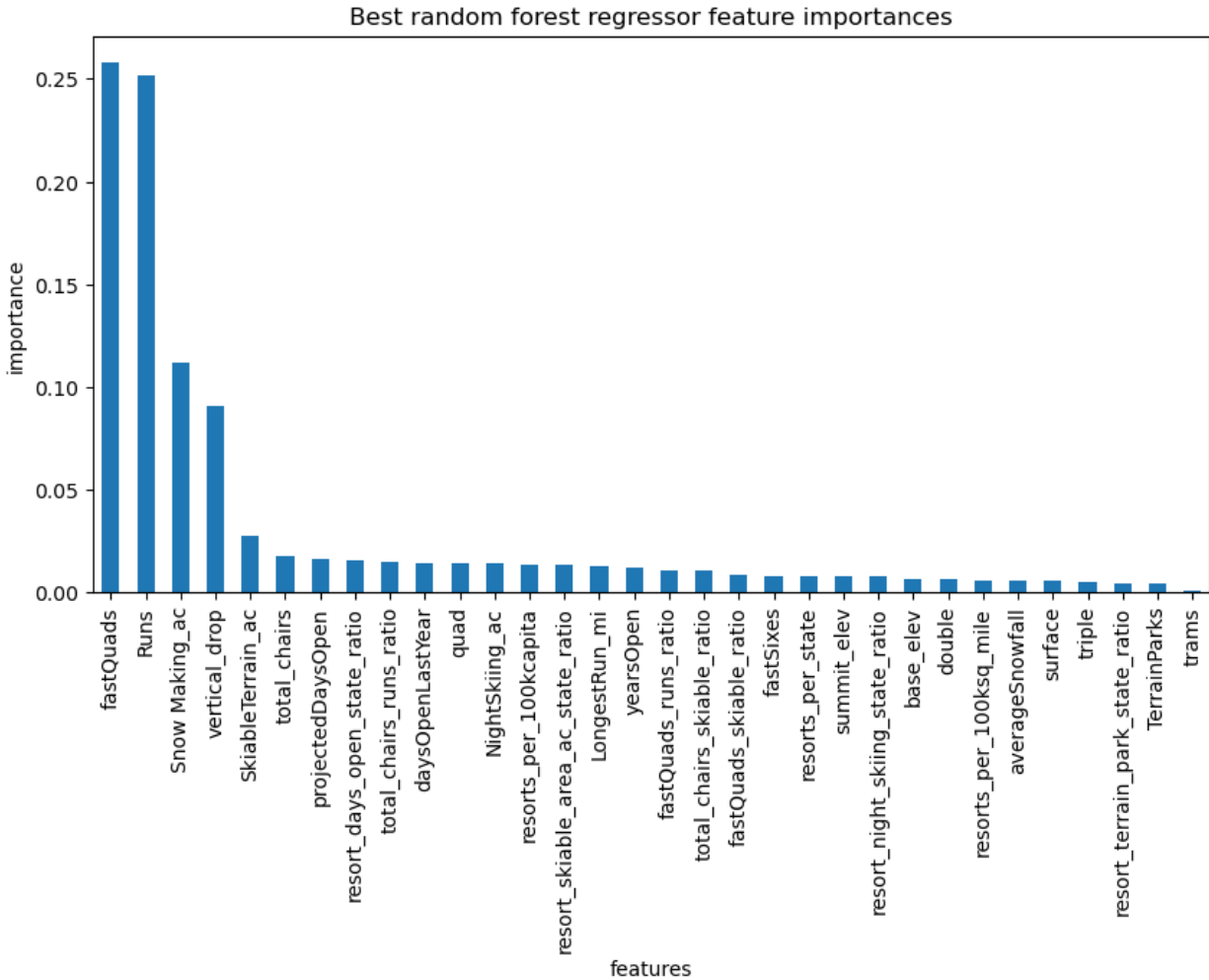
### Exploratory Data Analysis

In order to better visualize the relationships between price and each feature of the resorts in our dataset, we created the heatmap shown below. Looking at this heatmap, when focusing on the AdultWeekend column we can see that there are positive correlations strongly associated with features such as vertical\_drop, total\_chairs, fastQuads, Runs, SnowMaking\_ac, and resort\_night\_skiing\_ratio. Using these findings, we can better construct a data supported ticket price for Big Mountain Resort.



## Model Preprocessing with feature engineering

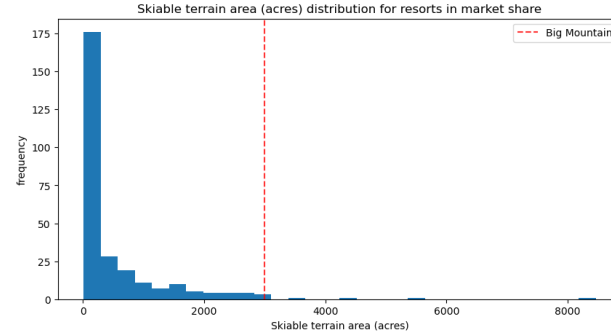
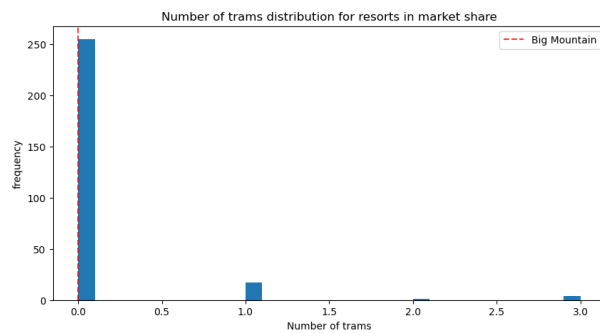
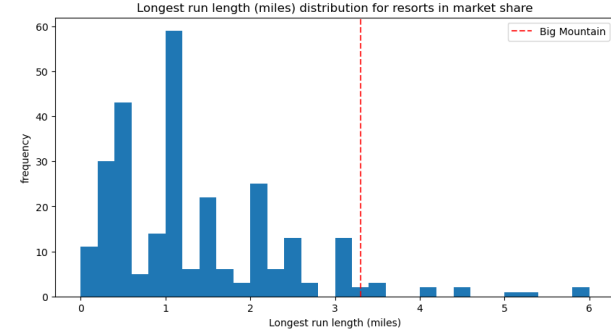
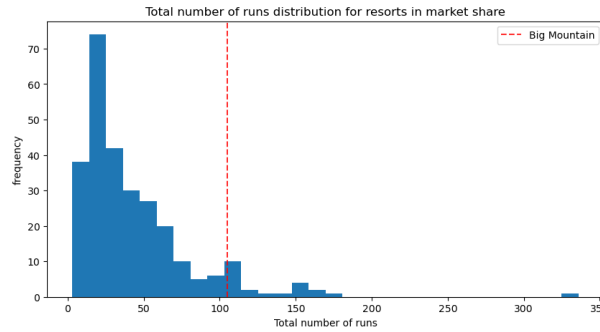
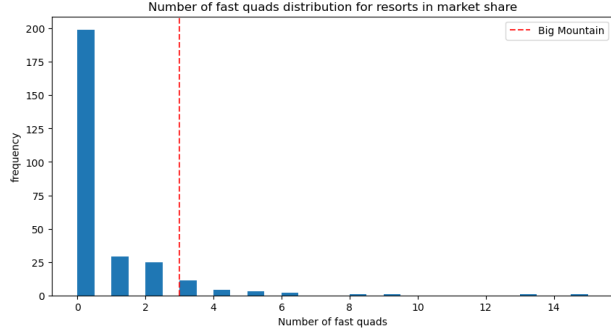
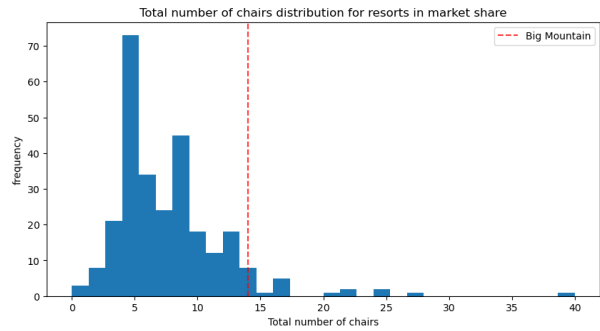
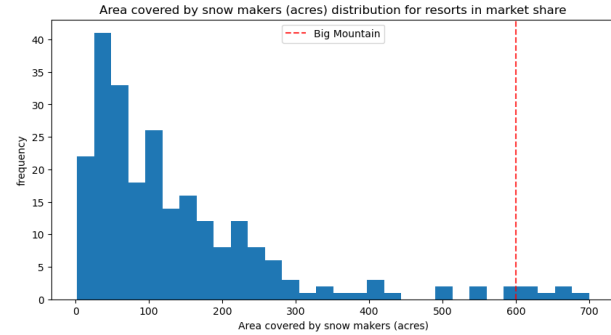
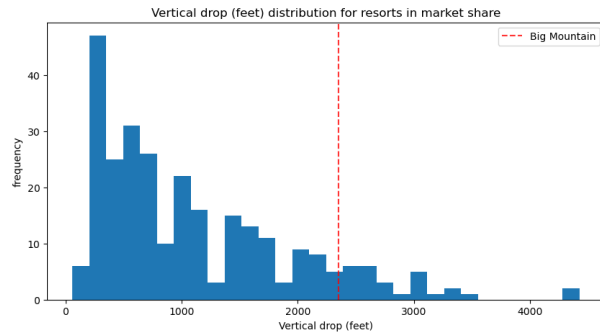
Initially, we explored mean as a price predictor. We found this to not be a great price predictor for Big Mountain Resort; it did not take into account the amenities that BMR has that are strongly correlated to price increase, as we identified in the previous step. It also left us with a Mean Absolute Error of \$19, which is too high. We then tried imputing missing values with the medians, and trained a linear regression model, bringing our Mean Absolute Error to only \$9 this time. Next, we tried a Random Forest Model. We identified the four most significant amenities for price prediction; fastQuads, Runs, Snow Making\_ac, and vertical\_drop. Ultimately, our Mean Absolute Error was brought down to only \$1.



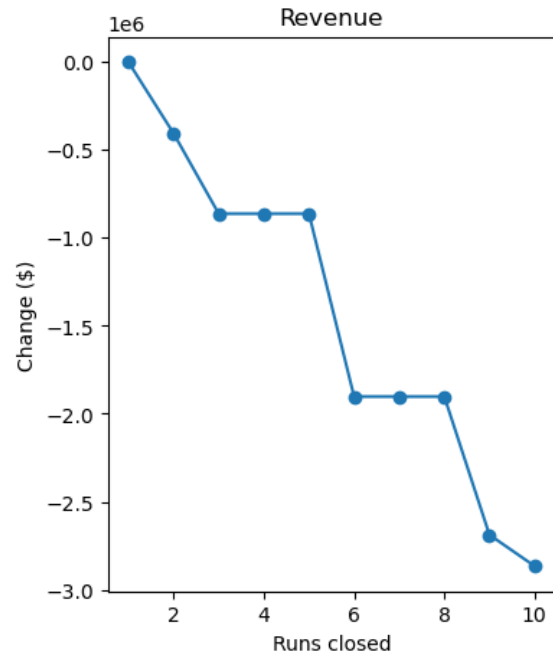
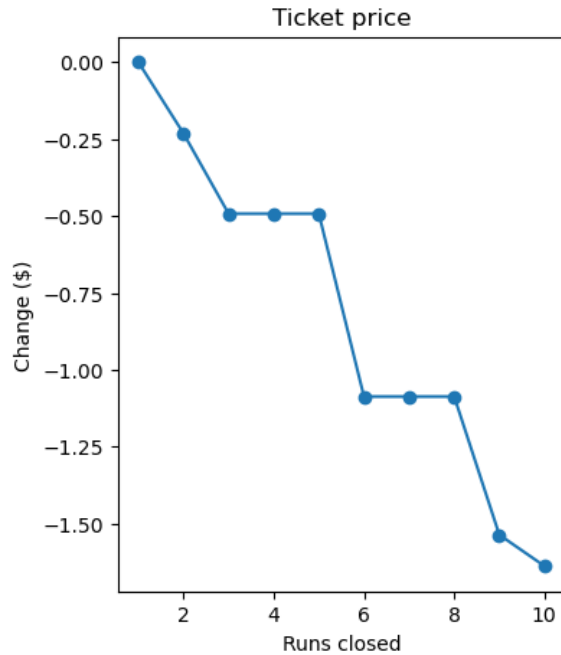
### Modeling/Pricing Recommendation

Utilizing features that had a strong correlation to ticket prices (vertical\_drop, Snow Making\_ac, total\_chairs, fastQuads, Runs, LongestRun\_mi, trams, SkiableTerrain\_ac), we were able to create graphs that show how Big Mountain Resort relates to its competitors in these categories, shown below (Big Mountain Resort is depicted by the red dotted line).

With the exception of trams, for which most resorts have zero, Big Mountain Resort outranks a majority of their competitors in each category. As suspected, Big Mountain Resort is not capitalizing as much as they could on their more valuable features. Using our modeled price, Big Mountain Resort can reasonably raise their ticket price from the current \$81, to about \$96.



Should Big Mountain Resort want to avoid a raise in ticket price, there is also opportunity for them to cut operating costs, in order to improve profit. It is not necessary to keep all of their runs open at once to accommodate all of their customers. In doing this, they are essentially wasting money. Using a predictive analysis, depicted below, Big Mountain Resort can close up to 5 runs at once without seeing a huge drop off in revenue.



### Conclusion/Future Scope of Work

There were two opportunities for Big Mountain Resort to increase revenue; increase ticket price or cut operating costs. When looking at the eight most influential features, with regards to price, Big Mountain Resort outshines most of their competitors in seven of those categories. Using these features as a predictor for ticket price, we can see that Big Mountain Resort can reasonably raise their ticket price by up to ~\$15. As shown above, the resort could also cut operating costs significantly without a significant loss in revenue, by closing up to five of their runs at once.