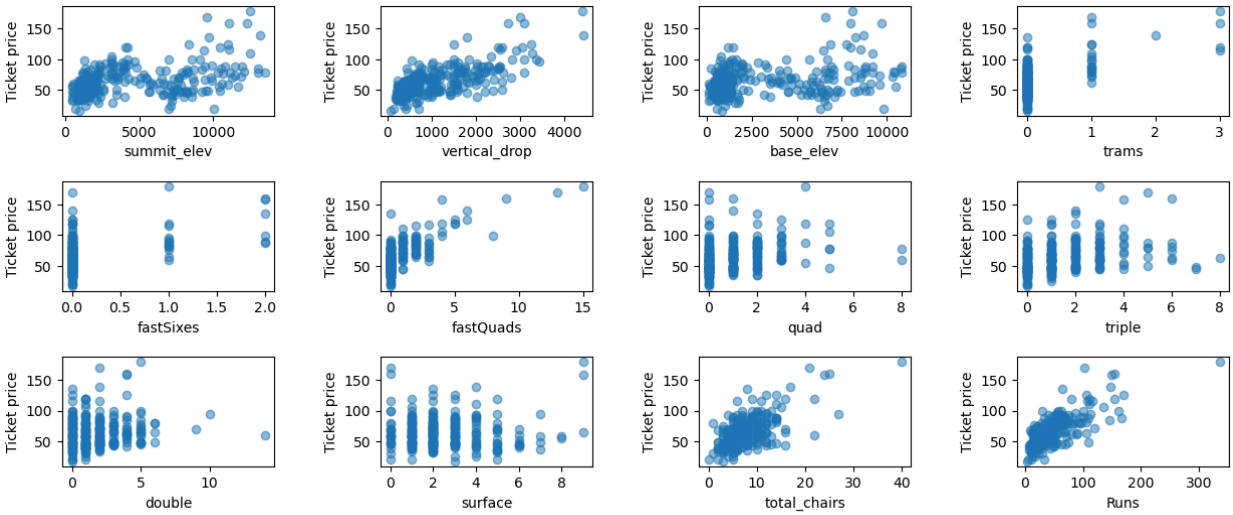
Big Mountain Resort Model Report

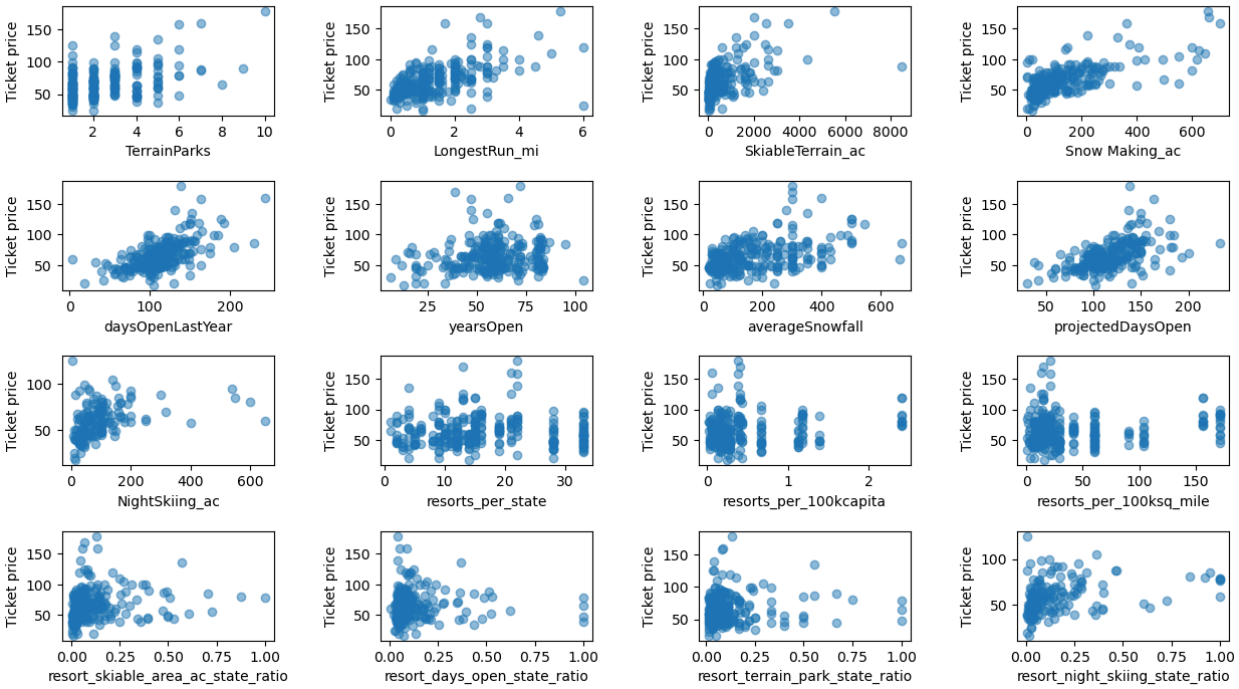
Methodology

The purpose of this analysis was to determine what factors have the greatest impact on ticket pricing for ski resorts and provide recommendations on optimal pricing strategies using a data science-driven approach. I was also asked to provide additional input on how Big Mountain Resort could potentially increase the perceived value of tickets to their resort. In this report, I will provide an overview of the model that I derived, the processes used to build the model, and recommended next steps based on the model's findings.

I started by cleaning the dataset, which involved removing several incomplete data points. I plotted out the data so that I could identify where there was missing information, and dropped columns and rows that had significant missing data. For example, the fast eight column was dropped due to it having few data points, and rows without ticket pricing data were also dropped as that is the key metric we are evaluating. At this point, there were 279 rows left in the data, representing resorts with information that will be helpful in determining a target ticket price as well as features that help to determine optimal pricing strategies for Big Mountain Resort.

In the exploratory data analysis, I looked at what variables had the highest correlation with ticket prices. Using PCA, I was able to identify outlier states, as well as understand what features caused some of those outliers. Categorical features include state, region, and name of the resort. A wide variety of numerical features were also observed such as days open, fast quads, chairs/runs, longest runs, vertical drop, and snow making. Below is a series of scatterplots showing the relationship between ticket price and the variables we are considering that drive ticket prices. Each point represents a resort.





From there, I took the dataset and split it into two groups: one for testing and one for building the model. Essentially, this provides a way to gauge the reliability of the model I'm building using real data points that aren't used to build the model. After that, I created a series of different models and compared them against each other. First I calculated a simple mean to compare the more complex regression models I later made against as a baseline. After that I looked at a linear and random forest regression model. Between the two, the random forest regression model showed less variability and had a lower cross-validation mean absolute error.

Findings

Currently, Big Mountain charges $81 for tickets. This is the highest price in the state of Montana, but only in the upper half when it is compared to resorts nationally, suggesting that the market for skiing in Montana may be hampering our ability to increase price significantly. However, when compared to the features provided by other resorts, Big Mountain is currently under-charging for their tickets. In fact, this model shows that we could be charging $100.12 for tickets, with a MAE of 10.23, showing that there is room for a price increase. While Big Mountain was modeled to have a significantly higher price than its current price, it is highly likely that its location plays a significant role in how high ticket prices are able to go, as it is already the most expensive ski resort in Montana. With this information in mind, I would hesitantly say that Big Mountain Resort can increase their ticket price, but further information on how receptive the market in Montana is to price increases would be helpful.

I modeled a few different scenarios to see how different changes would affect ticket price, the first being the removal of the least used runs on the mountain. It appears that one run could be

removed with no reduction in revenue or ticket price, and after the removal of three runs, five runs could be closed for no further reduction in revenue or ticket price. In the second scenario, I looked at adding an additional run to the mountain, which would increase our number of lifts by one and add 150 feet of vertical drop. In this scenario, the model supports adding an additional 60 cents to the ticket price, which totals to an additional 1.04 million in additional revenue over the course of the season. However, given the additional running cost of the chair lift we added recently increasing costs by 1.54 million, this strategy nets us $-500,000, making it unviable. I then modified this to include two additional acres of snow-making, which yielded no difference in results. In the final scenario, I looked at how increasing the snow making area and extending the longest run might impact ticket prices. With the model we used, extending the longest run and adding four acres of snow-making area had no impact on the ticket prices. With all of this in mind, the only viable strategy to increase profit based on the above model would be to remove one run, which is likely to reduce operating costs without impacting ticket prices or overall revenue.

The biggest hindrance with the current model and the data provided was not knowing the number of visitors that other resorts see. As such, I effectively had to operate under the assumption that all resorts have roughly the same number of visitors annually, which is highly unlikely to be true given the significant variation in location and ticket prices. The price of the additional chair lift was helpful in determining the value of adding further lifts, however, data such as cost of snow making and the difference in price of the different kinds of chair lifts (fast quad vs trams, etc.) would help better determine the value in adding these specific features.

With a greater degree of confidence, I can recommend acquiring attendance data for as many resorts as possible, as this would provide a much stronger reference point for how changes to the price of Big Mountain Resort tickets would impact attendance and thus paint a clearer picture for revenue for the season. As an immediate next step, I will build a simple calculation tool or dashboard for executives/business analysts to use to estimate how other adjustments impact the perceived value of Big Mountain Resort tickets. The model would allow them to input changes (adding/removing runs, lifts, snow-making, etc.) and provide an estimate for the change to prices/revenue.