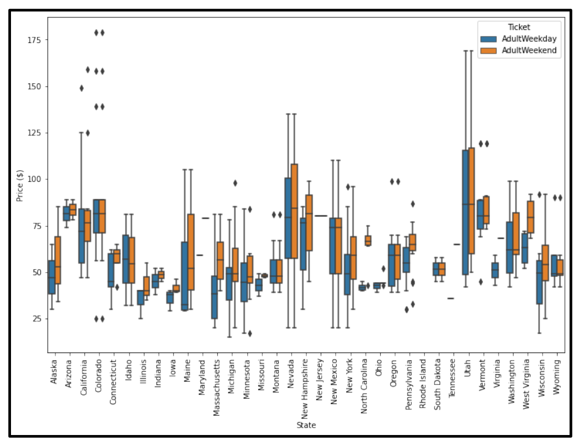
Big Mountain Ski Resort:
Ticket Price Optimization

Introduction

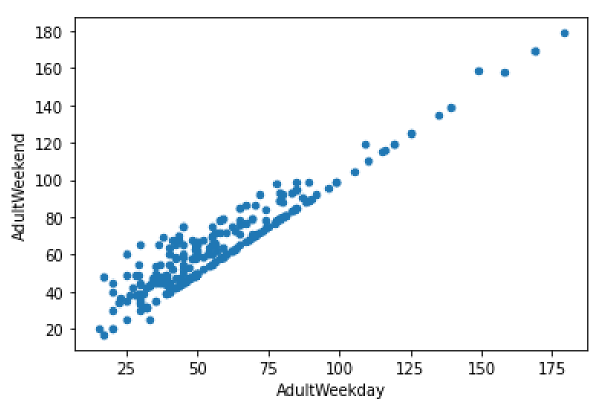
The resort's ticket pricing strategy has been to charge a premium above the average price of resorts in its market segment. Basing their pricing on just the market average does not provide the business with a good sense of how important some facilities are compared to others. This hampers investment strategy. The business wants some guidance on how to select a better value for their ticket price. They are also considering a number of changes that they hope will either cut costs without undermining the ticket price or will support an even higher ticket price.

Problem



By leveraging the more highly valued facilities at Big Mountain resort, the resort needs to increase its net profits by 10% over the course of two ski seasons. How can the different facilities at Big Mountain resort be quantified into value and desirability within the greater context of all competing resorts? How can this identification be leveraged to increase net profitability by 10% over the course of two ski seasons?

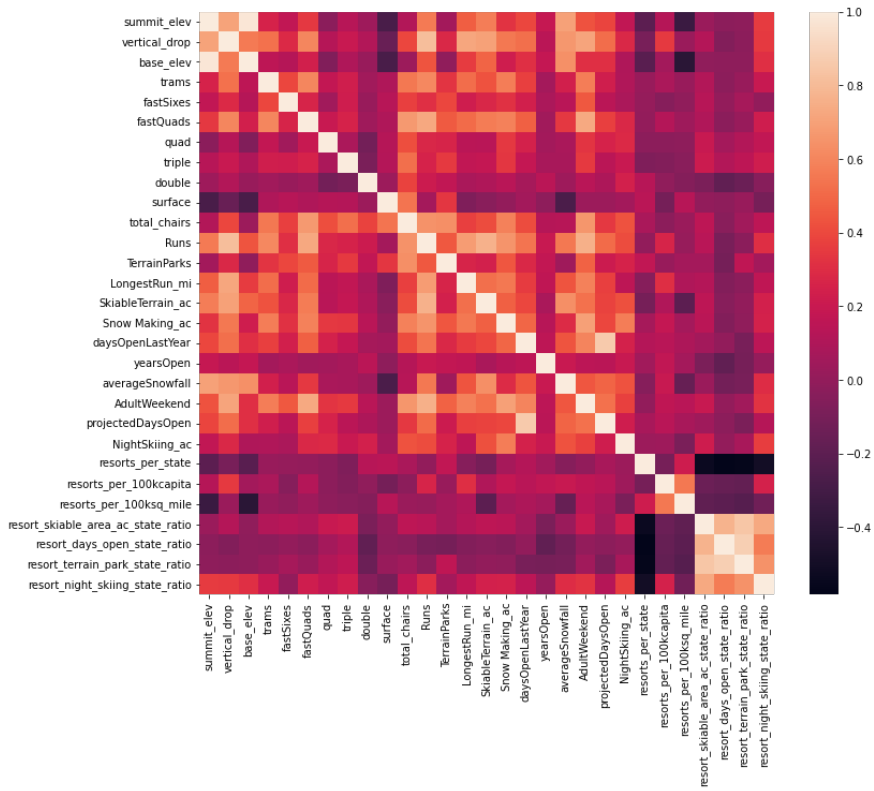
Data Wrangling



The data used for this analysis was provided by the resort and detailed 27 different variables from 330 different ski resorts that are spread throughout the United States. 15% of those resorts were missing information on ticket price. There were several input errors that needed to be corrected. Ticket price information was split into Adult Weekday ticket price and Adult Weekend ticket price. In this initial phase, variation by state of ticket price was being quantified. A comparison between weekend vs. weekday ticket prices showed that for resorts with ticket prices similar to Big Mountain at $81 or above, there was not a significant variation between the two prices. The number of resorts for comparison after the data wrangling was reduced to 277.

Exploratory Data Analysis

We explored location and which states the resorts were located in to consider how that affected pricing structure. There were no discernable patterns that correlated with pricing and variables associated with states. There were several promising correlations between ticket price and vertical drop, number of fast Quads chair lifts, and total number of runs.



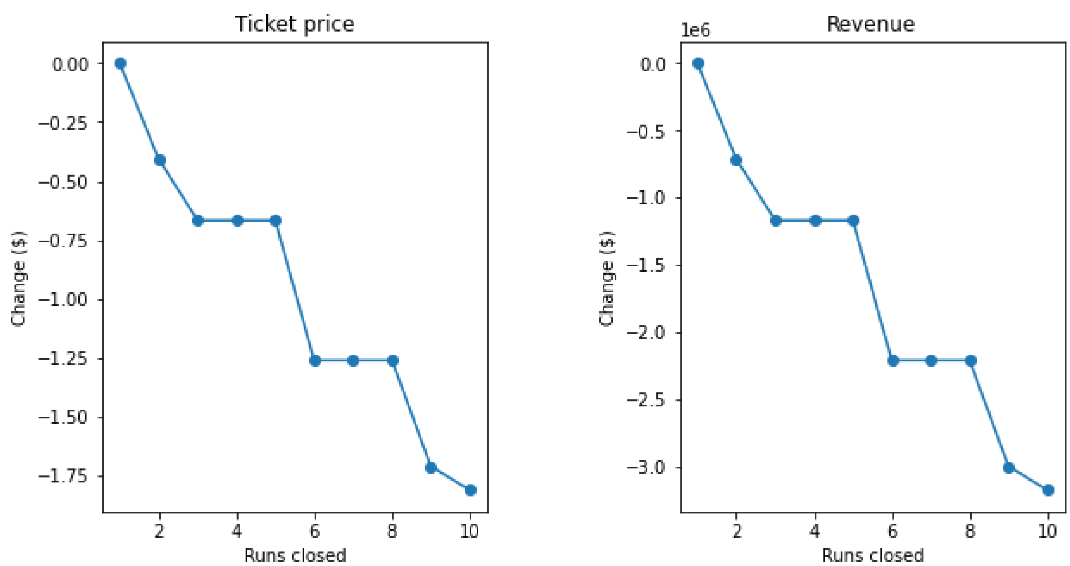
Pre-processing & Training Data

The data were split in to training and test sets. The first model was just a baseline for comparison based simply on the average ticket price. We also created a model based on linear regression and a random forest model. Several strategies were tested for imputing missing data and calculated how these strategies affected model performance. The models were tested using cross-validation on the training data sets to avoid overfitting the results. The test data set was kept separate for the final analysis of the selected model. The top four variables that explained the most variability and patterns within ticket pricing were consist between both the linear regression model and the random forest model: number of fast Quad lifts, total number of runs, vertical drop, and area of snow-making ability. The random forest model produced the more accurate results through both cross-validation and eventual comparison with the test data.

Modeling

The Random Forest model was selected as the most appropriate and accurate to optimize ticket price and model possible scenarios for investment into facilities to support a higher ticket price or cut services without affecting ticket price but increasing net profit. With the current quantification of the value of facilities at Big Mountain resort, the market should support a ticket price of $95.87, with a mean absolute error of +/- $10.39. With the current ticket price being $81, the model suggests that the ticket price could be safely raised. The facilities at Big Mountain are highly competitive in vertical drop, snow making area, total number of runs, number of fast quad lifts, longest run, and total skiable area.

In modeling several different scenarios to increase net profit, the resort is considering shutting down up to 10 of the least popular runs. Based on the model, 1 run could be shut down without adversely affecting the ticket price. Shutting down 3 runs would have the same impact as shutting down 5 runs on ticket price. Shutting down more than 5 runs were significantly impact supported ticket price.



In the second scenario of adding a run that would increase vertical drop by 150 feet and installing an additional chairlift, the model predicts that this would support for a ticket price increase of $1.99. Assuming 350,000 visitors over the total season that on average stay for 5 days, that is an increase in profit of approximately $3.5 million.

The third scenario was the addition of snow making ability associated with the new run and lift from the second scenario. The model predicted no significant increase in profit from this scenario over the predicted increase from the second scenario.

Conclusion

The model predicts that the ticket price at Big Mountain of $81 can be safely increased. The model predicts that the market will support a ticket price of $95 but the ticket price could be incrementally increased across several seasons to insure the validity of the model and moderate risk. To increase net profit, one chair lift can be shut down without significant effect and shutting down up to 5 lifts can be explored incrementally. The addition of a chair lift that also increases overall vertical drop would also increase profit by approximately $3.5 million.