Big Mountain Resort Pricing Model

Problem Statement

Investigate opportunities for Big Mountain Resort to effectively develop and implement a new pricing strategy that can maximize capitalization in their facilities investments to offset their recent additional operating cost by 1.54M this season.

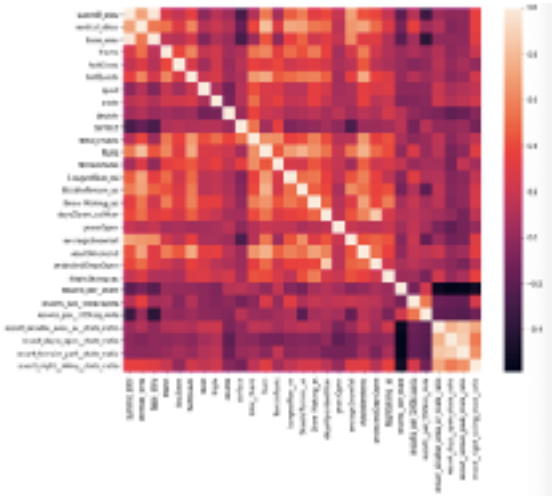
Background

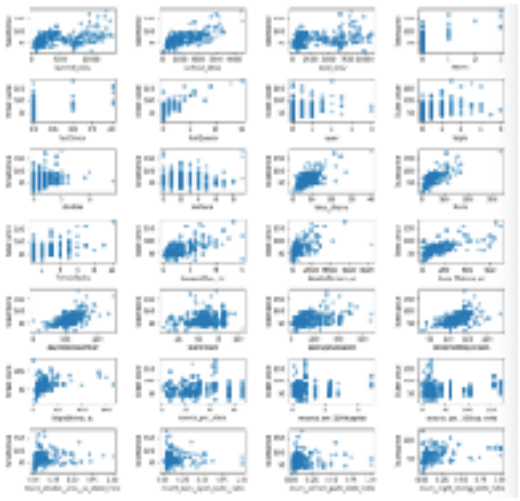
Big Mountain Resort is a ski resort with access to 105 trials that offers views of Glacier National Park and Flathead National Forest. Every year 350,000 people of all levels ski or snowboard at Big Mountain for an average of five days. Big Mountain Resort's current pricing strategy is to base it on the market average however that won't be enough to maximize their capitalization investment and can't be sustainable to gain an edge over their competition. Big Mountain Resort has been reviewing potential scenarios for either cutting costs or increasing revenue from ticket prices which include:

- Permanently closing down up to 10 of the least used runs.
- Adding 2 acres of snow making cover
- Increase the longest run by 0.2 mile to boost 3.5 mile length, requiring an additional snow making coverage of 4 acres
- Increase the vertical drop by 150 ft which require the installation of an additional chair lift to bring skiers back up, without additional snow making coverage

Model Development

We started the analysis with feature correlation heatmap to gain a high level view and identify patterns between features. As shown below, runs, total_chairs is quite well correlated with ticket price, AdultWeekend ticket price is quite well correlated with fastQuads, Runs, and Snow Making, and summit and base elevation are quite highly correlated.





In order to further analyze correlation, we looked at correlation scatterplots shown below. The scatterplots reveal AdultWeekend ticket price, have a few reasonable correlations such as fastQuads, Runs, Snow Making_ac. and vertical drop seems to be a selling point that raises ticket prices as well. When the value is low, there is quite a variability in ticket price, although it's capable of going quite high.

In developing a model, we first examined performance using the mean of prices. However, predicted ticket price using the mean was off by about $19. Next, we developed a linear model, the missing values were imputed with the median and mean values. Using the linear model, the ticket price was off by about $9 and the original model was overfitted and needed to be adjusted through cross

validation. The value of k was set to focus on eight variables: SkiableTerrain_ac, vertical_drop, trams, Snow Making_ac, LongestRun, total_chairs, Runs, fastQuads. For the random forest model, the missing values were imputed with the mdeian and mean values. However, the median values was not helpful to scale the features. The random forest model revealed four vairables to focus on: vertical_drop, fastQuads, Snow Making_ac, Runs.

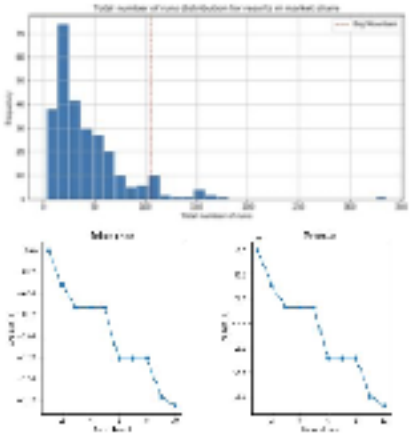
After testing both the linear model and random forest model, the forest regression model was developed. Comparison of the two was consistent with cross-validation results and cross-validation mean absolute error was lower using the random forest regressor.

Recommendations

Our model suggested that Mountain Resort's ticket price is lower than the predicted model by 16.31%. We looked at both cost-based and revenue-based strategies. Cost-based strategy included closing up to 10 used runs. Revenue-based strategy include increasing the vertical drop by 150 ft which would increase the ticket price by 10.63% from $81 to #89.46, resulting in revenue increase by $15. Another revenue-based strategy includes adding 2 acres of snow making which would increase the ticket price by 12.22% from $81 to $90.90, resulting in a revenue of $17M.

Looking at cost-based strategy, when it comes to closing up to 10 used runs, our model predicts the following:

- Closing one run - no impact on ticket price or revenue
- Closing two runs reduced ticket price and revenue by $0.4 and $750,000 respectively
- Closing three, four, or five runs had similar loss in ticket price and revenue of $0.67 and 1.25M respectively.
- Closing ten runs reduced ticket price and revenue by $1.71 and $3M respectively.



Looking at revenue-based strategy, the best scenario where the highest increase in revenue is possible includes increasing the vertical drop by 150 ft, adding one chair lift, adding one run, and adding 2 acres of snow making cover. This scenario has a ticket price increase of 12.22% from $81 to $90.90, resulting in a net increase of 15.53M in revenue after deducting operating costs of $1.54M.

Both cost-based and revenue-based strategies were affected due to lack of data. The current dataset was missing operating costs for most of the resorts features such as runs without which the model cannot recommend closing down used runs or how many cost savings will offset loss in revenue. Moreover, our current dataset was missing Weekday ticket prices without which our model cannot recommend implementing a dynamic ticket pricing such as having higher ticker prices during the weekends and lower ticket prices during the weekdays.