Big Mountain Resort Pricing Model

PROBLEM STATEMENT:

How much price needs to be increased by Big Mountain Ski Resort for Lift Tickets on Weekends and Weekdays in order to maintain a profit margin of 9.2% for the upcoming season, while covering additional operating cost of $1,540,000 for the newly installed chairlifts?

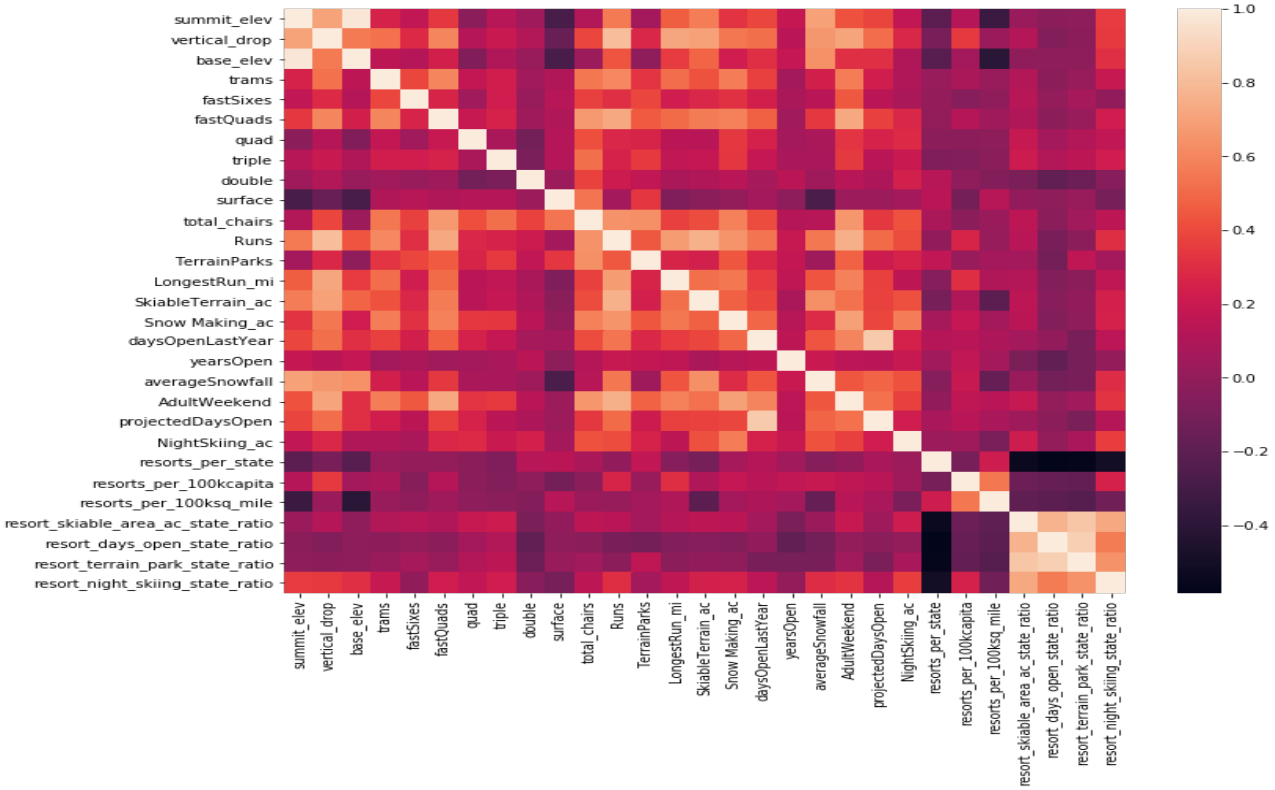
RESORT BACKGROUND:

Big Mountain Resort offers spectacular views of Glacier National Park and Flathead National Forest, with access to 105 trails. Every year about 350,000 people ski or snowboard at Big Mountain. 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 operating costs without undermining the ticket price or will support an even higher ticket price.

RESORT'S CURRENT PRICING STRATEGY:

At present Big Mountain Resort pricing is mainly based on the market average. This strategy won't be enough to maximize their market capitalization investment and also cannot be long-lasting to gain an advantage over the competition.

FEATURE ENGINEERING:

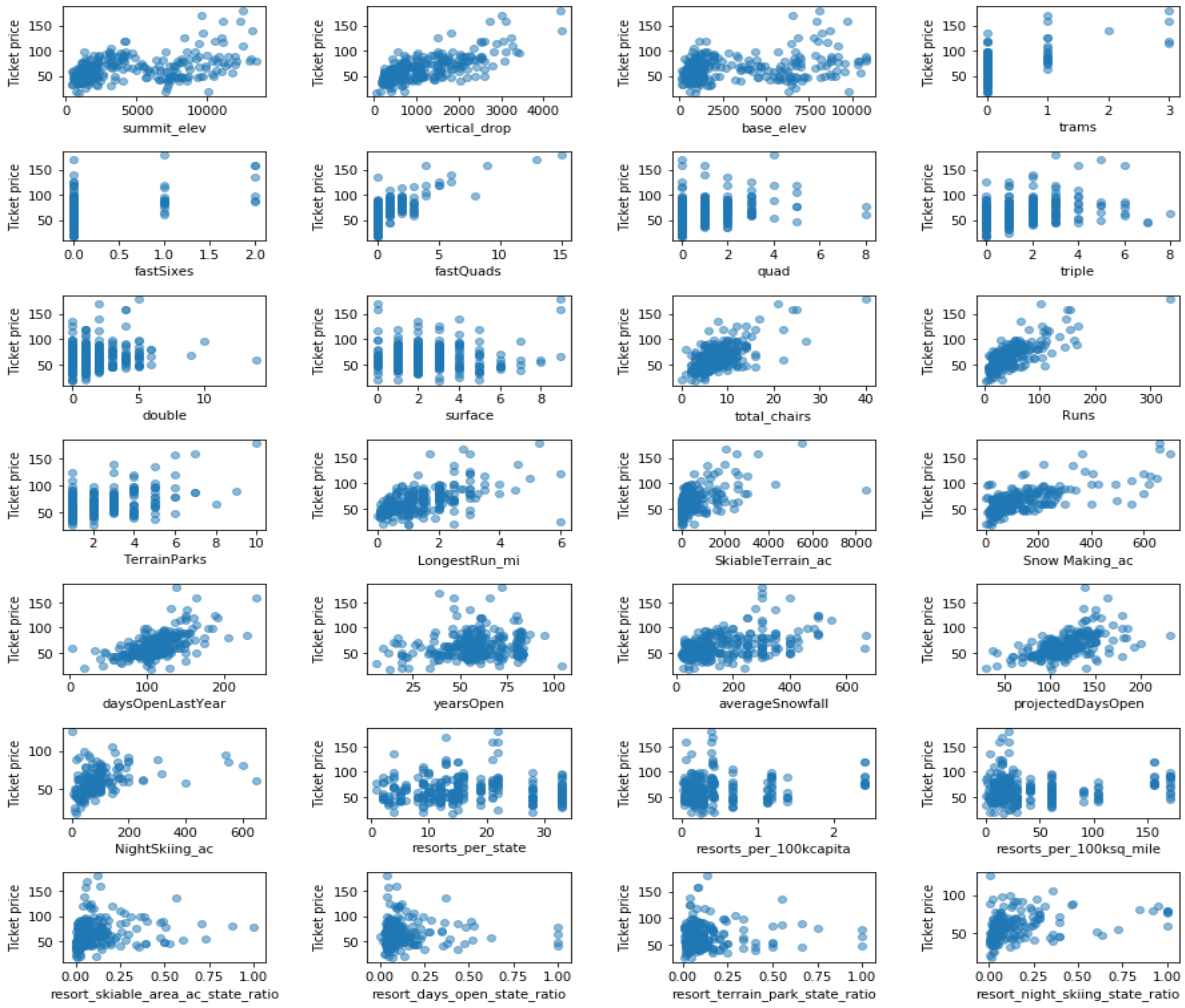


FEATURE CORRELATION HEATMAP:

With the help of feature co-relation heatmap following observations can be seen:

- summit elevation and base elevation are quite highly correlated.
- AdultWeekend ticket price is highly corelated to ‘fastQuads’, ‘Runs’, ‘vertical_drop’ and ‘Snow making _ac’.
- Snow_making_ac indicates that visitors would seem to value more guaranteed snow, which would cost in terms of snow making equipment, which would drive prices and costs up.
- Runs, total_chairs are also well correlated with ticket price. This is reasonable, as the more runs we have, the more chairs we will need to carry people there. Surprisingly, they may count for more than the total skiable terrain area. The total skiable terrain area is not as useful as the area with snow making. People seem to put more value in guaranteed snow cover rather than more varying terrain area.

FEATURE CORRELATION SCATTER PLOTS:



Correlations, particularly viewing them together as a heatmap, can be a great first pass at identifying patterns. But correlation can mask relationships between two variables.

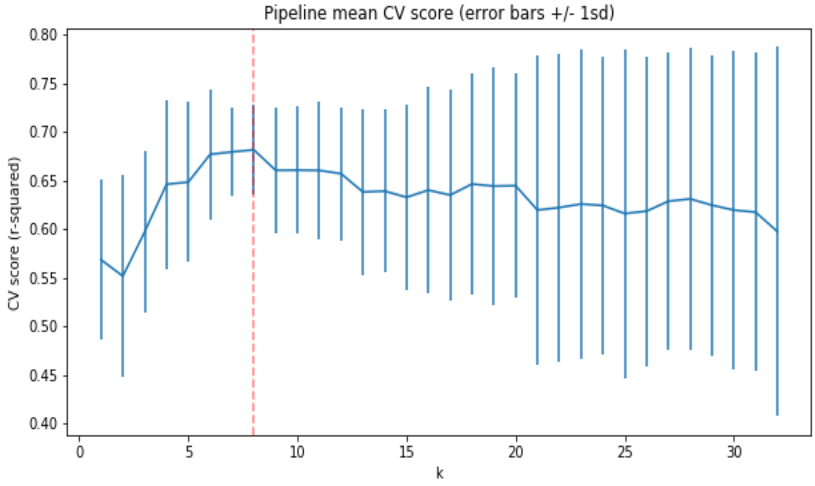
- There's a strong positive correlation of ticket price with 'vertical_drop'.
- fastQuads seems to be very useful. Runs and total_chairs appear quite similar and also useful.

PREPROCESSING AND TRAINING DATA:

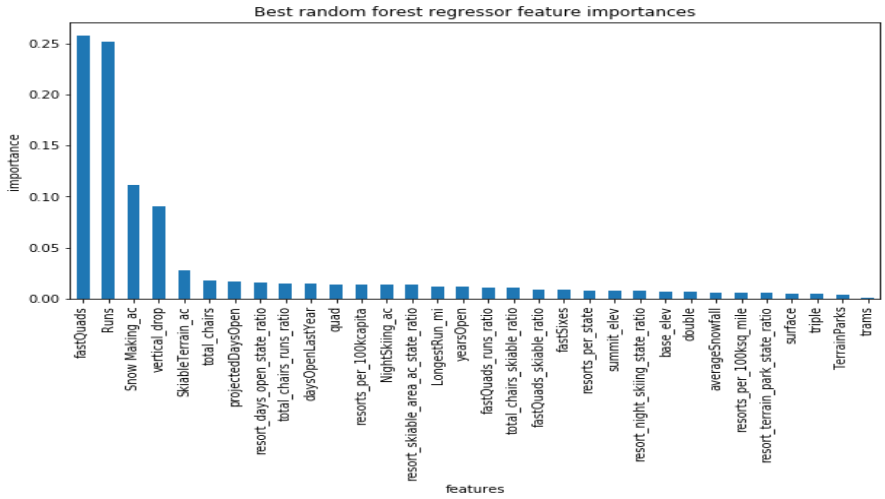
Here we have experimented with two different models:

1. Linear Model
2. Random Forest Model

Linear Model: While building the linear model, missing values were imputed with both the strategies of using mean and median values. When the ticket prices were predicted using the linear model, they would be off by about $9. However, the initial linear model was overfitting and needed to be adjusted by the number of features. Through cross-validation, the value of k was set to eight features to focus on: vertical_drop, Snow Making_ac, total_chairs, fastQuads, Runs, LongestRun_mi, trams, and SkiableTerrain_ac. These features fit our initial assumptions from EDA.



Random Forest model: Random Forest model was developed same as Linear Model, where missing values were imputed with both the mean and the median values. While, Imputing the median was helpful, whereas scaling the features were not. The topmost four features selected by random forest to consider are fastQuads, Runs, Snow Making_ac, and vertical_drop.



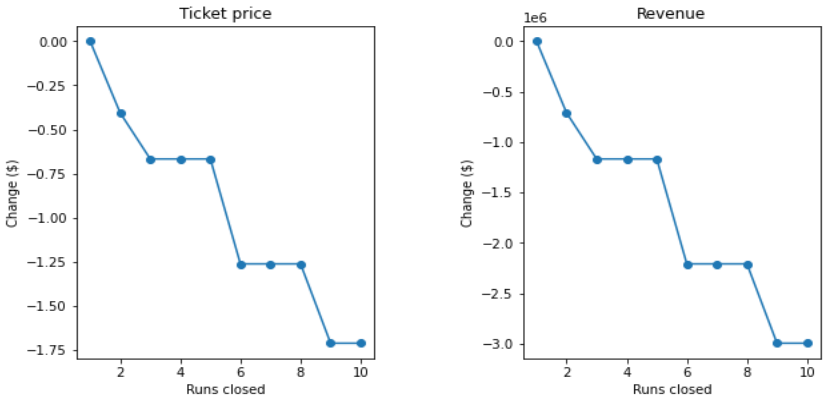
FINAL MODEL SELECTION: After experimenting with both linear model and the random forest model, Random Forest model was selected. As this model has a lower cross-validation mean absolute error by almost $1. It also exhibits less variability. Verifying performance on the test set produces performance consistent with the cross-validation results.

MODELLING SCENARIOS:

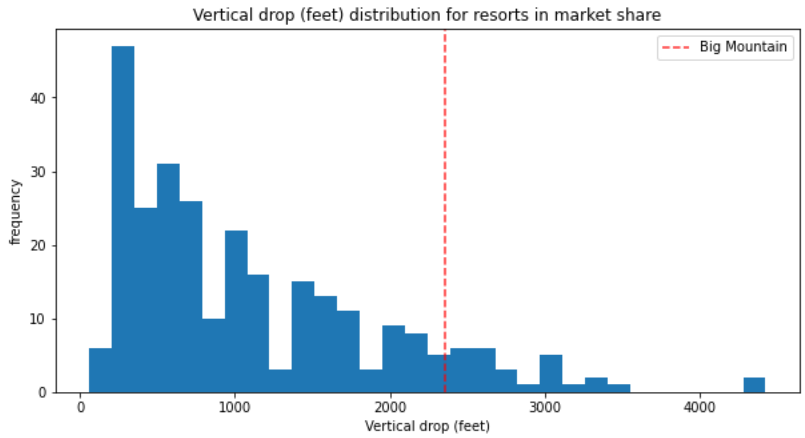
- Big mountain currently charges $81 and the price our model predicted is $94.22. Thus, the difference between the model price and the actual price is $13.22, and the resort has many scenarios for either cutting operating costs or increasing the ticket price by increasing vertical drop, adding acres snow making or by increasing the longest run.

Different approaches and scenario from the model can be used to show the changes:

- The First scenario is to close down up to 10 of the least used runs: If one run was to be closed, there will be no difference. If 2-3 runs are closed then this reduces support for ticket price, which affects revenue. If 4-5 runs are closed, then that is similar to the effects of 3 runs being closed. If six or more runs are closed, then the ticket price and revenue increasingly drop overall.



- In the Second scenario we can increase the vertical drop by lowering a run 150 feet lower, which would need to install an additional chair lift to bring skiers back up without additional snow making coverage.
- The Third scenario is similar but adds 2 acres of snow making cover. The 2nd and 3rd scenario produce similar results in supporting a higher ticket price by $1.99, which overall increases the revenue to $3474638. Over the season, this could be expected to amount to $3474638 resulting in revenue increase by $14,811,594.



- The final scenario is to increase the longest run by 0.2 miles and ensuring snow coverage by 4 acres of snow making capability. This scenario has no difference on ticket price and revenue.

CONCLUSION:

After applying our Model for ski resort ticket price and leverage it to explore Big Mountain Resort's potential scenarios for increasing revenue, we can conclude that:

- The best scenario where we managed to gain the highest revenue increase possible was by 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 increased ticket price by 12% from $81 to $90.75, resulting in a bottom-line increase by $15,528,841 (After deducting operating costs = $1.54M).
- Due to lack of data in regards of operating cost per used run and weekdays ticket price, our model cannot recommend closing down used runs or implementing a dynamic ticket pricing.