Introduction

Big Mountain is a premium ski resort residing in Montanta. It is equiped with advanced facilities that accomodates customers of all levels and abilities. Because of this, Big Mountain has been charging a premium price in the resort market, but they are not sure whether this is a good approach. They would like to understand what would be a fair ticket price to charge based on the facilities they have. In addition, they are evaluating 4 investment/divestment proposals, and they would like to know which one would support a higher ticket price.

Exploratory Analysis

In the given dataset, we have in total 330 observations and 27 variables. Our target variable is AdultWeekend, because this ticket price has less missing Value than AdultWeekday. After performing a correlation analysis, we found that fastQuads, Runs, and Snow Making_ac have strong positive correlation with AdultWeekend, as seen in Figure 1.

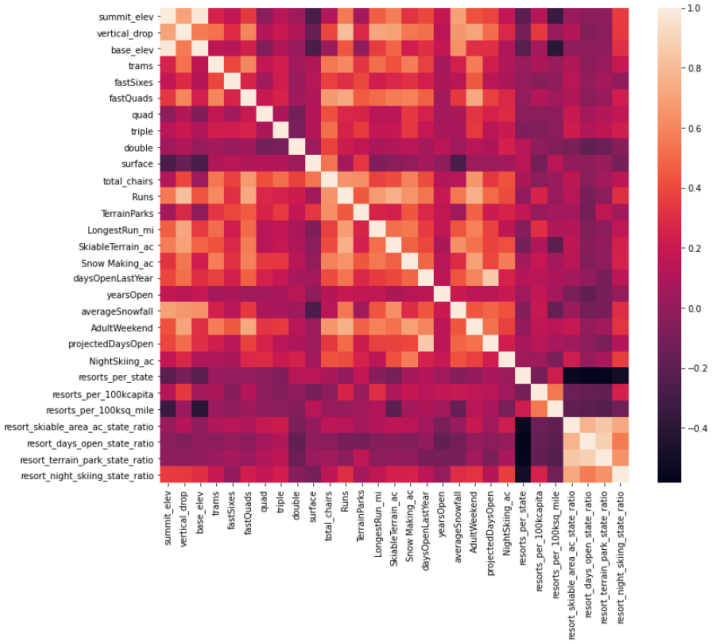

Figure 1 Correlation Heat Map

To understand the current pricing level, we used a histogram to display Adult Weekend prices for all resorts given (Figure 3) and for resorts in Montana only (Figure 2). As seen in Figure 2, Big Mountain's ticekt price of $87 is the highest among the 11 ski resorts in Montana. Even at a domenstic scale, Big Mountain's ticket price is among the top 1/3 of the ski resorts. This is substantial as Big Mountain's ticket price is considerably high not only at a state level but also at the domenstic level. As for the facilities, both Big Mountain's Vertical Drop and Snow Maker_ac are very competitive at the domenstic level. This could justify the high ticket price that the resort is currently charging and it would be interesting to know whether it can charge an even higher price.

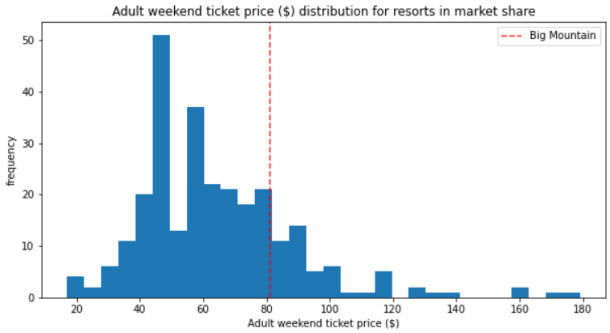

Figure 3 Adult Weekend Ticket Price

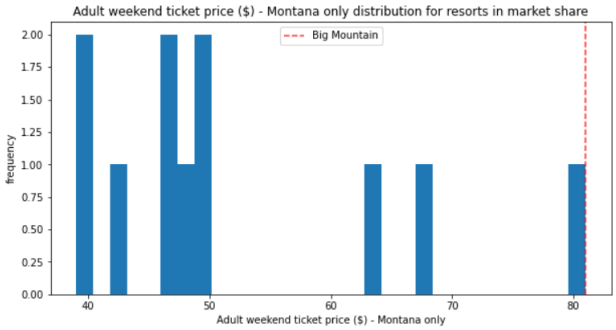

Figure 2 Adult Weekend Ticket Price Montana

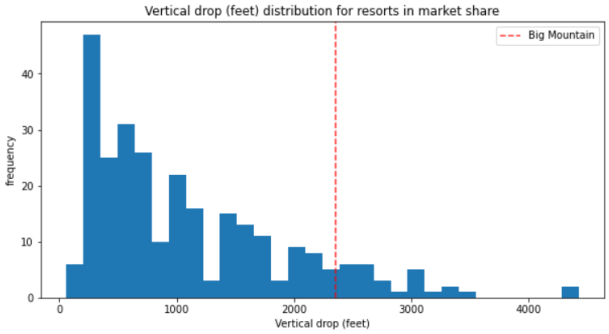

Figure 5 Vertical Drop Distribution

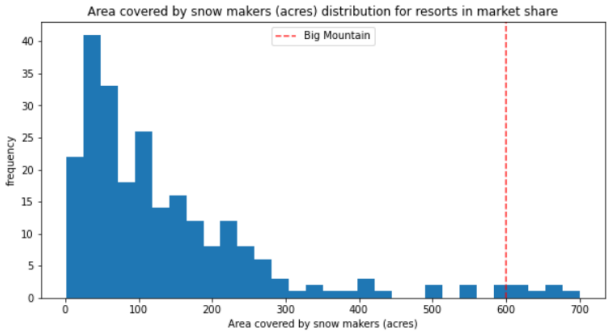

Figure 4 Snow Maker_ac Distribution

Model Selection

In order to find out which model would be a good fit to understand ticket price, we used Mean Absolute Error to compare a Linear Regression Model and Random Forest Model.

The models were built after we perform a data split into a training set and a test set. Both models were trained on the training set, and tested on the test set. We used the Mean Absolute Error on the test to evaluate both models.

Linear Regression

According to the Linear Regression Model, a fair price for Big Mountain to charge would be $110, $33 higher than the current price. The Mean Absolute Error is 11.8, which means that it is likely for the true fair price to be plus or minus $11.8.

The coefficients of the Model are listed as follows. This means that Vertical Drop, Snow Making and Total Chair have the strongest positive correlation with Adult Weekend ticket price.

Variable	Coefficient
Vertical Drop	10.78
Snow Making	6.29
Total Chairs	5.79
FastQuads	5.75
Runs	5.37
Longest Run	0.18
Trams	-4.14
Skiable Terrain	-5.25

Figure 6 Linear Regression Model Coefficient

Randon Forests

Based on a Random Forest Model, a fair ticket price would be $99.7, with a Mean Absolute Error of 9.58. The importance of coefficients are ranked in Figure 7. Interestingly, this result is largely consistent with the Linear Regression Model. However, Since the Mean Absolute Error of this model is lower than the one in the Linear Regression Model, we decide to use this model for our analysis.

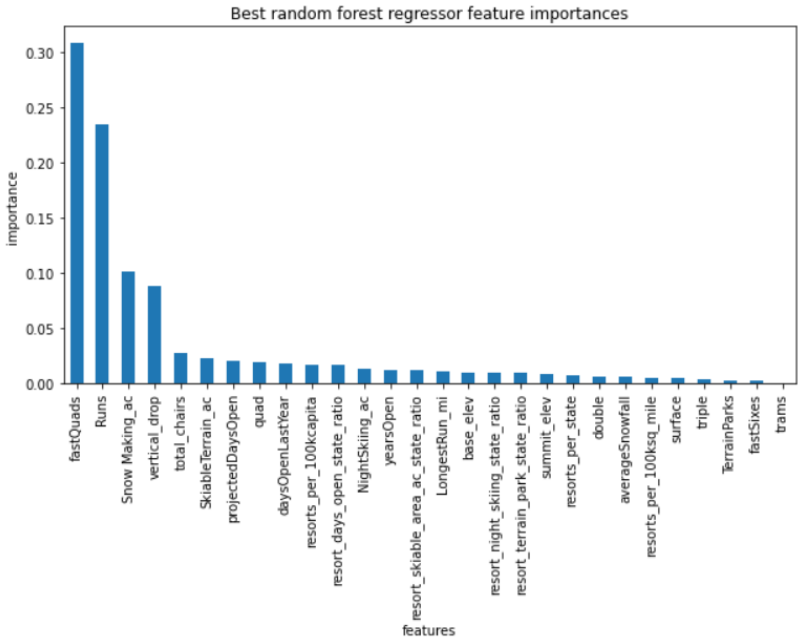

Figure 7 Variable Importance

Scenario Analysis

Big Mountain is evaluating four scenarios for facility adjustments. We used the Random Forests model to estimate the influence of these on ticket price.

1. Closing 1-10 least used runs
   This scenario would result in a drop in ticket price in general, and the estimate is demonstrated in Figure 8. An interesting thing is that closing 1 run would not result in any reduction in ticket value.

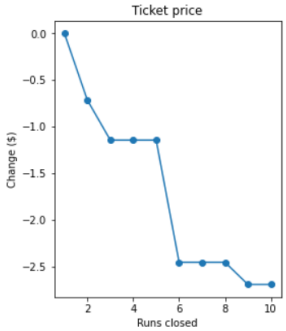

Figure 8 Ticket Price for Scenario 1

2. Adding a run, increasing the vertical drop by 150 feet, and installing an additional chair lift.
   This scenario is estimated to boost ticket price by $9.02, which would add up to 15.8 M of revenue for the season.
3. Adding a run, increasing the vertical drop by 150 feet, and installing an additional chair lift, 2 acres of snow making.
   Based on the Random Forest Model, this would increase the ticket price by $11.26, which would increase the seasonal revenue by $19.7M.
4. Increasing the longest run by .2 miles and guaranteeing its snow coverage by adding 4 acres of snow making capability.
   Interestingly, although this would increase the ticket price based on the Linear Regression Model. The Random Forest Model shows that this would have no positive or negative impact to ticket price.

I would recommend Big Mountain to choose Scenario 3 as it gives the strongest increase in ticket price. However, I believe that operating cost should be also considered in the analysis.

Summary

Although Big Mountain Resort has been charging a premium on their ticket price, I would still recommend Big Mountain to increase their ticket price to $100, based on the value of facilities estimated by the Random Forest Model.

In addition, I would recommend Big Mountain to choose Scenario 3 and enhance the facilities accordingly. This would be a great way to further increase the ticket value so that it will bring $20M more seasonal revenue in the future.