Big Mountain Resort

Recommendations

Problem Identification: What are the important aspects of the resort that we can look at to select a ticket price value that supports the increase in Big Mountain Resort's operating cost of 1.5M this season?

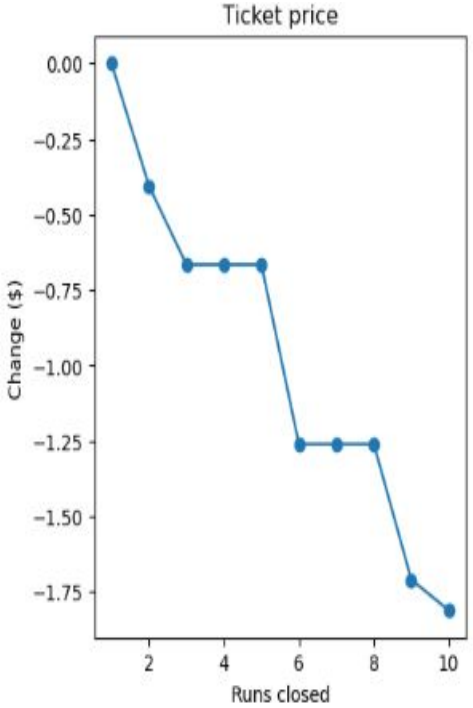
•**Context:** Big Mountain Resort has recently installed an additional chair lift to help increase the distribution of visitors across the mountain. This additional chair increases their operating costs by $1,540,000 this season and we need to figure out a way to select a ticket price value that supports this increase. 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.

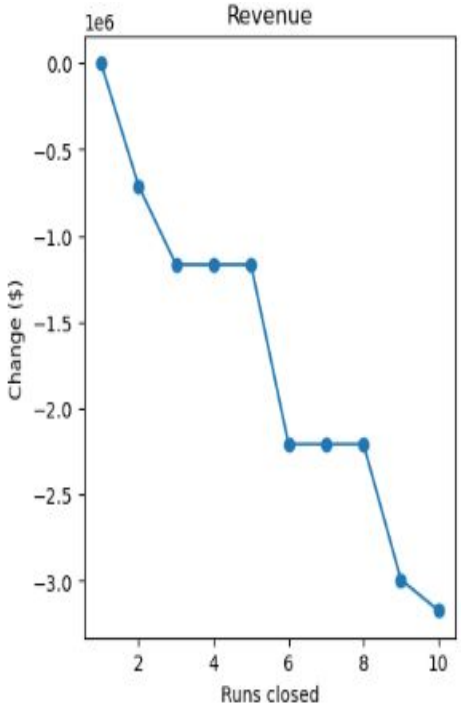
•**Critieria For Success:**

•Figuring out what other metrics we can look at to base our ticket pricing on other than the market average. Finding the most frequently used attractions.

Recommendations

- Recommendations would be to increase the vertical drop by adding a run to a point 150 feet lower but requires the installation of an additional chair lift to bring skiers back up without additional snow making coverage. This would increase the ticket price per person by $2.00 giving us a total of about a $350,000 increase in revenue for the season.
- Closing one run would not affect the ticket price value but closing 2 or 3 will reduce the ticket price and revenue. Future improvements could be to add more snow making coverage because the model suggested this to be a positive feature to increase the value of the ticket price

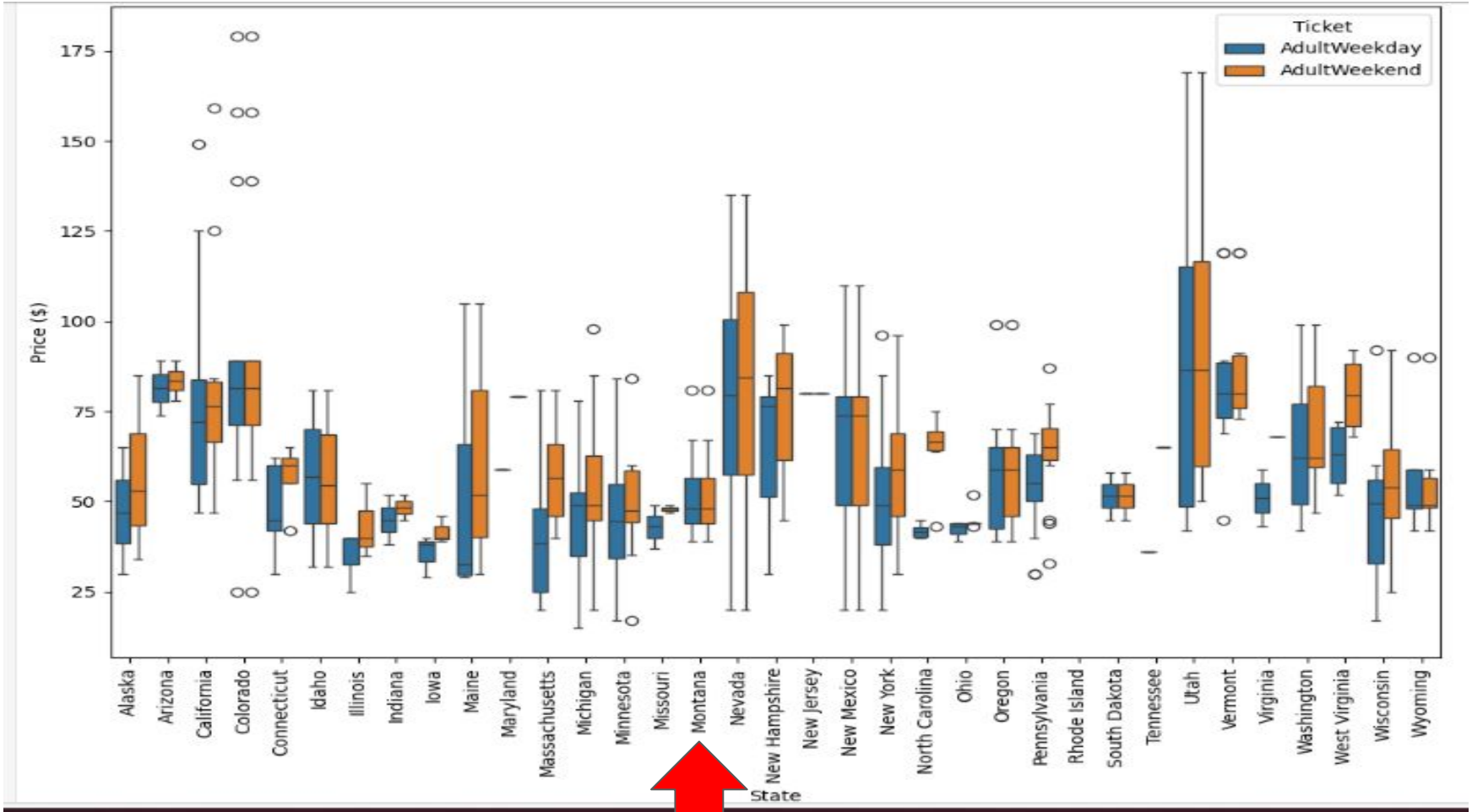




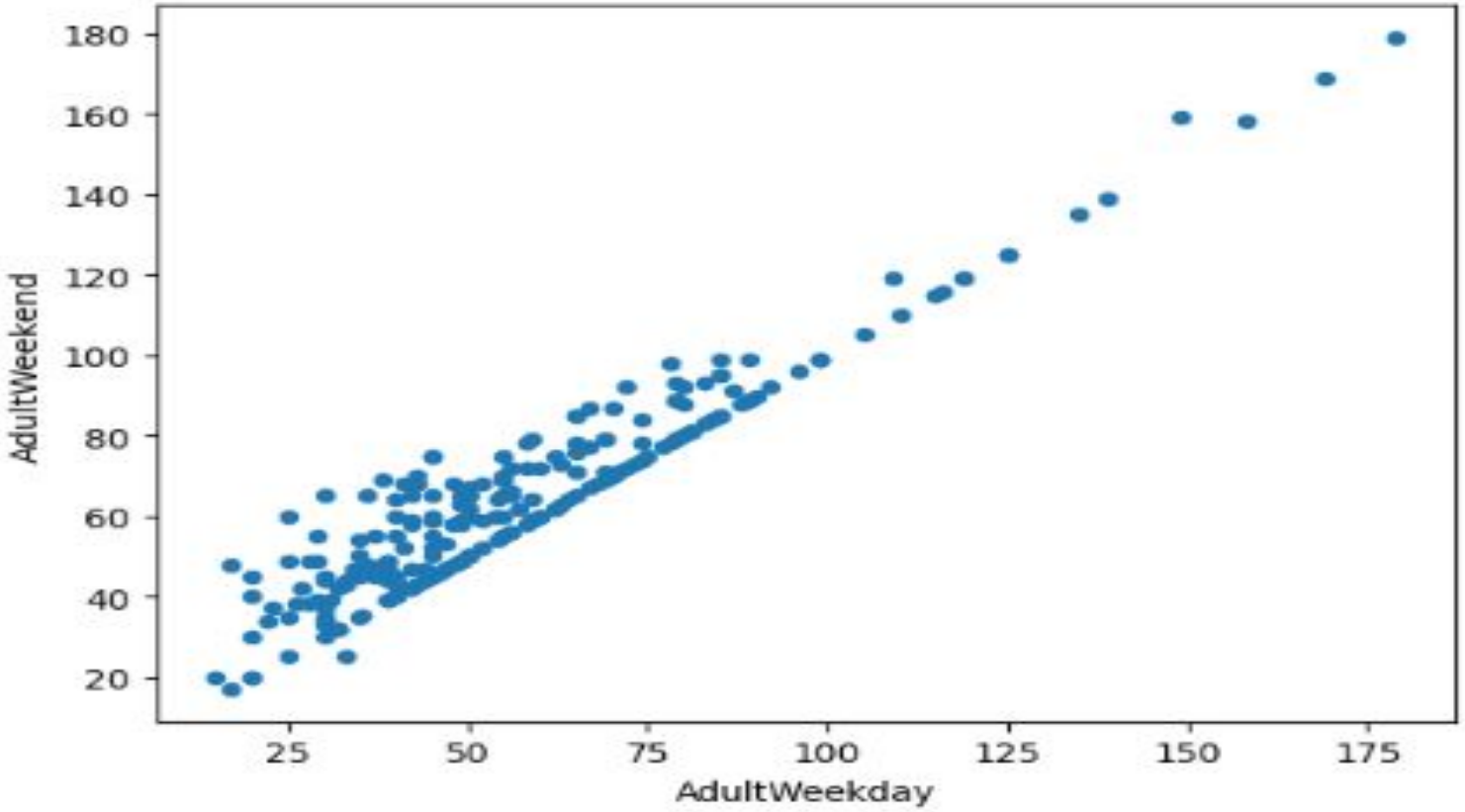
Key Findings

- After analyzing and cleaning the data we saw when looking at the boxplot distribution of ticket prices between the weekday and the weekend values in Montana that the prices were pretty much equal but looking at the scatter plot distribution for all the states in the ski data we have come to the conclusion that our target feature would be to look at the weekend prices since they were higher overall.
- In our exploratory data analysis we found that skiable area affected the ticket price when comparing other states and this lead us to keep an eye on this metric in our model for predicting a ticket price value.
- The number of total chairs relative to the amount of runs the resort has is something to be wary of in our modelling because these features also have an effect on the ticket pricing.
- Big Mountain Resort has amongst the highest number of total chairs compared to other resorts and also one of the largest skiable areas by snow making equipment. Big Mountain Resort is also doing well in having one of the biggest vertical drops which visitors are willing to pay a higher ticket price for.

Box Plot Distribution of Ticket Prices



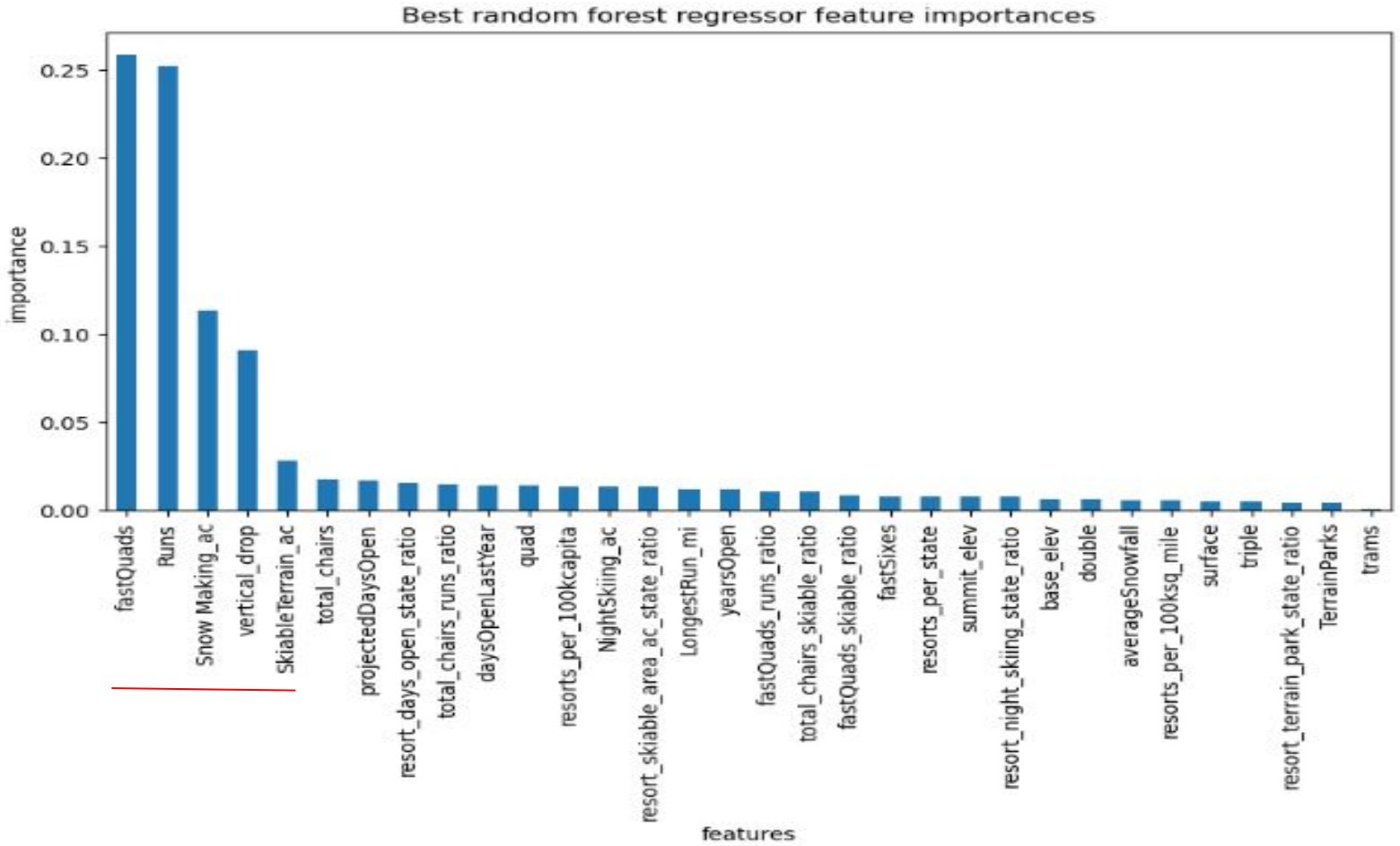
Scatter Plot Distribution of Ticket Prices



Modelling Analysis

- In the pre-processing phase we found that the mean average price of our training data was $63 and after fitting a dummy regressor to our training data we found that it produced the same result as our mean average price and calculating the mean absolute error showed that we would be off around $19 if we were to predict the ticket price based on an average of known values.
- When we built a linear model we found that our model explained over 80% of the variance on the train set and over 70% on the test set which could suggest overfitting. On average we would expect to estimate a ticket price around $9 from the real price which is better than just guessing using the average. The linear model's performance result from cross-validation on the test split suggests that without using the same random state for initializing the cross-validation folds, our actual numbers will be different from our training data. Once we did a cross-validation test for multiple k-values we found that 8 was a good choice and found that vertical drop was the most useful feature which is consistent with what we saw in our exploratory analysis with skiable area being a factor in ticket pricing.
- People seem to want to pay more for skiable areas covered by snow making equipment because of the guaranteed skiing but the overall skiable terrain was negative for this model possibly because resorts can charge a lesser ticket price due to the large amount of visitors they acquire. Visitor numbers were missing from our data so we cannot be sure that this is the case. We built a Random Forest Model and found that "Fast Quads, Runs, Snow Making Terrain, and Vertical Drop" were our top features in common with the linear model.

Random Forest Model

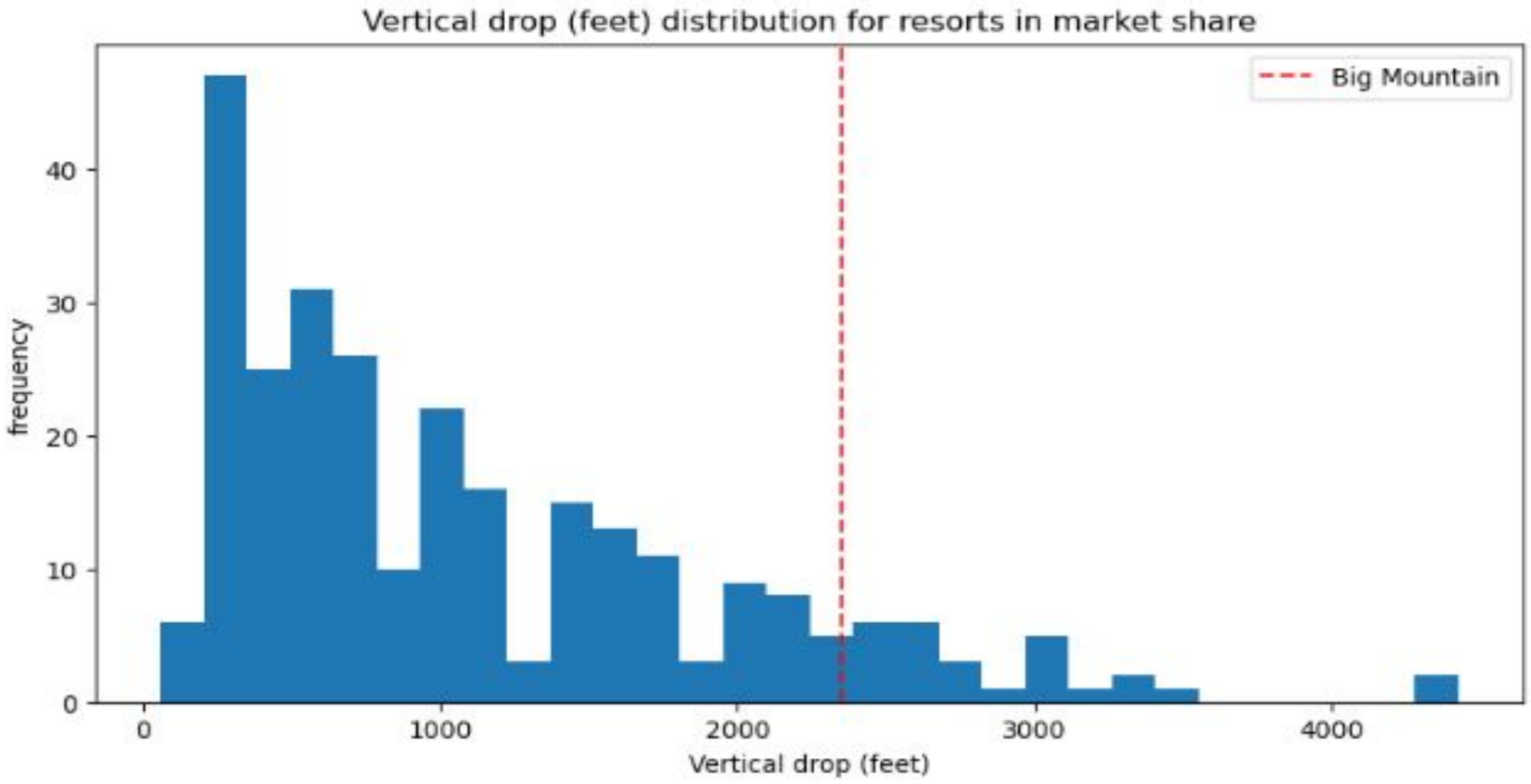


Modelling Results

- We decided that the Random Forest Model was the best model for our test data since it provided performance consistent with the cross-validation results. It had a lower cross-validation mean absolute error of almost $1 and it also showed to have less variability. After doing a data quantity assessment it seems to show that we have plenty of data for our model.
- Big Mountain Resort's weekend price that they charge is $81.00. After refitting the Random Forest Model using all of our test data, we found the modelled price to be $95.87. Even with the expected mean absolute error of $10.39, this suggests that there is room for an increase of price. The validity of our model lies in the assumption that other resorts are setting their prices based on what the market supports, so the fact that our resort seems to be charging much less than what's predicted suggests our resort is undercharging for its ticket prices.
- Big Mountain Resort has amongst the highest number of total chairs compared to other resorts and also one of the largest skiable areas by snow making equipment. The resort is also doing well in having one of the biggest vertical drops which visitors are willing to pay a higher ticket price for.

Adult Weekend Ticket Price in Montana

Vertical Drop Comparison



Conclusion

- The model results show that we can increase the ticket price by at least $10 given the data provided. The modelled price was much higher than the actual price due to Big Mountain Resort basing its pricing on average market value which shouldn't come as a surprise to the business executives as they have already suspected this to be the case of undercharging.
- Visitor information being missing from our data limited our results. Looking at the number of runs and total number of chairs, it might be effective to keep the additional amount of these to a minimum as it could have a possible negative effect on the ticket pricing in regard to the amount of visitors that the resort attracts but the data also shows adding more fast quads might be beneficial since the resort covers a wide area.
- If the business executives find this model to be useful we could automate the model’s use and create an excel plugin or make the model highly parameter-driven with clear documentation for business analysts to use and explore.