# Guide Capstone Project Report

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## Overview

Big Mountain Resort (BMR) has historically charge a premium above the market average for lift tickets. BMR would like to determine if the current/projected facilities can support a higher price. How can Big Mountain Resort use its information on facilities and amenities to determine a fair ticket price before the start of the next ski season?

## Data and Model

The data set used contained the detailed facilities offerings of 277 different resorts across 35 different U.S. states. Information on the facilities offered by each resort included:

- number of chairs: {fast: {sixes, quads}, normal:{ quad, triple, double, surface, total}, trams}
- run information: { total number, highest point, elevation drop, longest run, skiiable acreage, night skiing acreage, acres of snow-making, number of terrain parks}
- general resort info: { number of years open, days open last season }
- state market share info: { days open last season, skiiable acreage, night skiing acreage, terrain park availability}

Analysis revealed that more information was available for adult weekend lift ticket prices. In Montana this was shown to be identical to weekday prices at $51.91. With this as the target for developing models, the features with the strongest correlation were: FastQuads, vertical_drop, total_chairs, Runs, SkiableTerrain_ac, SnowMaking_ac, LongestRun_mi.

I fit three models to predict AdultWeekend ticket prices. The first being a dummy regressor that predicted the mean value across the data set, and served as a baseline model. Next I fit the data to a linear regression model using the optimal eight features from the data set to predict Adult weekend ticket prices. Finally I fit the entire data set to a random forest based regression model and examined the importance of the different features to the outcomes.

## Results

The baseline model revealed that no amount of the variation in price could be explained, and predicted a ticket price of $68.81 for BMR with an MAE of $19.14 suggesting that the best adult weekend ticket price falls within the range of $49.67$87.95.

The random forest based regression model was selected over the linear regression model for several critical factors. First, it accounted for more variation in price at 75% compared to 59%, and resulted in an MAE of $9.53 compared to $11.79 a significant reduction over the dummy model. During the preliminary analysis there was a strong positive correlation between price and skiiable terrain, but in the linear regression model this was determined to be a negative relationship. In the random

forest model the five features that had the greatest impact on the predictions were: fastQuads, Runs, SnowMaking_, verticaldrop, and SkiiableTerrain_ all of which agreed with the results from the analysis, see Figure 1 below. The final model predicted a price of $95.87 and using the MAE this provides a

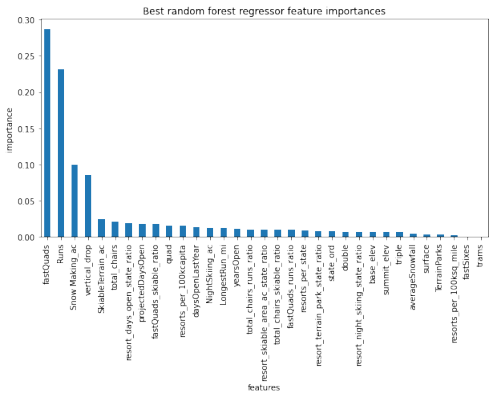


Figure 1: Feature importance of all variables on the model outcome predicting weekend adult ticket prices.

potential range of $85.45 to $106.26. Of the five scenarios to either reduce operating costs or generate revenue, the most viable option was to build a new lift that reached a higher elevation and added more runs. This scenario indicated a further price increase by $1.99. Reducing up to 10 lifts would negatively impact revenue be reducing ticket prices and seasonal revenue generated see in Figure 2, while also reducing operating costs.

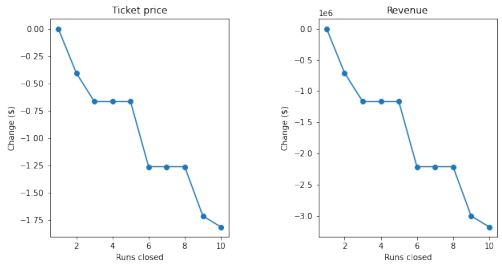


Figure 2: Profit loss .

# Conclusion

Evidence indicates that the current facilities offered at BMR support a higher ticket price. Increasing the number of lifts, runs, and lift elevation provide further justification for a higher ticket price. While the model predicted $95.87 caution should be exercised in selecting a new price as BMR is already the upper end of Montana ticket prices, and while weekend prices are consistent with weekday prices in Montana, they are typically more expensive in other states.