## Guided Capstone Project Report

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This report summarizes the key findings and recommendations for Big Mountain Resort (BMR) pricing strategy and business model based on the analysis of 330 resorts in the same market share.

Exploratory data analysis was performed to identify relationships between state and ticket price as well as gain valuable insight into the features predictive power of the ticket price. Since no obvious pattern was discovered by examining the states and ticket prices, all states were treated equally. We found that the ticket price is correlated with several features. In particular, fastQuads, Runs, Snow Making_ac, Runs, vertical_drop, and total_chairs seem the more promising to determine the price value. Furthermore, the analysis showed that data regarding the number of visitors per year may be beneficial.

A random forest regressor was selected to predict the ticket price as it offered the best performances (lowest error in price prediction) among various candidate models. The model confirmed that fastQuads, Runs, Snow Making_ac, and vertical_drop represent the four most important features to predict the ticket price. In particular, the modelled (predicted) price for BMR is $95.87 (± $10.39). If the expected number of visitors over the season is 350,000 and visitors ski for five days on average, an increase of $14.87 for the ticket price with respect to the current adopted price of $81.00 would lead to a revenue increase of ~$26M, which covers the increased operating cost of ~$1.5M attributed to the recently installed lift. Decreasing the suggested ticket price to $85.50, i.e. choosing the lower end of the ticket price range, corresponds to a revenue increase of $7.84M, which shows a good margin to cover the experienced increase in the operating costs. However, in our analysis we are not considering the total operating costs, hence, we cannot predict the potential profit at this stage.

Note that the current ticket price of $81.00 is the highest among the resorts located in Montana, and is in the 81st percentile among all resorts. However, the current ticket price appears not to be in line with the facilities offered by BMR. For instance, BMR offers 3 fast quads while most resorts do not have any. Even though there are some resorts offering even more fast quads, these are rare (see Fig. 1A of the Appendix). As shown in Fig. 2A of the Appendix, BMR compares well for the number of runs, i.e. the second most important feature. Also in this case, there are some resorts with more runs, but not many. BMR excels in area covered by snow makers, the third feature for importance, as noticed in Fig. 3A of the Appendix. In fact, BMR is among the top resorts in this category with 600 acres whereas most resorts have less than 300 acres and the maximum is 700 acres. Finally, Big Mountain is doing well for vertical drop, but there are still quite a few resorts with a greater drop (see in Fig. 4A of the Appendix). These excellent features justify the higher predicted cost.

Four potential scenarios for either cutting costs or increasing revenue have been proposed by BMR. Our analysis provides the following results in terms of revenue change since the operating costs we were not provided for the analysis:

> **1. Permanently closing down up to 10 of the least used runs**. Closing one run makes no difference. Closing more than one run reduces support for ticket price and, therefore, reduces the revenue. There are no differences at closing down 3, 4 or 5 runs, as there is no further loss in ticket price. Increasing the closures down to 6 or more leads to a large drop. The following figure Fig.1 summarizes the variation of the change in the ticket price (left plot) and the revenue (right plot) with the number of closed runs.

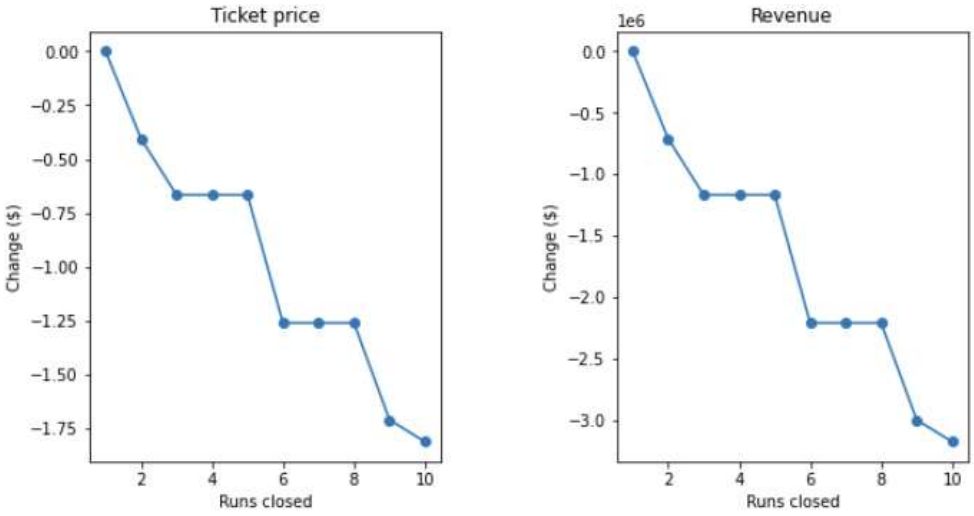


Figure 1: Variation of change in the ticket price (left plot) and revenue (right plot) with the number of closed runs.

**2. Increase the vertical drop by adding a run to a point 150 feet lower down but requiring the installation of an additional chair lift to bring skiers back up, without additional snow making coverage**. This scenario increases support for ticket price by $8.61. Over the season, this could be expected to amount to $15M.

**3. Same as number 2, but adding 2 acres of snow making cover.** This scenario increases support for ticket price by $9.90. Over the season, this could be expected to amount to $17M. Thus, an increase of 2 acres of snow making covering area makes no substantial difference.

**4. Increase the longest run by 0.2 mile to boast 3.5 miles length, requiring an additional snow making coverage of 4 acres.** This scenario has no effect on revenue.

The scenarios explored should be evaluated in regard to the difference in the operating costs that they cause. The proposed analysis only determines the change in total revenue for each scenario.

**Conclusive Remarks**

We found that fastQuads, Runs, Snow Making_ac, and vertical_drop are the most predictive features of the ticket price. Based on the modeling result, we suggest the ticket price is increased from $81 to ~$96 immediately, without the need of implementing new facilities. This change in ticket price increases the revenue by $26M.

Among the different four scenarios considered, an increase in the vertical drop by adding a run to a point 150 feet lower down, but requiring the installation of an additional chair lift to bring skiers back up and without additional snow making coverage further increases the new revenue by ~$15M, or ~$17M if 2 acres of snow making cover are added. To choose between these two options the operating costs should be included in the analysis.

Finally, this model will be deployed to a web app in order to allow the business leaders to further investigate the effect of different scenarios on the revenue.

## APPENDIX

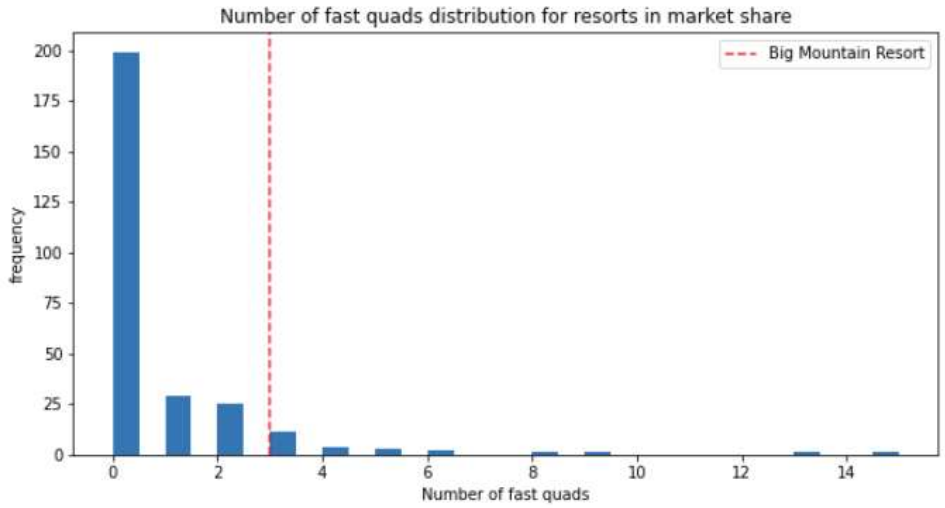


Figure 1A: Distribution of the number of fast quads for resorts in the market share; the red dashed vertical line represents the BMR location.

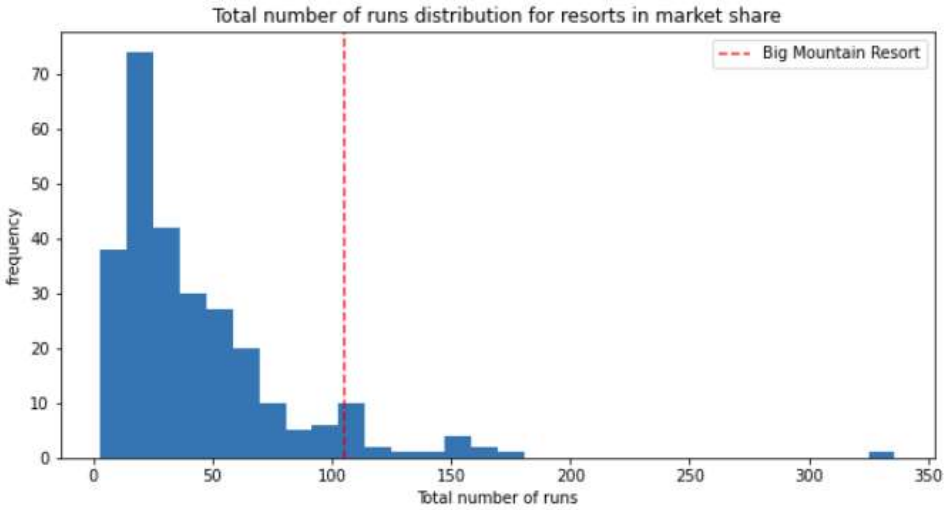


Figure 2A: Distribution of the number of runs for resorts in the market share; the red dashed vertical line represents the BMR location.

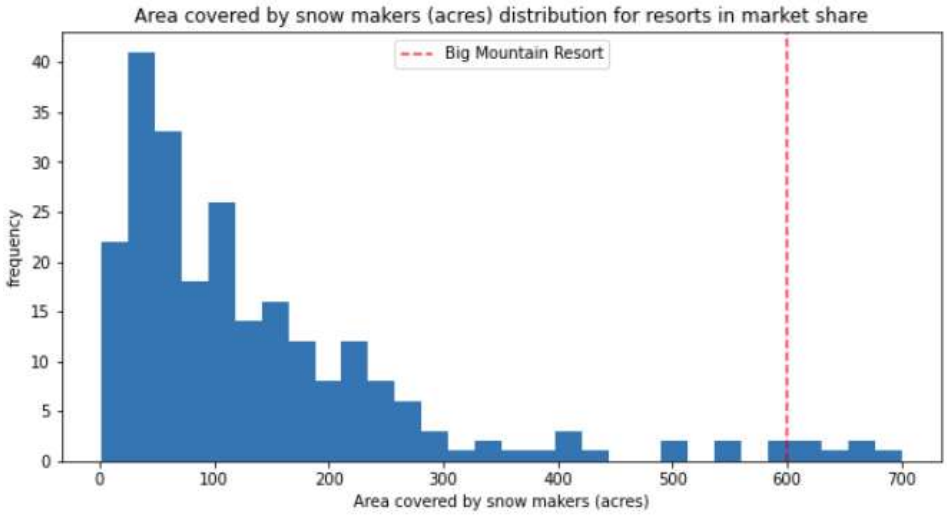


Figure 3A: Distribution of the area covered by snow makers in acres for resorts in the market share; the red dashed vertical line represents the BMR location.

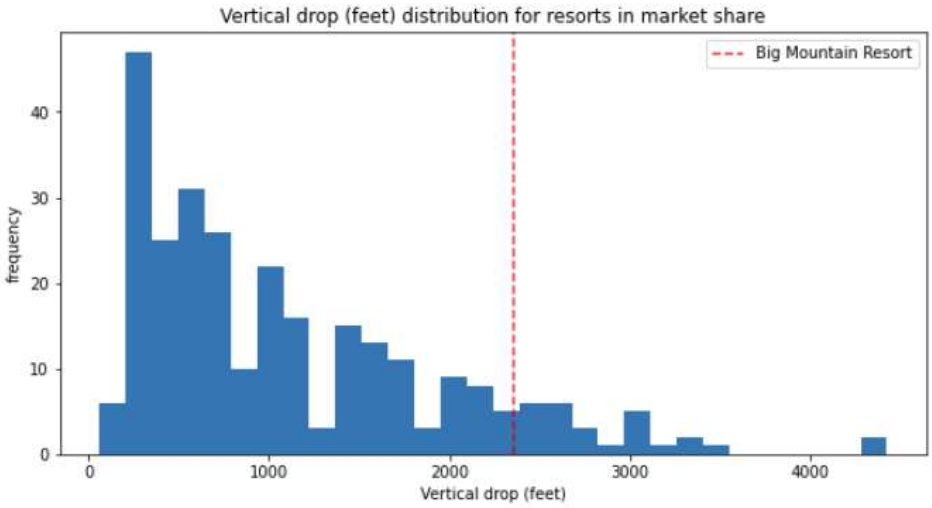


Figure 4A: Distribution of the vertical drop in feet for resorts in the market share; the red dashed vertical line represents the BMR location.