Big Mountain Ski Resort
Guided Capstone Project Report

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Background:

Big Mountain Ski Resort, also known as Whitefish Mountain Resort, is located in the old railroad town of Whitefish, Montana just 60 miles south of the Canadian Border. Big Mountain is among the 10 largest ski resorts in the U.S. offering over 3,000 skiable acres, 85 marked runs and 11 lifts including two high-speed quad chairlifts. The resort also boasts an impressive vertical drop of 2,353 feet. The base elevation of the mountain is 4,464 feet and the summit is 6,817 feet. Its longest run is approximately 3.3 miles. The resort has also invested and it has become a warm weather destination. In the summer, the resort transforms into an adventure playground with activities like zip line tours, an aerial adventure park, and mountain biking.

Problem Identification:

The resort first opened on December 14, 1947. In their first year, the new T-bar ski lift ticket was $2 and a hamburger was only a quarter. Since then, the resort has maintained a competitive lift ticket price when compared to in-state and national competitors.

Recently, Big Mountain constructed a new chair lift to add accessibility to other parts of the mountain. The installation of the new lift has increased operating costs by $1.54 million for the season. The additional costs have spurred management to review their current pricing strategy, which is to charge a small premium above the average price of resorts in the same target market as Big Mountain.

The problem that Big Mountain would like answered is, what opportunities exist for Big Mountain to select a better price point for their ski lift ticket prices? And, how can this new price point take Big Mountain's facilities and amenities into account?

Data Wrangling:

The provided dataset was large and included a number of important resort characteristics that impact price points. For example, the total number of runs, total skiable area, vertical drop and weekend and weekday pricing, were all included in the dataset. Weekend and weekday prices were the first to be

investigated. The data shows that the difference was minimal and that there were several resorts who did not differentiate between the days to set their price. Moreover, the weekend prices column included many resorts with no information. As a result, weekend prices were removed from the analysis.

Other columns had missing data or 0's for their entries. One such column, fastEight was removed because most of the values were null or 0. Accordingly, those columns were dropped from the analysis. The end result is that of the original 330 rows/records, 53 were removed, and 277 remained.

Exploratory Data Analysis:

Next, exploratory data analysis (EDA) was performed . EDA is important to analyze datasets and to summarize the data's main characteristics. It is used to better understand the data and to discover patterns, anomalies, and to inform further investigation.

Developing a scatterplot that tracks the price in relation to Runs (number of ski runs available on the mountain), fastQuads (4 person chair lift), vertical_drop (the height difference between the top and bottom of the mountain), and Snowmaking_ac (the amount of manmade snow that the mountain is capable of making) shows that all four have a strong correlation to price. Because of this positive correlation, they were chosen for further review.

Pre-Processing and Training Data:

After identifying the four characteristics with the strongest correlation to price, we then take a best guess at a price point using mean data. This new price point was $64.37. This is a low price point even if you factor the $19 Mean Absolute Error.

To ensure that the four categories: 1) Runs, 2) fastQuads, 3) vertical_drop, and 4) Snow Making_ac were the correct ones to look into, a random forest regression analysis was done so we can better understand the relationship between the multiple variables.

Modeling:

After going through the first 4 stages of this data science problem, charts were developed to provide a visual explanation of Big Mountain's position in relation to other resorts. In sum, vertical drop, fastQuads, Runs, and Snow Making placed Big Mountain toward the top in comparison to other resorts. In addition, other

categories such as total number of chairs and longest run, when packaged with the other leading categories, put Big Mountain at the top in comparison to other resorts.

There were 4 scenarios that Big Mountain management would like to review:

1. Close up to 10 of the least used runs.
2. Add a run, increase vertical drop by 150 feet, and install a new chair lift
3. Add a run, increase vertical drop by 150 feet, and install a new chair lift AND add 2 acres of snow making.
4. Increase the longest run by .2 miles and add 4 acres of snow making

Conclusion and Recommendation:

Any combination of options 1, 2, and 3 will add to the bottom line. The data does not include operational costs so it is unclear how much can be saved through implementing option 1; however, the model shows that BMSR can close anywhere from 2-6 runs with no visible impact to revenues. Option 2 and 3 together will add a total of 31.3M USD in lift ticket revenues and allow the current BMSR lift ticket prices to be raised from 81 USD to 98.87 USD, which would place BMSR's ticket price at approximately 34 USD above the nationwide mean for ski resorts.