Big Mountain Resort Documentation Report

Big Mountain Resort is a ski resort located in Montana, offering spectacular views of Glacier National Park and Flathead National Forest, and access to 105 trails. Every year about 350,000 people ski or snowboard at Big Mountain. This mountain can accommodate skiers and riders of all levels and abilities. Big Mountain Resort usually prices their tickets at a premium above the average ticket price, but the addition of a new chair lift increased their operating cost by $1,540,000 for the season. In order to keep profits, Big Mountain Resort must enact changes that either cut costs without sacrificing quality, or allow for a higher ticket price. This brings forth the question: What changes can Big Mountain Resort implement to either cut costs without undermining ticket price, or allow for a higher ticket price?

First, the data must be wrangled.The dataset given was originally 330 rows x 27 columns, which is too large for our purposes so it must be trimmed and modified. Since the goal is to create a model for ticket prices, AdultWeekday and AdultWeekend are the most relevant data. State and Region were dropped because, unless the client specifies otherwise, it is irrelevant data for the current question. FastEight was also dropped because over 50% of its data was missing and was thus unusable. Other data was cleaned, such as a resort that appeared to have been open for 2019 years, which is not possible.

Once the data has been wrangled, the data should be explored. To do this, the states are compared based on several data, including total area, number of resorts per state, etc. Of note, there was a positive correlation between the total number of days open and the number of resorts per state. The data pointed to how larger states had an

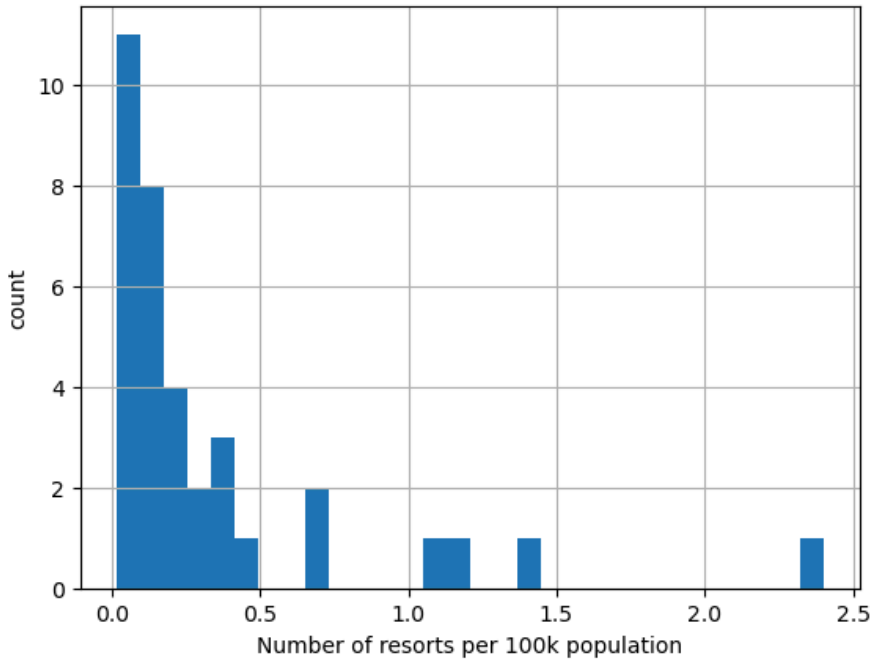
advantage across the board, so to rectify this certain data points were turned into Per Capita points. Mainly, Number of Resorts per 100k population and Number of Resorts Per 100k Square Miles. This allows the data to be read more accurately without the confounding population variable. Creating histograms of this data (Figure 1) presented that a large portion of the states have less than 0.3 resorts per 100k population, and less than 30 resorts per 100k square miles. After making the data fit a PCA transformation, it was found that all states could be treated equally for pricing models. Using this information and a heatmap (Figure 2), it was found that fastQuads, Runs, Snow Making_ac, and total_chairs had strong positive correlations with AdultWeekend, the pricing variable of choice.

After data exploration, you need to do pre-processing and training data models. To this end, a few methods were tried. First, simply taking the average was tried, which was found to be extremely unreliable. After calculating the absolute mean error, it was found to be off by about $19 on average. Two regression methods were attempted as well: Linear Regression and Random Forest Regression. To do both of these, any missing values in both the testing and training data were filled in using the median for its column then scaled so it was all on a similar magnitude. Linear Regression had an absolute mean error of roughly $9, which is significantly better than just taking the average. However, the random forest performed better with a slightly smaller AME and less variance in that AME, thus a random forest regression should be the data model of choice.

Now the data must be modeled using the aforementioned regression technique. After running it through the model, it is revealed that, given the current facilities and

market prices, the ticket price could be increased to $92.8 with a margin of error of $10, meaning its current price of $81 could be increased by even one dollar feasibly and only see an increase in profit. In the context of the newly built char lift, operating prices have increased by 1.54M for the year. To cover this, the owners of Big Mountain could add a new run and increase the vertical drop by 150 feet. These actions would allow for an easy increase in ticket price of $2, which would on average account for 3M increase in profit, more than covering the price of the chair lift.

In conclusion, with the creation of a new chair lift, Big Mountain should add a new run and increase the vertical drop by 150 feet. This has the highest increase in support for a relatively low ticket price increase of $2, meaning theoretically the customer base shouldnt drop sharply as a result of a steep increase. For future explorations, more data is required, such as the total and individual operating cost of each facility, and customer count for the resort. This would allow for additional context for each solution to see if they would increase operating costs by a larger amount that the supported ticket price increase could handle.


count
Number of resorts per 100k population
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2
4
6
8
10
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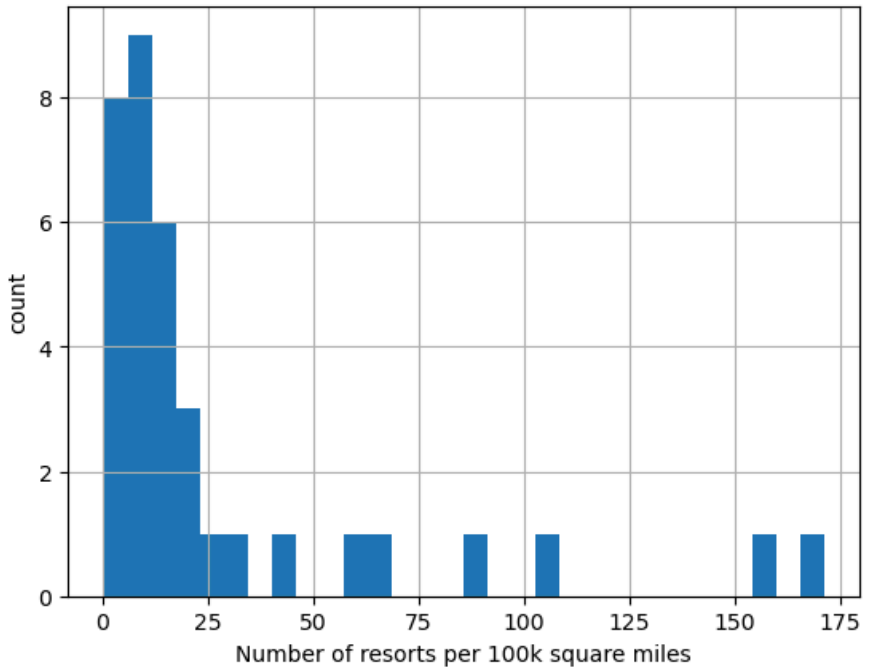
0.5
1.0
1.5
2.0
2.5


count
Number of resorts per 100k square miles
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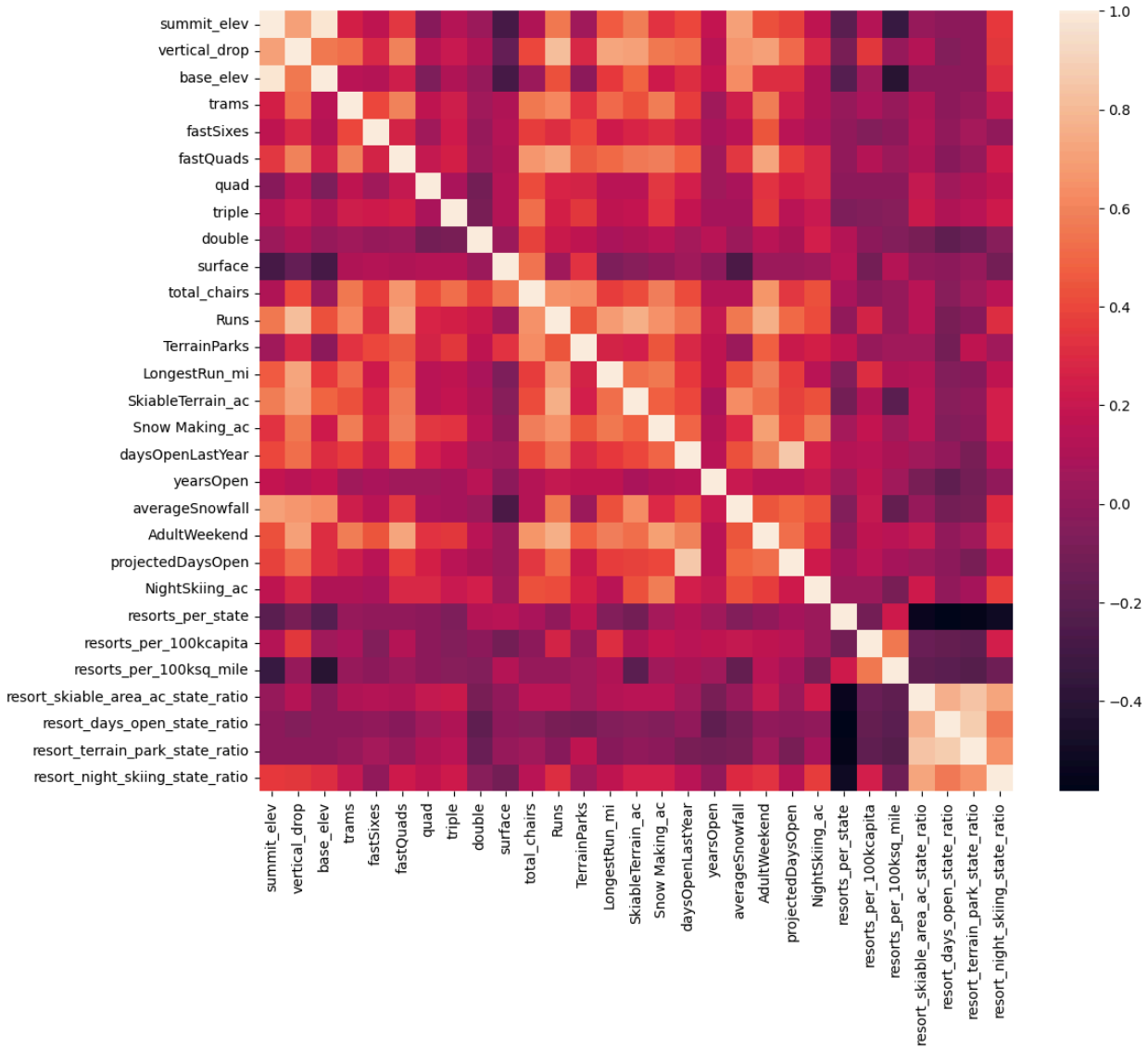
2
4
6
8
0
25
50
75
100
125
150
175

Figure 1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base_elev
trams
fastSixes
fastQuads
quad
triple
double
surface
total_chairs
Runs
TerrainParks
LongestRun_mi
SkiableTerrain_ac
Snow Making_ac
daysOpenLastYear
yearsOpen
averageSnowfall
AdultWeekend
projectedDaysOpen
NightSkiing_ac
resorts_per_state
resorts_per_100kcapita
resorts_per_100ksq_mile
resort_skiable_area_ac_state_ratio
resort_days_open_state_ratio
resort_terrain_park_state_ratio
resort_night_skiing_state_ratio
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4

Figure 2