Big Mountain Resort Ticket Price

The purpose of this data science project is to come up with a pricing model for ski resort tickets in our market segment. Big Mountain suspects it may not be maximizing its returns, relative to its position in the market. It also does not have a strong sense of what facilities matter most to visitors, particularly which ones they're most likely to pay more for. This project aims to build a predictive model for ticket price based on a number of facilities, or properties, boasted by resorts (*at the resorts).* This model will be used to provide guidance for Big Mountain's pricing and future facility investment plans.

Big Mountain Resort

Currently Charges a premium above market average ticket prices at $81. Most Adult Weekend Ticket prices range from $25 to $100 based off current data. BMR is currently higher due to its upgraded facilities, 2352 feet vertical drop, 14 total chairs, 3000 acre skiable area, 3.3 mil longest run, and 600 acre of snow making area. BMR Recently Installed a chair lift which increases their operating costs 1,540,000 this season.

Data Wrangling & Exploration

Our Ski Data was provided by the Database Manager. Upon Exploration and analysis, I found that New York, Michigan, Colorado, and California have the most resorts 33-22 respectively, while Montana has 13 resorts. I then checked to see which features of the resort or state can have an impact on price. Accounting for population density and resort density I found State-wide supply and demand of certain skiing resources may well factor into pricing strategies. We decided to compare everything as one market. We Dropped snow making_ac, dropped fastEight, yearopen, dropped rows with no price data, as these were not enough accurate data to help analyze our price point. After analyzing Weekday vs Weekend prices, Weekend prices have more variability and relevance to our price analysis. We also want to include TerrainParks, SkiableTerrain_ac, and NightSkiing_ac as this can help us identify pricing. California dominates the state population figures despite coming in second behind Alaska in size (by a long way). The resort's state of Montana was in the top five for size, but doesn't figure in the most populous states. Thus our state is less densely populated.NY has most resorts in its states despite its size.Montana has top 5 total skiable areas even for fewer, larger resorts.

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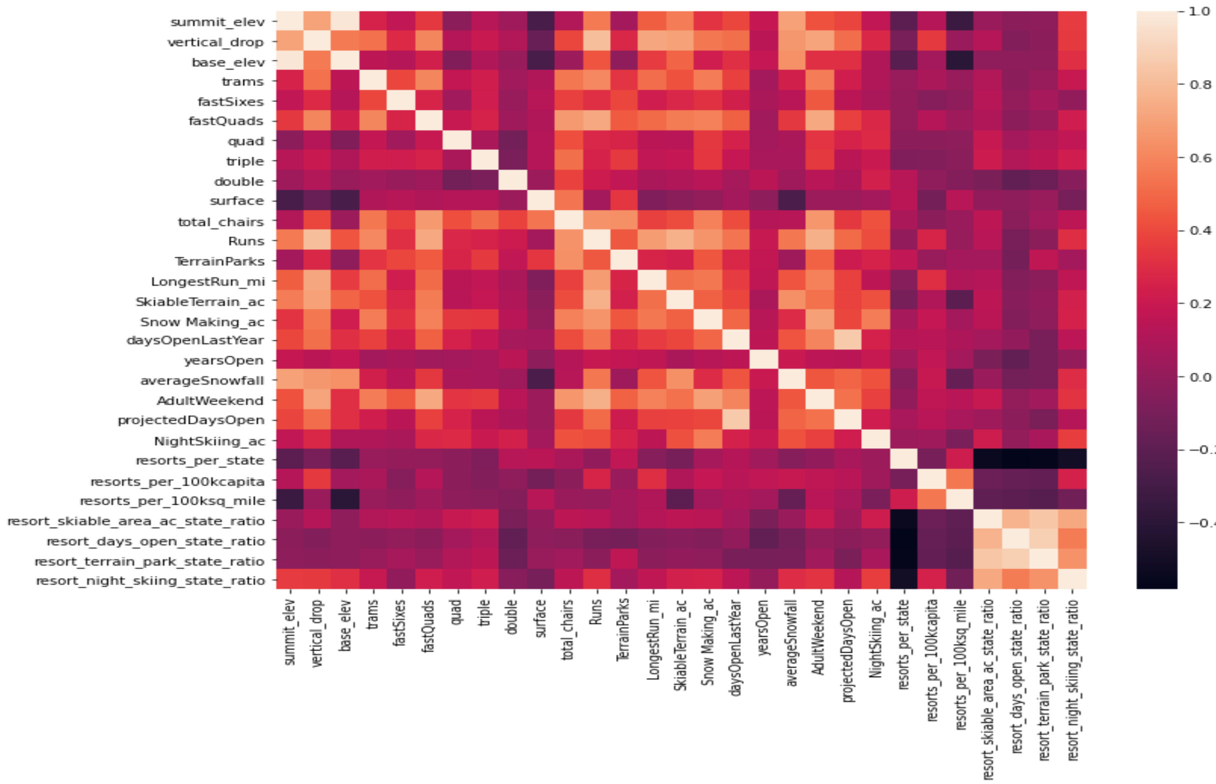

Using PCA and a HeatMap, we can see that Summit and base elevation is highly correlated and negatively correlated with the number of resorts which shows that if you increase the number of resorts in a state the share of all other state features will drop , which is expected. There is some positive correlation between the ratio of night skiing areas with the number of resorts per capita. In other words, it seems that when resorts are more densely located with population, more night skiing is provided. Adult Weekend ticket prices have relationships between fastQuads, runs, snow making_ac, resort night skiing, vertical drop, and total chairs. We are taking the states ratio by 100k per capita to determine effectiveness of features for each resort in each state. Ticket prices may drop a little before then climbing upwards as the number of resorts per capita increases. Ticket price could climb with the number of resorts serving a population because it indicates a popular area for skiing with plenty of demand. The lower ticket price when fewer resorts serve a population may similarly be because it's a less popular state for skiing. The high price for some resorts when resorts are rare (relative to the population size) may indicate areas where a small number of resorts can benefit from a monopoly effect. It's not a clear picture, although we have some interesting signs!

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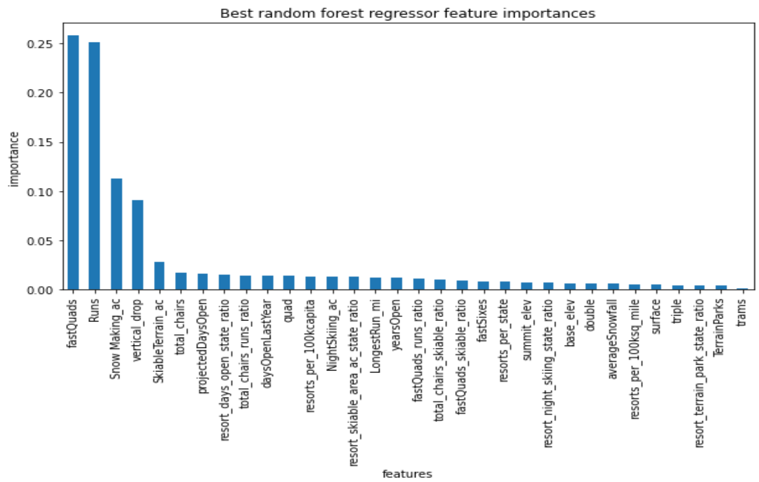
Pre-Processing and Training Data

First, we split the data set into Training and Testing splits. We then explored some metrics such as R-squared, mean absolute error, and mean squared error. Using the regression model and Random Forest Model, we can see that BMR’s modeled price is $95.87, with an MAE of $10.39 showing that there is room for a price change. With some cross-validation we found that fastQuads, runs, snow Making_ac, and vertical_drop are our most important features.



Modeling Scenarios

Big Mountain Resort has been reviewing potential scenarios for either cutting costs or increasing revenue (from ticket prices). Ticket price is not determined by any set of parameters; the resort is free to set whatever price it likes. However, the resort operates within a market where people pay more for certain facilities, and less for others.

The business has shortlisted some options:

1. Permanently closing down up to 10 of the least used runs. This doesn't impact any other resort statistics.
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
3. Same as number 2, but adding 2 acres of snow making cover
4. Increase the longest run by 0.2 mile to boast 3.5 miles length, requiring an additional snow making coverage of 4 acres

The expected number of visitors over the season is 350,000 and, on average, visitors ski for five days. Assume the provided data includes the additional lift that Big Mountain recently installed.

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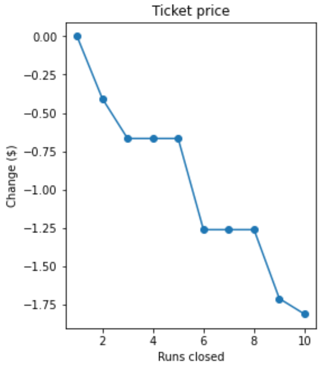
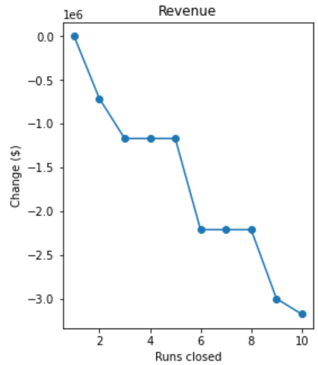
Scenario 1 - Close up to 10 of the least used runs. The number of runs is the only parameter varying.





The model says closing one run makes no difference. Closing 2 and 3 successively reduces support for ticket price and so revenue. If Big Mountain closes down 3 runs, it seems they may as well close down 4 or 5 as there's no further loss in ticket price. Increasing the closures down to 6 or more leads to a large drop.

Scenario 2 - BMR is adding a run, increasing the vertical drop by 150 feet, and installing an additional chair lift.

This scenario increases support for ticket price by $1.99
Over the season, this could be expected to amount to $3474638

Scenario 3 - same as scenario 2 + 2 acres of snow making.

This scenario increases support for ticket price by $1.99
Over the season, this could be expected to amount to $3474638
So no difference.

Scenario 4 - increasing the longest run by .2 miles and guaranteeing its snow coverage by adding 4 acres of snow making capability.

No difference whatsoever. Although the longest run feature was used in the linear model, the random forest model (the one we chose because of its better performance) only has longest run way down in the feature importance list.

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Recommendations

The model suggests that with the additional chairlift in scenario #2, Big Mountain could expect to have revenue of $3,474,638 (if they raise the ticket price by $1.99, and expected visitors are 350000 people) I'd suggest further consideration for scenario 2, but instead of increasing the number of runs, close down 1 run. Closing down 1 run might not affect the ticket price and revenue (as seen in scenario 1). However, we should be careful when changing multiple facilities at once.