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Guided Capstone Project Report

How can Big Mountain Resort create better value for their ticket prices, either by cutting their costs without changing ticket prices, or raising the ticket prices?

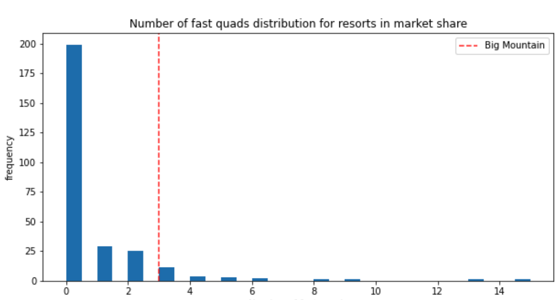
Big Mountain Resort is a ski resort located in Montana with views of national parks/forests and access to 105 trails. They have many lifts for all levels and have just invested in a new lift that adds over $1.54 million in operational costs per season. They are looking to cut costs per year by either cutting operations costs, or raising ticket prices.

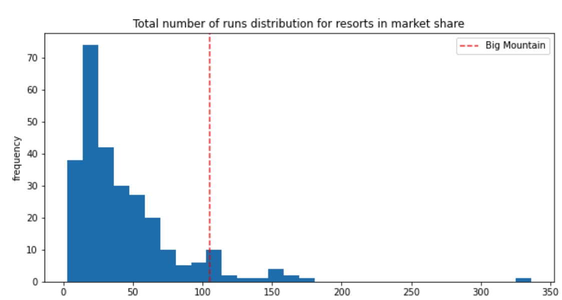
The plan is to run a comparison of these facilities vs tickets prices at Big Mountain compared to other resorts. If ticket prices cannot be raised, then look for opportunities to either increase customer count, or adjust operations so that fewer lifts are operational when customer count is low. Data was provided by the resort's databasemanager, and some state population data was scrubbed from the internet.

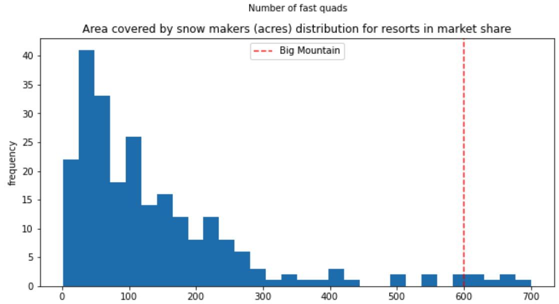
There were two models used during my project. First, I used linear modeling using median values to return predictive data. This returned an average estimated ticket price within $9 or so of the real price. The linear model showed a bit of overfitting so using some of sklearn's features and through cross-validation I was able to find the best performing model. This model concluded that the best features to focus on were (from most to least positive): 1) vertical_drop, 2) Snow Making_ac, 3) total_chairs, 4) fastQuads, 5) Runs. The refined linear model returned a mean absolute error of about $10.49 with a variability of $1.62.

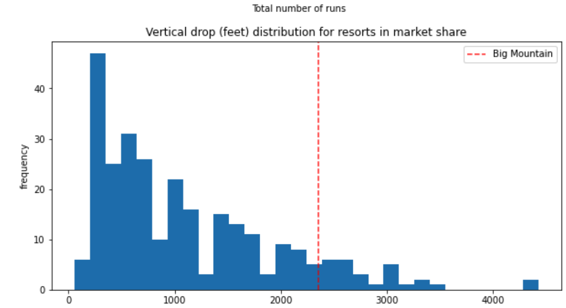
The second model I used was the Random forest model. In using a Random forest model I found the best parameters, and discovered that the top features here are similar to the linear model: 1) fastQuads, 2) Runs, 3) Snow Making_ac, 4) vertical_drop. Using these features the Random forest model returned a mean absolute error of about $9.64 with a variability of $1.35.
The random forest model has a lower cross-validation mean absolute error by almost $1. It also exhibits less variability. Verifying performance on the test set produces performance consistent with the cross-validation results. I chose to move forward with this model instead of the linear one.

Here are the visuals for each of the top 4 features (1.fastQuads, 2.Runs, 3.Snow Making_ac, 4.vertical_drop) compared to Big Mountain Resort (red line).









There are 4 scenarios that have been modeled.

1) First scenario is about closing runs and the loss of profit that will occur.

- Closing 1 run makes no difference.
- Closing 2 and 3 successively reduces support for ticket price and so revenue.
- Closing 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.

2) In the second scenario Big Mountain 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 3,474,638.

3) In the third scenario, you are repeating the previous one but adding 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 3,474,638. Such a small increase in the snow making area makes no difference.

4) The fourth scenario calls for 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 the longest run way down in the feature importance list.

Referring back to initial information, opening another chair lift could cost about $1.5 million, and the customer count was about 350,000 people per season. If each customer were to buy a 5 day pass with your current pricing you would have made $141,750,000 in tickets sales. If the 2 dollar ticket increase is applied the number would jump up to $145,250,000. This is a difference of $3.5 million dollars, which more than covers the cost of 1 or 2 lifts being operated.