Big Mountain ticket price modeling report

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Version Jun 24, 2021

Problem Statement

Big Mountain Ski Resort management would like to better understand its facility usage and ticket prices relative to its "nearest" competitors rather than the entire market segment, to better direct its efforts to increase revenue and profitability

Actual vs modeled ticket price

Big Mountain Adult Weekend ticket price is currently $81, but there was concern that this price may not be appropriately set given our mix of facilities relative the rest of the market segment. There we decided to create a ticket price prediction model that tries to predict as closely as possible a resort's actual ticket price given its mix of facilities. From this model, we can then predict a reasonable range of Big Mountain's ticket prices given our existing facilities. We can also use this prediction model to gauge reasonable changes to ticket prices given proposed facility changes.

Two different types of ticket price prediction models were evaluated. The selected model used facility information from 276 other ski resorts in our market that also included their ticket price. The underlying information was provided in a CSV file from Alesha Eisen.

An Adult Weekend ticket pricing model was constructed under the assumptions that (a) other resorts have appropriate ticket prices given their set of facilities, and (b) these resorts are part of the same market segment. For example, the model includes no region-specific factors that influence price. Of note, the selected pricing model typically predicts Montana resort prices roughly 10% higher than actual. The uncertainties in the pricing predictions will be increased if these assumptions are not strictly correct.

Given these caveats, with the current Big Mountain facilities, the pricing model predicts an Adult Weekend ticket price of $95.87. Even with an expected average prediction error of +/-$10.39, this suggests there is market support for a price increase. If there is a "Montana" effect of overpredicting by 10%, perhaps the region-specific target price might be $87.

Competitive landscape

Big Mountain's Adult Weekent ticket price is higher than 80% of the other resorts in the market.
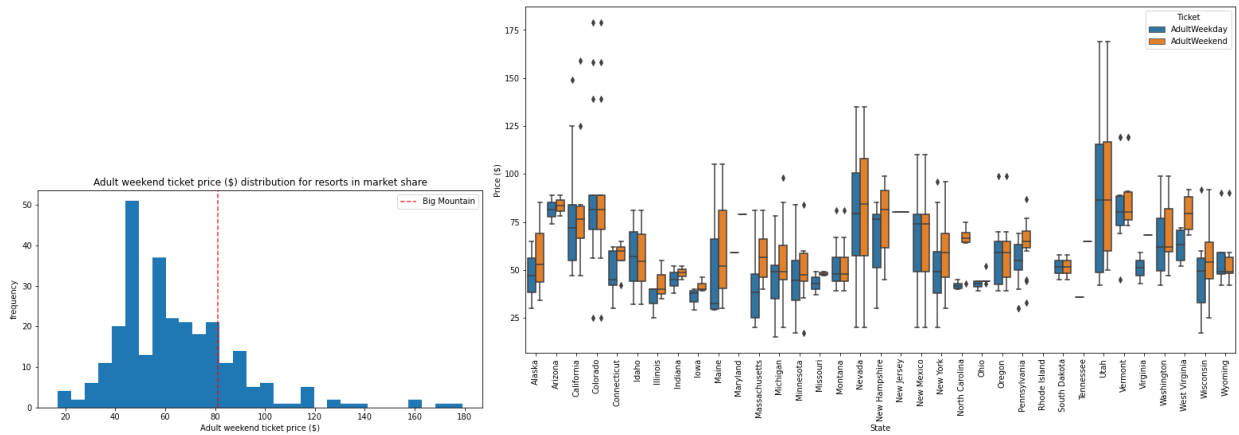
However, the pricing model indicates that its facilities justify the higher than average ticket price. The pricing model placed the most importance on the number of fast quad chair lifts, the number of runs, acres supported by snowmaking equipment, the vertical drop of between base and highest elevation accessed by a lift, and total skiable terrain. The relative importance of the various facility features in the pricing model are shown below:
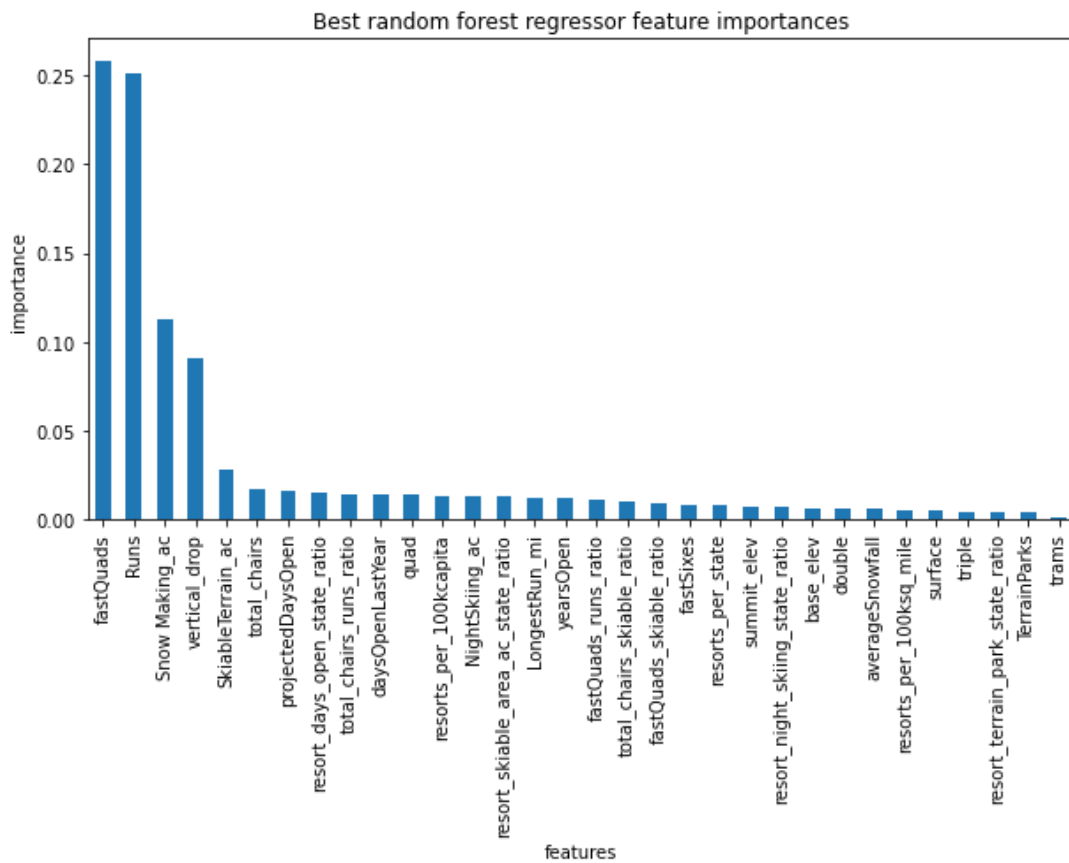
For the five most important assets to the pricing model, Big Mountain is above average in the market segment:
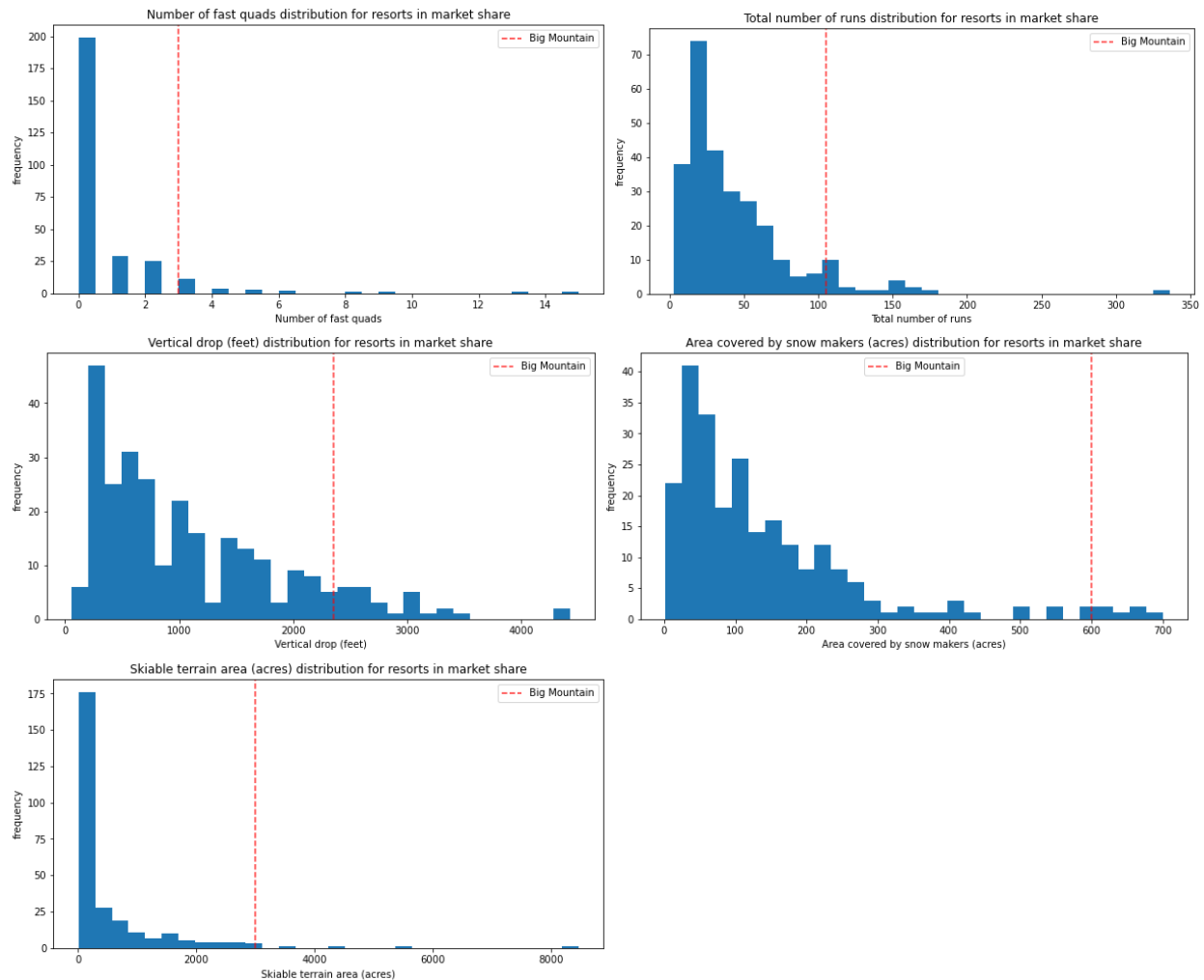
Impact of facility changes

The following 4 scenarios in Big Mountain facility changes were evaluated using the same ticket price prediction model. The predicted change in revenue is also reported, assuming no impact on annual number of tickets sold (350,000 visitors x 5 tickets/visitor).

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.

- Evaluation of (1): Closing down 10 runs suggests a ticket price drop of $1.81, for an annual revenue decrease of about $3.2M. The predicted delta isn't quite linear

with number of closed runs, but a reasonable estimate is a drop of revenue by about $0.32M for each closed run.

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

- Evaluation of (2): Making these facility changes suggests a ticket price increase of $1.99, for additional annual revenue of $3.5M.

3) Same as (2), but adding 2 acres of snow making cover

- Evaluation of (3): The small increase in snow making cover was not enough to justify a change in ticket price. However, if this change is needed to support scenario 2, additional impact on operating costs should be considered.

4) Increase the longest run by 0.2 mile to boast 3.5 miles length, requiring an additional snow making coverage of 4 acres

- Evaluation of (4): The selected pricing model does not put much important on longest run length, and this proposed increase does not lead to a higher modeled ticked price to offset the increased cost of snowmaking coverage.

In selecting which scenario(s) to pursue, the anticipated revenue changes (as a result of ticket price changes) should be weighed against the change in operating costs, which are not available for this report. Since the pricing model suggests that the current $81 ticket price is lower than the market can support, proceeding with ONLY scenario 1 suggests ticket prices don't need to be lowered as a consequence. If there is management tolerance to only pursue scenario 1 for the next ski season, the resort could successively close the least profitable runs first (fewest skiers per operating cost) and monitor the impact on ticket sales.

Since implementing ONLY scenario 2 has perceived added value, increasing ticket prices coincident with these new features seems reasonable. This price hike could be even more than the modeled $1.99, if management is convinced current ticket prices are already undervalued.

Pursuing scenario 4 is not supported by the pricing model. Pursuing scenarios 1-3 requires knowing the impact on operating costs to make a more informed decision.

Details and future work

The only monetary data in our dataset was ticket prices. We were provided with information about the additional operating cost of the new chair lift, but did not have information on the typical cost of maintaining each run, and cost/acre to support snowmaking equipment.

Ticket price for a facility running for a number of years has the advantage of being market-tested: For the particular resort, how much impact is there on ticket sales as a function of a specific price change? This information was not available, but is critical in gauging how much of a price adjustment can be tolerated.

The price prediction model is only as good as its input data. If there are significant factors impacting ticket prices that are not modeled, this limits the model's utility. For example, there are no features that measure lodging facilities and other amenities that influence demand, and thus ticket price.

Deficiencies in the data used to build the ticket price prediction model included:

- missing information for some of the facilities. About 20% of the facilities were dropped due to missing information. If the dropped facilities are not representative of the retained facilities, the model may have introduced some bias.

- Big Sky Resort, one of Big Mountain's biggest competitors in Montana, was excluded due to missing ticket price data. This means we couldn't evaluate how well the model predicts its ticket price.

- Of the features with high importance in the final model, acres of land supported with snow making equipment, had a lot of missing values that were replaced by the median of the remaining values. Perhaps that missing data might actually indicate there are NO snow making acres at those facilities, and the missing values should have been replaced with 0. An alternate model could be made under this assumption, and evaluate the impact on price prediction for Big Mountain resort. A significant change would indicate a need for additional work on this feature (more data collection, different ways of filling in missing information based on expected weather patterns and elevation).

A Dashboard is planned that will allow management to gauge resort facilities and ticket price vs the market at large, and also broken down by region. The dashboard will also include ticket price predictions, and other financial figures of merit. A key feature of the Dashboard will be a scenario wizard to evaluate the impact of facility changes on the financials. Note that periodic market surveys will be needed to maintain Dashboard utility.