What's in the price?

A Path to More Informed Pricing

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Big Mountain Resort

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The Problem

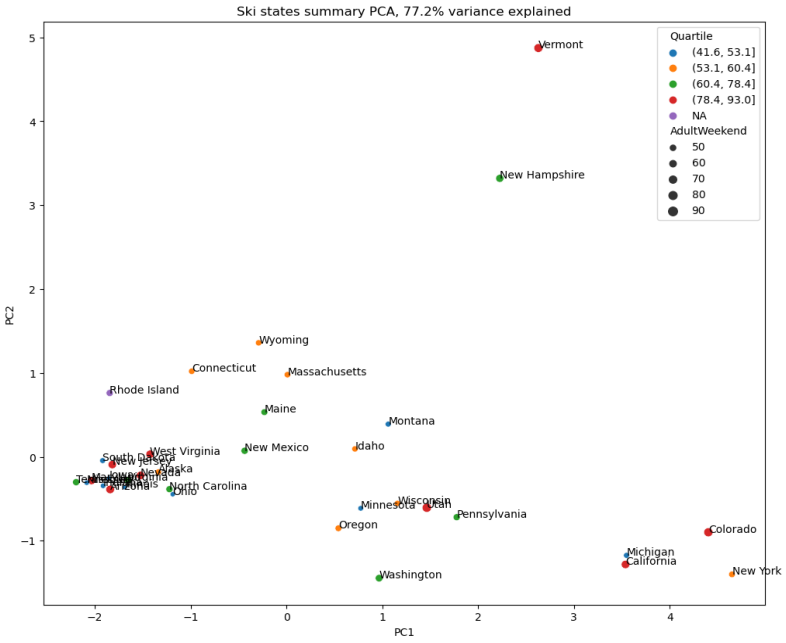
Big Mountain Resort charges $81.00 per day for admission. This is slightly higher than the average price seen in the industry. We think we're justified in charging this premium but we're not entirely sure exactly what it is about Big Mountain that provides this justification. Wouldn't it be better to determine a price based on something more than an arbitrary guess? With the data we have from resorts across the U.S. we can create a tool that not only gives us a more informed price given our current facilities but provides guidance on potential changes to the resort in the future.

Data Wrangling

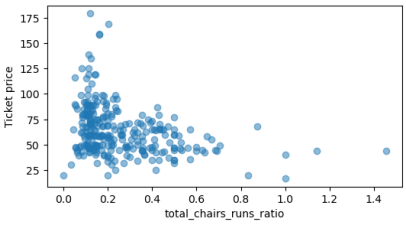
- Created a state summary dataset from the original dataset that aggregated features grouped by state. This was augmented with additional data on each state's population and area in square miles.
- Dropped fast eights column due to no useful information.
- Dropped resorts with missing price information.
- Decided on AdultWeekend price as target feature since it had fewer missing values compared to Adult Weekday.
- Dealt with a couple of outliers by cross-referencing information found online or just dropping it from the dataset.

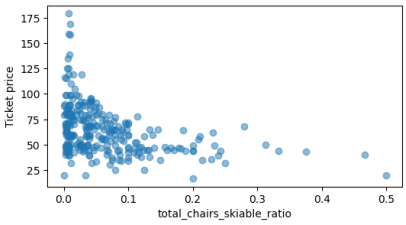
Exploratory Data Analysis

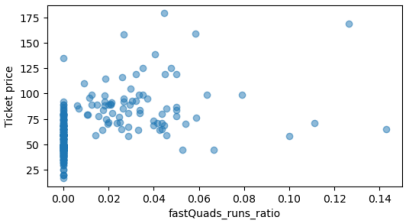
- Started with comparing how states stack up according to various features in our new state summary data. Looked at comparing states according to resort density both in terms of resorts per 100k capita and resorts per 100k square miles. Both New Hampshire and Vermont have high resort densities.
- PCA performed on the state summary to see if there is justification in dropping state labels and treating all states equally.

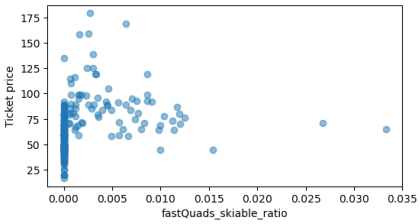


- Found no grouping of states based on target feature of AdultWeekend. States can be treated equally but we retain some features derived from state information and merge state summary data into original resort level dataset.
- Explored a few scatter plots that looked at the relationship of transportation, number of runs, and skiable area to ticket price. Adding chairs seems to decrease the price perhaps by increasing the capacity to support more visitors per day. Adding fast quads seems to support a higher ticket price when the resort serves a large area with many runs.



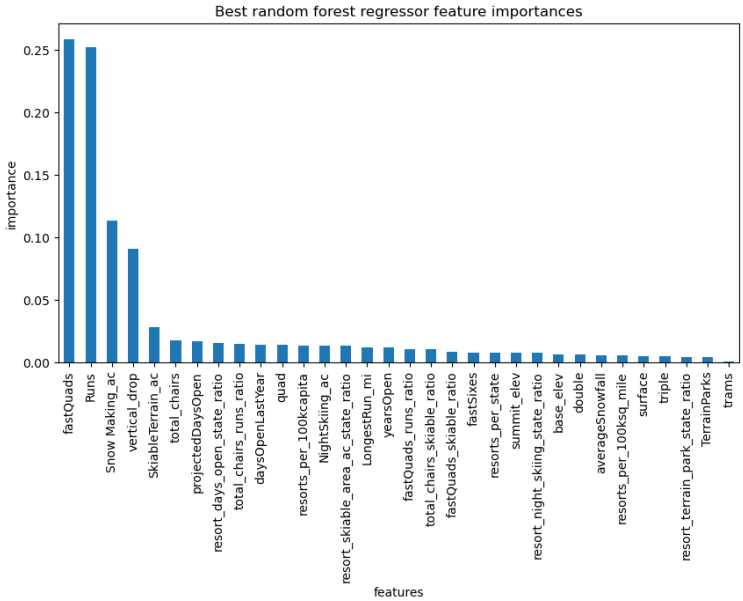






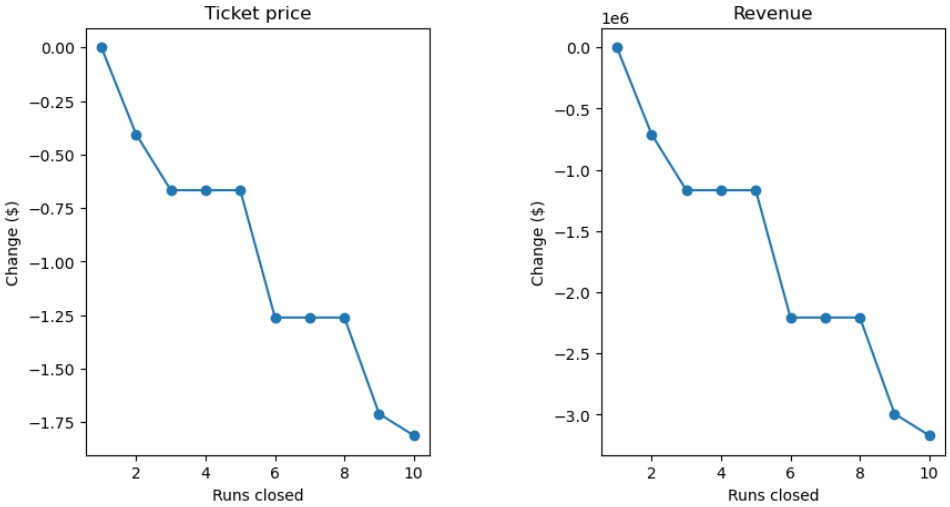
Pre-Processing and Training

- We split our data into a training set and a test set.
- We removed the categorical features of state, Name, and Region and verified we had only numerical datatypes.
- We used the mean of AdultWeekend to establish a baseline to compare models' predictions against.
- The mean absolute error when only using the average price as a predictor was around $19.
- We compared the performance of two models. Linear Regression and Random Forest.
- Random Forest had the least mean absolute error, and its performance was closer to its cross-validation estimate from training. For these reasons we chose to use the Random Forest model moving forward.
- Below is a chart of the features ordered by importance according to the Random Forest model.



Modeling

- The model predicts that Big Mountain Resort should be charging $95.87 as opposed to the current $81.00. This suggests there is room for an increase.
- It's reasonable to assume that some resorts overcharge, and others undercharge. When comparing Big Mountain to the market we do see that it ranks high in all the important features.
- Four changes were proposed to support a higher ticket price. 1. Closing up to 10 runs. 2. Increase the vertical drop by adding a run to a point 500 feet lower down but requiring a new chair lift to bring skiers back up, without adding snowmaking coverage. 3. Same as 2 but adding two acres of snow making cover. 4. Increase the longest run by 0.2 miles with an additional 4 acres of snowmaking coverage. The line plot below shows the change in price and change in revenue due to closing runs.



- Closing one makes no difference. Closing 2 and 3 reduces support for ticket price and revenue. If we close 3 we can close 5 without any further loss of support.
- The model predicts that if we extend our vertical drop by 150 feet then we increase support for ticket price by $1.99. Adding snow making, as in option 3, to this extension does not increase support any further.
- The model predicts that extending our longest run would have no effect on our ability to charge more.
- Our models can be improved by obtaining more data. Good features to add would be average annual visitors, average length of stay, and annual operating costs.