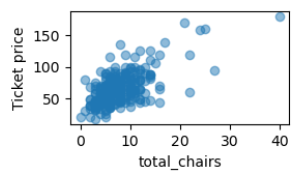
**Big Mountain Resort:** Ticket Pricing Analysis

Problem Statement

* Big Mountain Resort must identify an appropriate ticket price to increase revenue by at least 5% for the upcoming season.

Recommendation

* Current Pricing: Pricing models suggests the current resort features support a price of $96, with a variation of +/- $10. Recommendation is to implement price increases in increments of $5 per month and evaluate the impact on overall revenue after each increase.
* A blue dotted graph with white text

  Description automatically generated with medium confidenceSuggested Improvements: Recommendation to add a new run with an additional vertical drop of 150 feet and a new chairlift. The additional operating costs associated with the new run are expected to be offset by the $15 million increase in revenue. This expectation assumes 350,000 visitors purchasing 5 lift tickets each. This is further supported by our analysis of the two impacted features. Both vertical drop and total chairs have a positive relationship with price, that should support higher ticket prices.
* A graph with blue dots and numbers

  Description automatically generatedRun Closure Testing: The model suggests that closing one run would have no impact on revenue. However, closing 2, 3, and 5 runs would reduce revenue by $0.5-$1 million for each increment. It's recommended to use a phased approach for closure by increments of 1, 2, 3, and 5 runs, evaluating after each change to determine if lost revenue is covered by reduced operating costs. If operating cost for each run is under $500k, no change to runs would be recommended.

Initial Analysis:

* Original ski resort dataset was obtained with 330 recorded observations, one of which was our own resort. The focus of the analysis was adult weekend ticket price. Records without ticket price information were dropped. After wrangling the ski resort dataset, 277 observations remained.
* The analysis was focused on understanding relationships between Adult Weekend ticket prices and other features. We first assessed the primary categorical feature, state, to determine if there was a significant relationship. We used state metrics such as resorts per state, total skiable area, total ski days, total night skiing area, resorts per capita and per square mile. We were unable to find any significant relationships between state and ticket price.
* FastQuads, runs, snow making area, night skiing ratio within the state, total chairs and vertical drop were all key numerical features with strong relationships to ticket price.
* Resorts per capita seems to indicate that ticket price can vary significantly when resorts are scarce and can also move higher when resort density increases to the extreme end.
* Having at least one FastQuad appears to be a requirement for ticket prices to exceed $100. The number of chairs also appears to have an inverse relationship with ticket price, which may be a result of the exclusive vs. mass market effect.

Model results:

* Data set was broken up 70% for training, 30% for testing. Baseline of mean was created to measure effectiveness of models.
* Developed a linear regression model. Assessed impact of filling empty values with mean compared to median. Determined no significant difference, but median was more appropriate due to skewed distributions. Scaled all features. Assessed various number of features to use. Determined 8 features provided the most accurate prediction with least variance.
* Also developed a random forest model. Assessed a range of 20 different estimators, impact from scaling the data and imputing empty values with mean or median. Determined 69 estimators, not scaling the data and imputing with median provided the most accurate model results.
* In both models, 4 most important metrics were fastQuads, runs, snow making area and vertical drop. Training data was used to cross validate both models 5 times. Both the cross validating and test data indicated the random forest regression model was on average $1 closer to the actual ticket price than the linear regression model. Both models were significantly closer to the actual ticket price than the simple mean approach.

Summary:

* After review of many key factors, it was determined that fastQuads, runs, snow making area and vertical drop are the four most predictive features for ticket price. Using a random forest model, the ski resort data from 276 resorts was used to train the model and predict the expected ticket price for Big Mountain Resort. Further scenarios were modeled to estimate the revenue impact from various investments and operational changes. In conclusion, the recommendation is to slowly raise the ticket price to $96 and add an additional run and chair lift that will extend the total vertical drop by 150 feet.