Optimizing Big Mountain Resort's Ticket Pricing

Introduction:

Big Mountain Resort, a popular ski resort located in Montana, with views of Glacier National Park and 105 trails. It serves 350,000 annual visitors of all skill levels with 11 lifts, 2 T-bars, and a magic carpet. Its base elevation is 4,464 ft, reaching a summit of 6,817 ft with a 2,353 ft vertical drop. Recently, Big Mountain added a new chair lift, increasing costs by $1.54 million this season. Although it prices above the market average, the resort's management harbour concerns over their current strategy that it may not be making best use of its facilities.

Problem:

Big Mountain Resort needs a data-driven pricing strategy based on nationwide ski resort data. The goal is to develop a pricing model that sets a competitive price for customers while accurately reflecting the value of Big Mountain's facilities.

Data Wrangling:

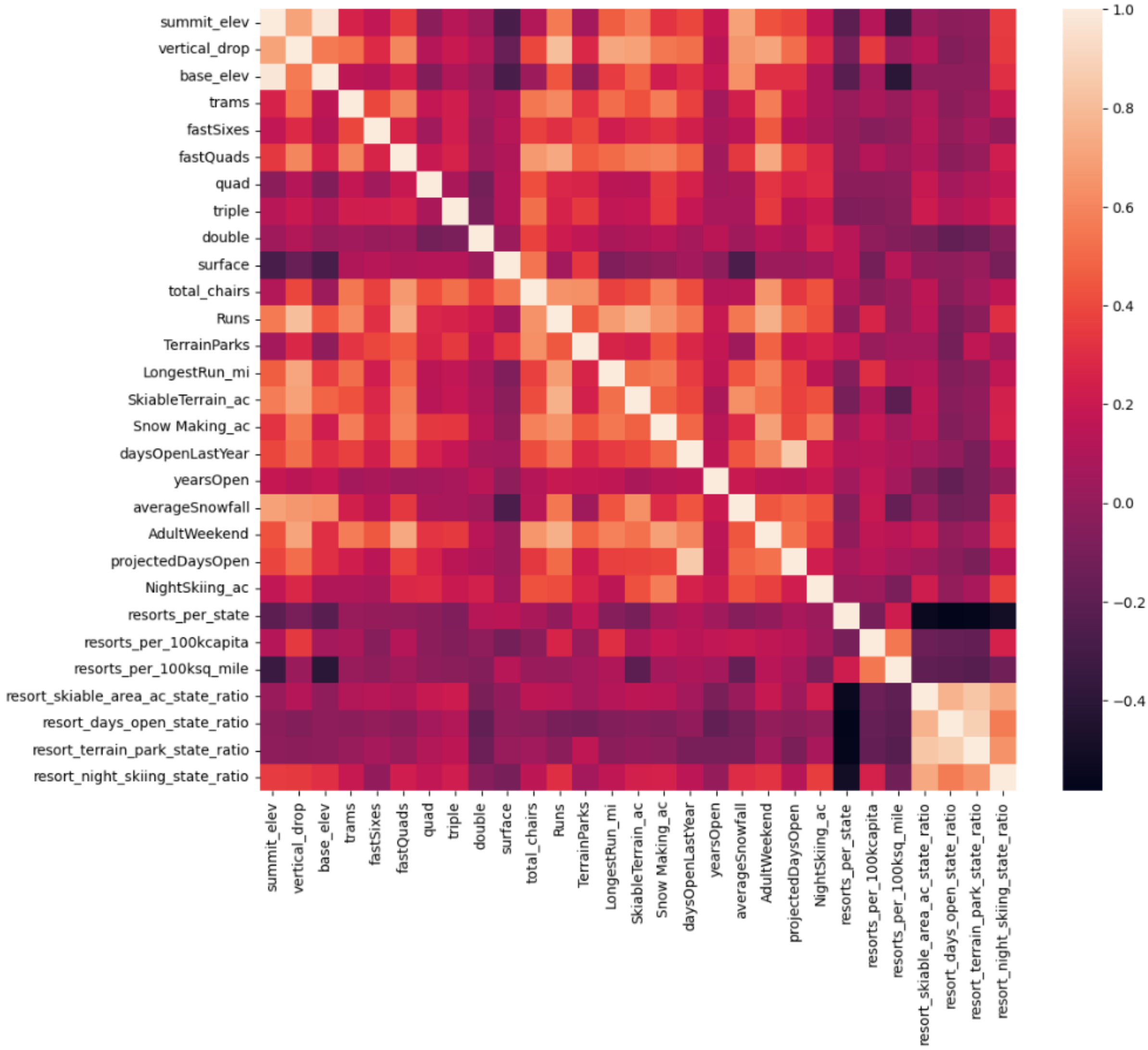
The initial data exploration for the ski resort dataset involved quality checks and understanding trends across features, such as regions, skiable areas, and target parameters (weekday and weekend adult ticket fares). Montana, where Big Mountain Resort is located, ranks 13th in resort count.

Comparing the Weekend and Weekday prices was it actually advantageous to have a different price for the weekend? Major rises in Weekend prices over the Weekday prices were noticed only for ticket fares below $100. Otherwise, it seems to hold a very linear relationship. Adult weekend ticket prices, with the fewest missing values, were chosen as the target feature.

Exploratory Data Analysis:

The state-wise summary data was analysed for trends, with each feature explored independently. To simplify the data's complexity, PCA was applied, scaling and transforming the data to create derived features. PCA revealed that "resorts_per_100k_capita" and "resorts_per_100k_sq_mile" capture the most variation, grouping states like New York and Colorado separately, and Vermont and New Hampshire together.

At the resort level, exploratory analysis identified strong correlations between features like vertical drop, number of runs, snowmaking area, fast quads, and weekend ticket prices. A heatmap was able to highlight these relationships, suggesting that certain amenities, like fast quads in larger resorts, may positively impact ticket pricing.



Pre-Processing and Training Data

The ski data was split into training and test datasets in a 7:3 ratio.

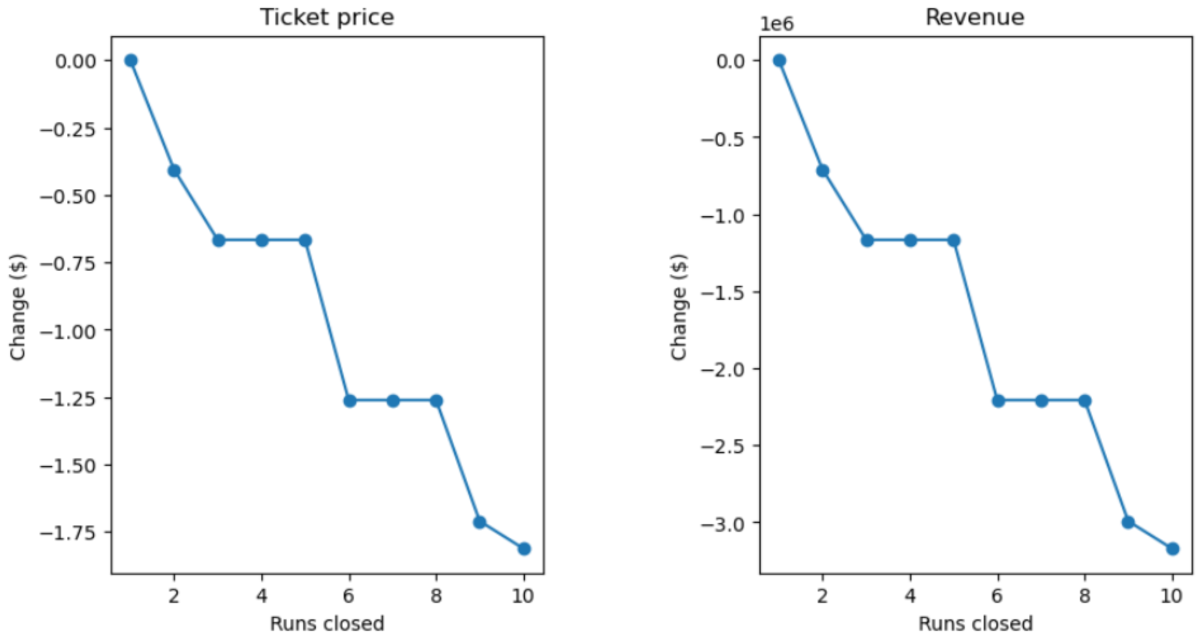
For the Linear Regression model, a pipeline was established that included a SimpleImputer for missing values, a StandardScaler, and LinearRegression. Model performance was evaluated using R-squared, MAE, and root squared MSE. To optimize further, SelectKBest was used, narrowing down to 8 parameters. The final model identified vertical drop and snowmaking area as key features, while skiable terrain showed a negative correlation, necessitating additional visitor data for clarification. A Random Forest model was also tested with a similar pipeline. Key features identified by the model included fast quads, number of runs, snowmaking area, and vertical drop.

The Random Forest model was selected for two main reasons: it had a lower cross-validation mean absolute error by nearly $1 and showed less variability.

Modelling:

Big Mountain's current ticket price is $81, while the model suggests it should be $95.87, indicating a potential increase of $14.87 per weekend ticket. With a mean standard error of $10.39, there's room for a price adjustment. The model can help guide Big Mountain in raising ticket prices and focusing on specific areas to enhance profit margins.

The analysis found that closing one run would have negligible revenue impact, while shutting down 3-5 runs could slightly affect profits if operational costs are a concern. Adding a run, increasing the vertical drop by 150 feet, and installing an additional chair lift could raise ticket prices by $1.99, translating to approximately $3,398,551 in seasonal revenue. However, adding 2 acres of snow coverage would not affect ticket prices.



Overall, these solutions could significantly boost Big Mountain's revenues and satisfy both management and customers.

While the dataset is substantial, it has gaps, such as relying solely on potentially inaccurate ticket prices from other resorts. The model’s higher pricing reflects Big Mountain's strong features, which management may not fully recognize. Our analysis indicates that Big Mountain ranks among top resorts, and the model effectively sets fair prices that can boost revenue. Additionally, the model is adaptable, allowing for easy incorporation of new data to enhance its accuracy over time.

By Rohan Thampi

Dated: 11th Nov 2024