Jaime Aguilar

Springboard

School of Data

Data Science Certificate

07/17/2024

Guided Capstone Project Report

Problem Statement

The problem statement is as follows. How may Big Mountain Resort, optimize their ticket price, while maintaining a high profit margin, based on the current operational costs of their facilities so that they may have a better business investment strategy right now? Criteria for success involve: selecting a better ticket price for the resort, and synthesizing how important some facilities are compared to others, so that the business may have a better investment strategy.

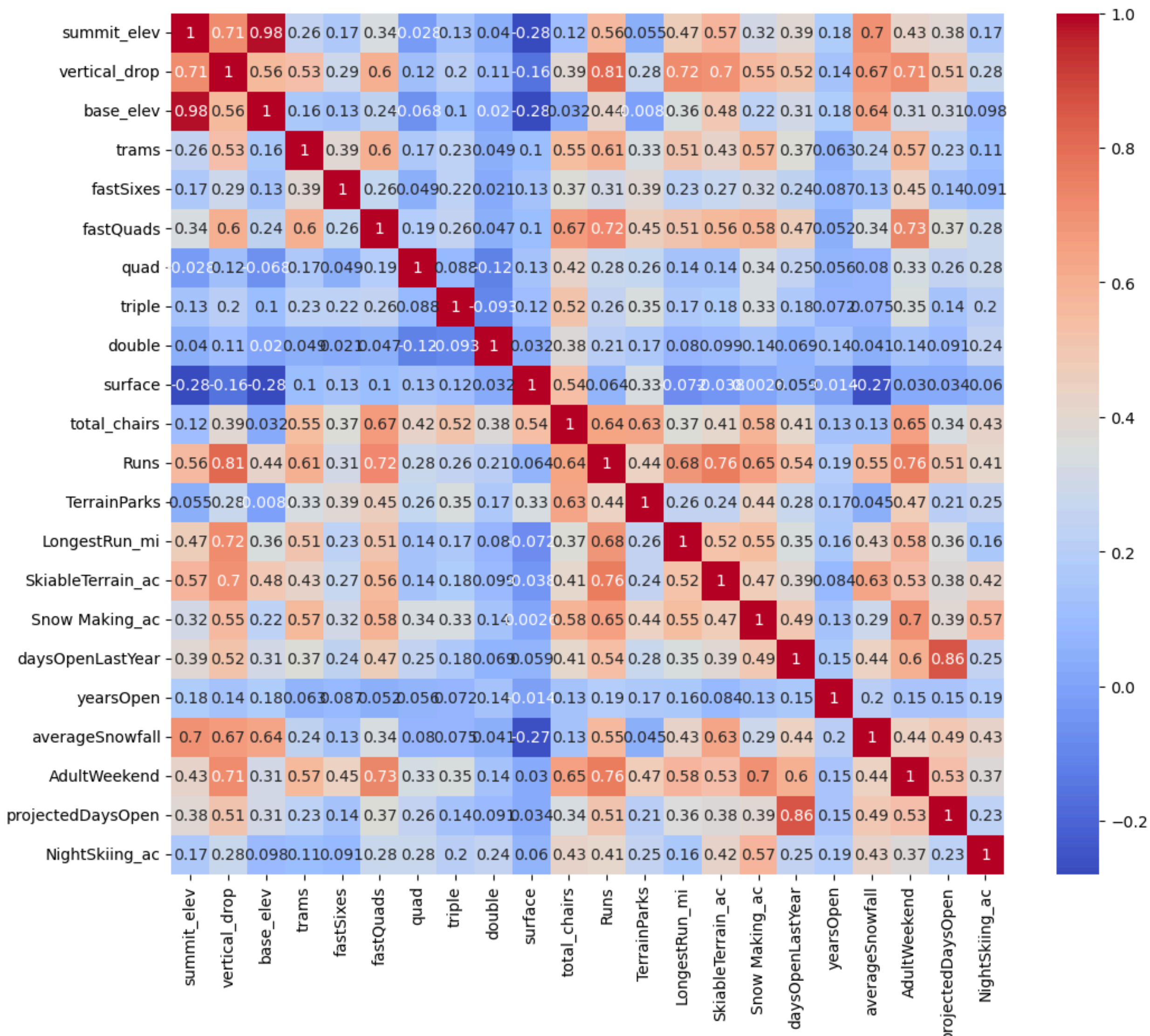
Data Wrangling

There were several rows in the dataset that had a largely significant amount of missing data such as “The number of fast eight-person chairs” and “Total skiable areas covered in lights for night skiing” which were both missing approximately 50% of its values. This information was dropped. The ticket price information is a value of critical importance, so the resorts that where missing this information where dropped from the scope of this analysis. Notable analysis from early data wrangling shows that resorts that were priced more cheaply, such as resorts that are under $100 in a weekday ticket price, had more expensive ticket prices on the weekend. Big Mountain Resort is currently priced at sub-$100, so *it is suggested that during the weekend ticket prices should be higher than weekday prices.*

Exploratory Data Analysis

Multidimensional visualizations involving many variables were explored at this stage. One such was the standard deviation of the mean of the number of resorts by 100k capita (population) versus another standard deviation of the number of total resorts per 100k square miles. A heatmap was plotted to the correlations of many variables all in one visualization in Fig. 1 below.

Fig. 1 shows a heatmap with all the variables of data relating to one another by correlation.



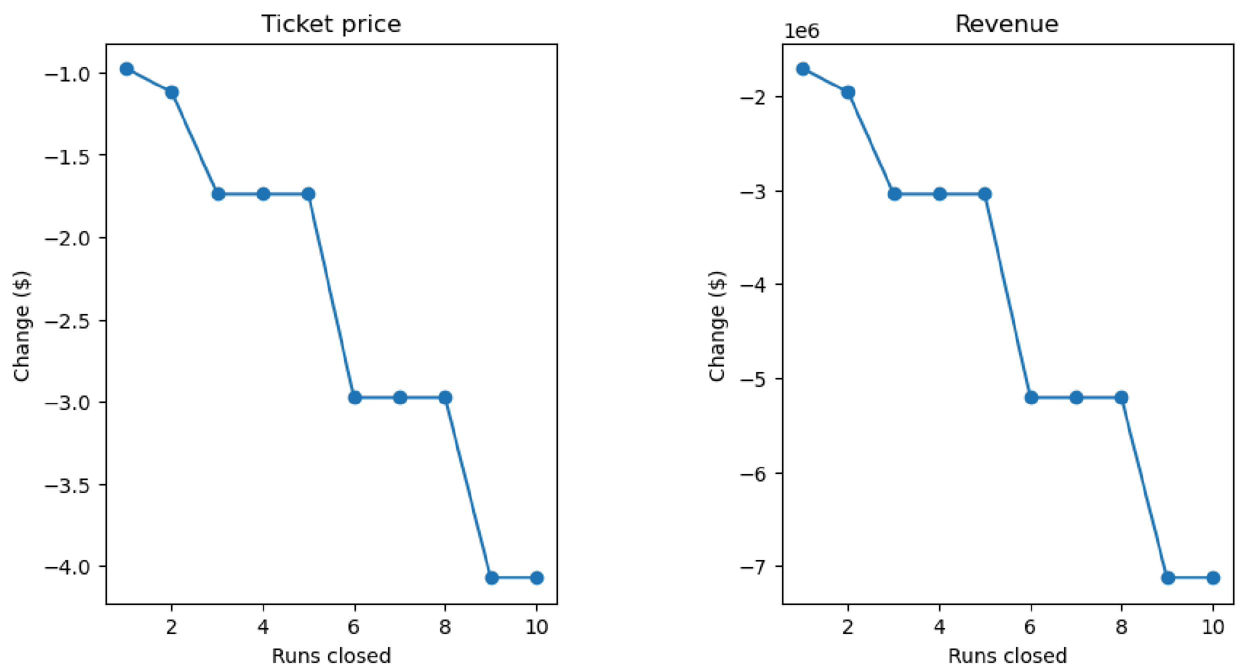
There are several more conclusions that can be drawn from the Exploratory Data Analysis (EDA). First, where resorts are more densely located, they offer more night skiing. Skiers value guaranteed snow because there are higher ticket prices for more snow-making equipment, more ski runs, and higher ticket prices for “fast quad lifts”. More night skiing might be a great offer to justify higher ticket prices because they are positively correlated. Also, the total number of runs and the number of chairs are positively correlated. A larger vertical drop raises ticket prices. Shockingly enough, high demand for a chair does not mean a more expensive ticket price. Few chairs and more runs just mean less of a ticket price.

Model Preprocessing with Feature Engineering

Data was imputed (altered), scaled, trained, and predicted to assess the performance of two machine learning models which were the Random Forest Model, and a Linear Model. Several findings agree with the conclusions made by the EDA phase, such as people preferring guaranteed skiing. The Random Forest Model exhibited a lower cross-validation mean absolute error by $1 and had less variability. In layman’s terms, the Random Forest Model fit our data better and was more accurate than the other machine learning model, so the Random Forest Model is a more helpful machine learning model. The following scenarios are modeled after this winning model.

Scenario 1

Scenario one is to close up to 10 of the least used runs. Fig. 2 below shows runs to price changes.



Closing one run makes no difference in the value of the ticket price. Closing 2-3 does reduce the ticket price and revenue. If they close three they should close 4-5 because it will have no further effect on the ticket price.

Scenario 2 & 3

Scenario 2 is adding a run by increasing their vertical drop by 150 ft. This increases validation for the ticket price by $1.55. Adding 2 acres of snowmaking also increases the price of the ticket by $1.55. In total, the price increases in executing these two scenarios increase the price by $3.10. *This is advisable to proceed with.*

Scenario 4

Scenario 4 is to increase the longest run by .2 miles and guarantee snow coverage by adding 4 acres of snow-making capability. In this scenario, our best model found that this leads to zero difference in justifiable price change.

Pricing Recommendation

Big Mountain Resort is underpriced. Conclusively, Big Mountain Resort's modeled price is $98.07, while its actual price is $81.00. Considering that prices go higher when there are fewer runs and more chairs, and prices go higher when there is more guaranteed snow and increasing vertical drop, it is advisable that Big Mountain Resort consider dropping one ski run (Scenario 1), increase their vertical drop by 150 ft (Scenario 2) and add 2 acres of snowmaking for guaranteed snow (Scenario 3) to bring the final weekend ticket price to $101.17 as a justified and conclusively accurately priced ticket for the value Big Mountain Resort brings to the state of Montana.

Future Scope of Work

The only monetary data that was considered in the scope of this work were the weekday ticket prices and the weekend ticket prices for skiers at Big Mountain Resort. For future work, and to also even further accurately base prices relative to other resorts local to them, a full dataset on Big Mountian Resorts expenses should be considered. Business is about profiting from having expenses and considering the full weight of expenses of each of the facilities at Big Montinan Resort is advisable in the future scope of this work to more accurately price tickets.