Big Mountain Resort Ticket Price Prediction

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Background and objectives

Every year about 350,000 people ski or snowboard at Big Mountain. They have recently installed an additional chair lift to help increase the distribution of visitors across the mountain. This additional chair increases their operating costs by $1,540,000 this season. Their pricing strategy has been on the average market price. However, as this pricing does not suggest which facilities are important than the others, they aim a better pricing strategy. A strategy which supports price increases if required and is sensitive to the facilities used in the resort.

Data Source

The dataset used for this project is a CSV file of 330 resorts in the US. The dataset has 25 features which include information about the facilities, runs, snow covered areas, days open, night skiing, as well as data about ticket prices.

Features description

The following tables shows a summary of the features in the data provided.

Table 1: Description of features provided.

Column	Description
Name	The name of the ski resort.
Region	The region within the United States where the resort is located.
state	The state name where the resort is located.
summit_elev	Elevation in feet of the summit mountain at the resort.
vertical_drop	Vertical change in elevation from the summit to the base in feet.
base_elev	Elevation in feet at the base of the resort.
trams	The number of trams.
fastEight	The number of fast eight person chairs.
fastSixes	The number of fast six person chairs.
fastQuads	The number of fast four person chairs.
quad	Count of regular speed four person chairlifts.
triple	Count of regular speed three person chairlifts.
double	Count of regular speed two person chairlifts.
surface	Count of regular speed single person chairlifts.
total_chairs	Sum of all the chairlifts at the resort.
Runs	Count of the number of runs on the resort.
TerrainParks	Count of the number of terrain parks at the resort.
LongestRun_mi	Length of the longest run in the resort in miles.
SkiableTerrain_ac	Total skiable area in square acres.
Snow Making_ac	Total area covered by snow making machines in acres.
daysOpenLastYear	Total number of days open last year.
yearsOpen	Total number of years the resort has been open.
averageSnowfall	Average annual snowfall at the resort in inches.
AdultWeekday	Cost of an adult weekday chairlift ticket.
AdultWeekend	Cost of an adult weekend chairlift ticket.
projectedDaysOpen	Projected days open in the upcoming season.
NightSkiing_ac	Total skiable area covered in lights for night skiing.

Data Wrangling

FastEight column was dropped because not only half the values are missing and but also all the others are the value zero. The weekday prices were dropped as their missing values were higher than those of the weekend prices. The row with yearsOpen = 2019 was dropped as it was not a correct value. Eventually, 277 rows of data remained.

Exploratory Data Analysis

New features have been generated to include the population and size of the state and were merged with the wrangled data from the wrangling stage. Also, the ratios of the resort data and their corresponding total state data were calculated and were used instead of their state label equivalents. The weekend ticket prices were correlated with other features as below.

Most Important Features

We performed cross validation grid search to obtain the important parameters. The dominant top four features are in common with your linear model: fastQuads, Runs, Snow Making_ac, vertical_drop.

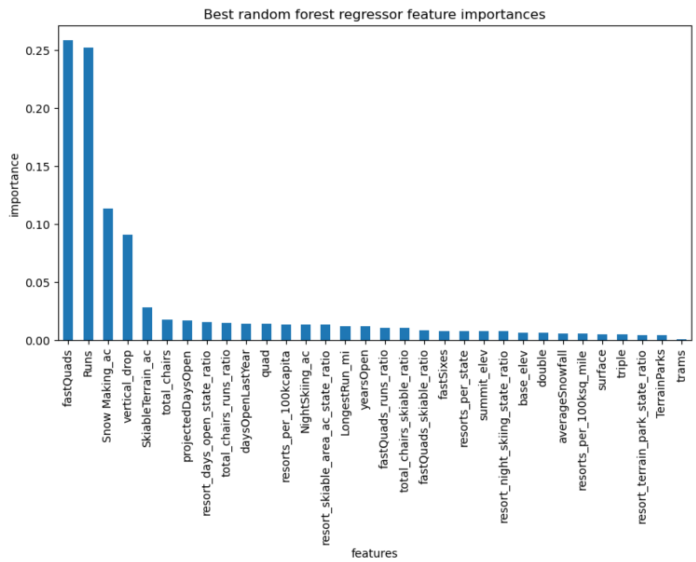

Fig. 1: Feature importance chart

Data Quantity Assessment

To provide the business with feedback on any further data collection, we assessed the performance of the model for different dataset sizes. The results indicate that no further data collection is needed as after 60 data points, there is no significant increase in the cross-validation score.

Fig. 2: Cross validation score vs the training set size

Scenarios Experimentation

Several scenarios were implemented. Figure 3 suggest that closing one run does not change the ricket prices and therefore the revenues. However, removing 2 and 3 runs causes significant revenue loss while closing 4 and 5 runs shows no change. If 9 runs are close, $3M revenue loss is predicted.

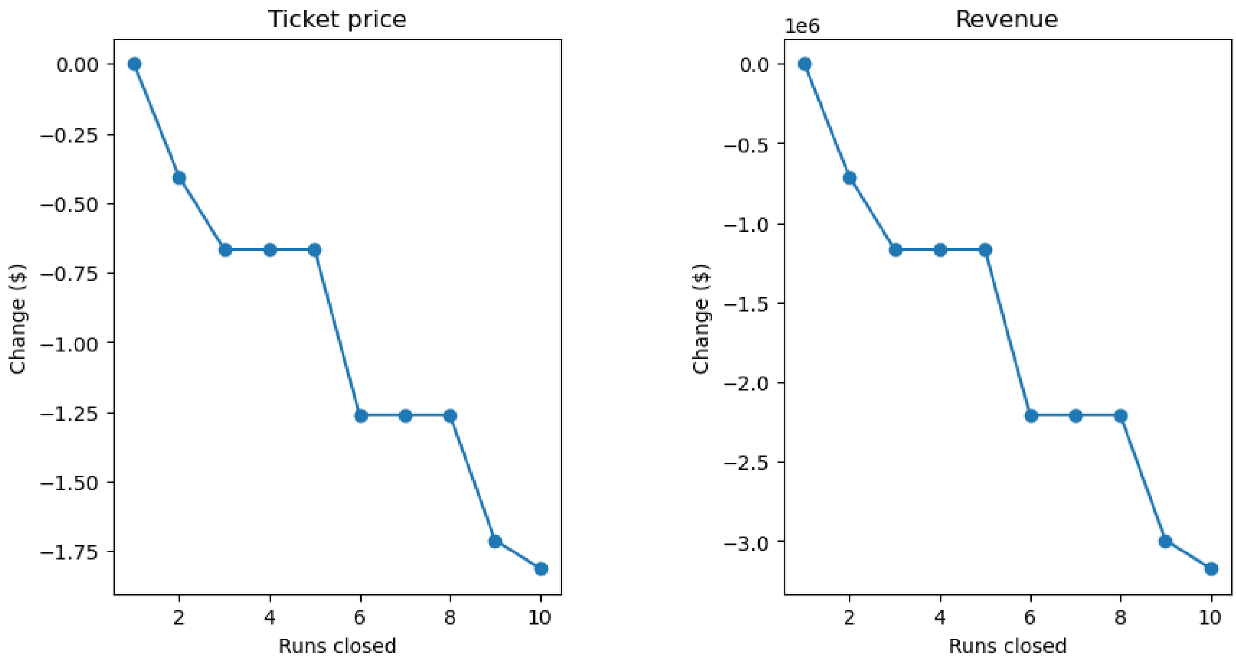

Fig. 3: Effects of runs closed on the ticket price change (left) and revenue loss (right)

Also, increasing the vertical drop, which requires the addition of a chair lift imposes an additional cost. However, the cost can be covered by rising the ticket prices, which is supported by the modeling results. A revenue of $347,4638 can be generated by increasing the ticket by $1.99. This will cover $1,540,000 operating costs of adding a chair lift. From the sensitivity studies, it was found that removing runs may not be a good option as huge revenue is lost. The study supports the addition of lift chair because the ticket prices can be raised by $1.99. Checking the revenue generation against the operational cost suggest that the operating costs can be covered from the increasing prices. Snow coverage and increasing the length of the longest runs seem to be ineffective. Based on the modeling, the Big Mountain resort underprice the ticket prices, as it is based on the average market price.