Springboard Data Science - Career Track
Guided Capstone - Project Report
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Predicting ticket price at Big Mountain Ski Resort

Problem Statement

How much could ticket prices at Big Mountain Ski Resort be raised this season, to accommodate a $1.54 mil increase in operating costs, while still staying competitive with other ski resorts in the same market?

Background

Big Mountain Ski Resort, located in Montana, offers skiers and riders of all levels and abilities, access to 105 trails and amazing views. Every year, Big Mountain welcomes approximately 350,000 guests. Recently, the resort installed an additional chair lift, which has raised their operating costs this season by $1.54 million. The resort now wants to implement changes in order to accommodate this increase in operating costs. They currently charge $81.00 per Adult Weekend ticket.

Approach

Our approach was to use a regression model to predict Adult Weekend ticket prices for a ski resort, based on that resort's features. We were provided a CSV file containing information on 330 ski resorts including and in the same market as our target, Big Mountain Ski Resort. To create a more robust model, we also extracted state population data from wikipedia, which we used to engineer several features to add to our final data set. After cleaning our data, we ended up with a data set containing state and resort information on 277 ski resorts.

Modeling
Testing

We split the data into training and test sets, then tested two regression models: LinearRegression and RandomForestRegressor. Based on the results below, we selected the RandomForestRegressor.

Model	MAE mean	MAE std
LinearRegression	10.49	1.62
RandomForestRegressor	9.65	1.34

Hyperparameter Tuning

Model	Best Parameters
RandomForestRegressor	n_estimators = 69 Missing value fill strategy = median Scaling = none

Feature Importance

       The top four features, in terms of importance, for our model were: fastQuads, Runs, Snow Making_ac, and vertical_drop. These were consistent with the top features in the LinearRegression model.


Best random forest regressor feature importances
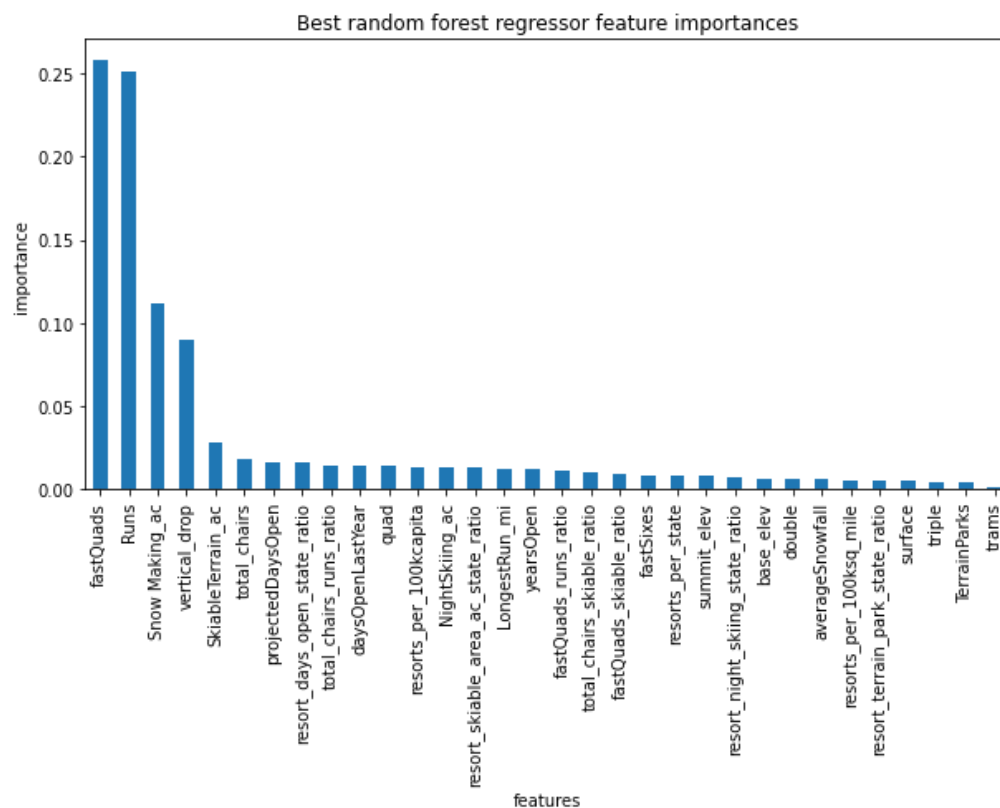
Recommendations

       We used our model to predict the effects of 4 different scenarios on the Adult Weekend ticket price for Big Mountain Ski Resort. See below for results.

       Scenario 1 - Close up to 10 of the least used runs:
          As you can see below, closing 2 and 3 runs reduces support for ticket price (and revenue). And closing 3 runs is the same as closing 4 or 5, as there is no further loss in ticket price.
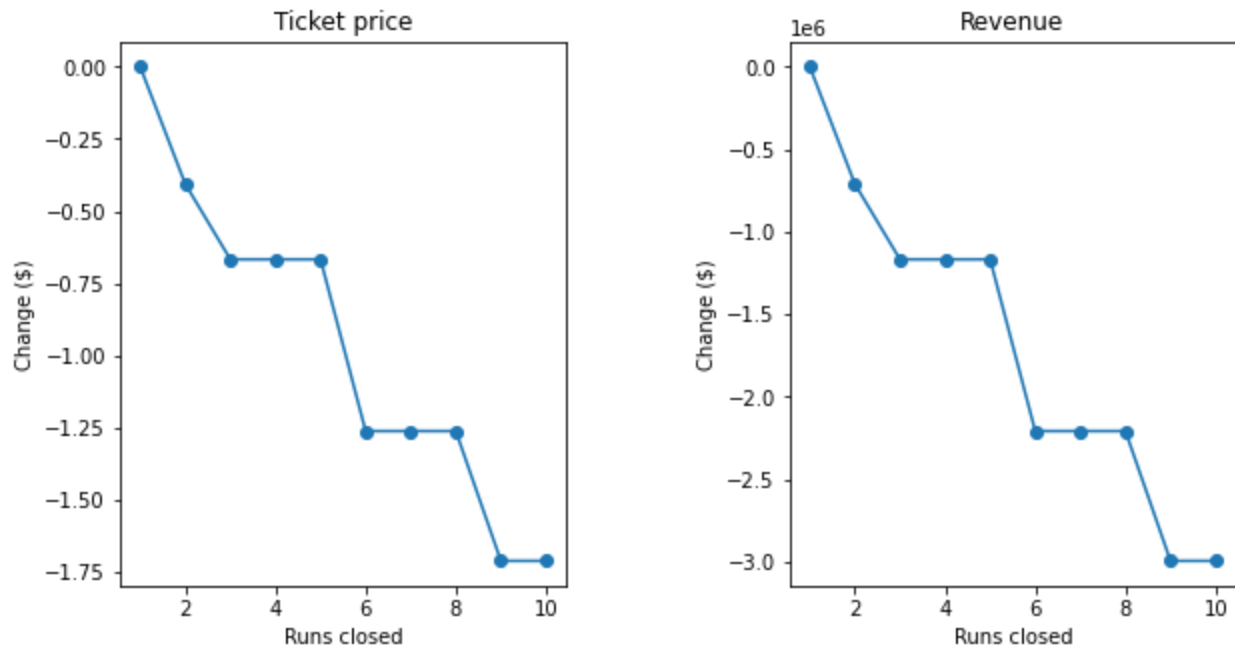
Scenario 2 - Add a run, increasing the vertical drop by 150 feet and install an additional chair lift

> This scenario increases support for ticket price by $1.99, which could amount to $3474638 over the season.

Scenario 3 - Complete scenario 2 and add 2 acres of snow making

> This scenario increases support for ticket price by $1.99, which could amount to $3474638 over the season. So adding 2 acres of snow making capabilities doesn't make a difference.

Scenario 4 - Increase the longest run by 0.2 miles, will also need to add 4 acres of snow making capability to accommodate

> This scenario doesn't change the support for ticket price at all.

Currently, Big Mountain Resort charges $81 per person for an Adult Weekend ticket. Based on our model, there is evidence to support a price increase to between $83 and $104 with the resort's current facilities. I would suggest caution when increasing the price too drastically as that could have a negative impact on visitation. Out of the 4 scenarios that we tested, I feel that increasing the vertical drop by 150 feet and installing an additional chair lift is the most viable option. This scenario alone supports an increase in ticket price of up to $1.99 per ticket.