Guided Capstone Project Report: Big Mountain Resort

Problem Identification Overview

The Big Mountain resort is 73-year-old ski resort, 350,000 people visit every year to ski or snowboard the big mountain. The recent addition of chair lift is increasing the operating costs by $1.54M per season. The management wants some guidance on how to select a better value for their ticket price.

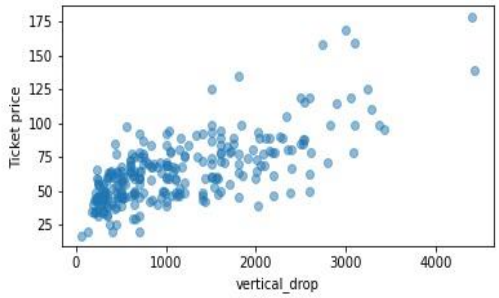
The business problem is to find what opportunities exist for Big Mountain resort to increase their annual revenue to offset the increased operating costs by either reducing the operating costs in other areas or selecting a higher value for their ticket price.

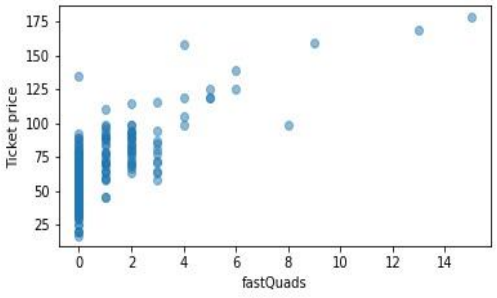
Data

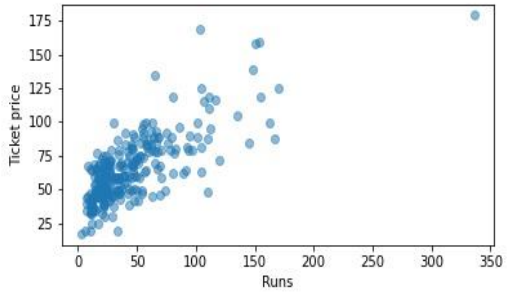
The data is obtained for 330 similar resorts not just limited to local Montana region but even across other states to come up with a pricing model for Big Mountain ski resort tickets in the market segment. It has the data for our resort of interest Big Mountain too.

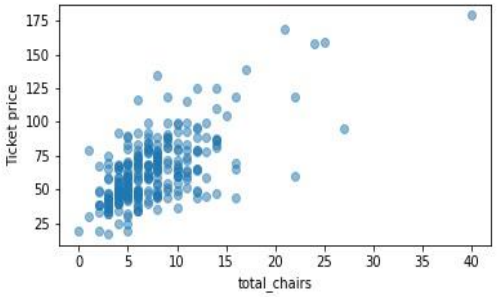
The data contained some ticket price values, but with a number of missing values that led to several rows being dropped completely. There were two kinds of ticket price. There were also some obvious issues which led to one column being completely dropped, a data error corrected. Some additional US state population and size data with which to augment the dataset was also obtained and cleaned.

The data exploratory step reveals vertical_drop, Snow Making_ac, total_chairs, fastQuads are the most important features for modelling the ticket price of our resort as there is a strong positive correlation. Runs, Longest Run_mi, trams are also can be used. The figs below show some of these features with ticket price. States labels did not seem to be particularly useful as there is no clear grouping.









Model Description and Performance

During the preprocessing simple linear regression model is tried putting missing values with mean and median. Assessing model performance on metrices R2, mean absolute error and mean square error suggest results don't seem very different with either mean or median input and there is some overfitting issue which is also expected.

Random Forest regressor model is also tried by exploring different values for the number of trees with and without feature scaling and tried both the mean and median as strategies for imputing missing values.

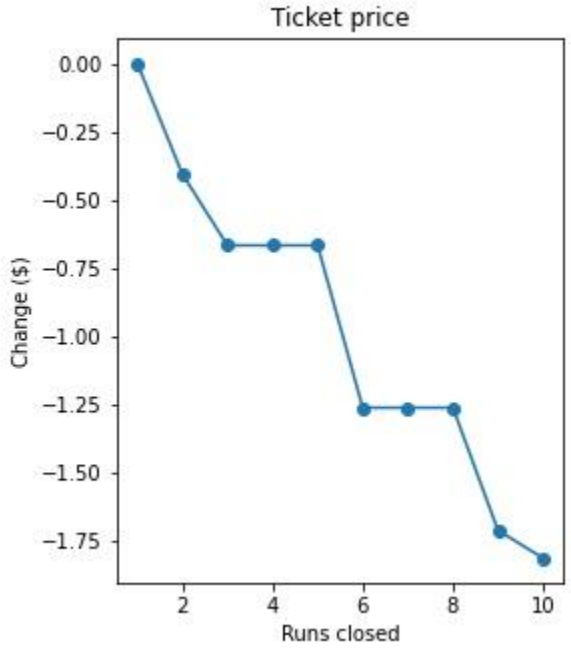
Fortunately the dominant top four features are in common with both the models : :fastQuads, Runs, Snow Making_ac and vertical_drop.

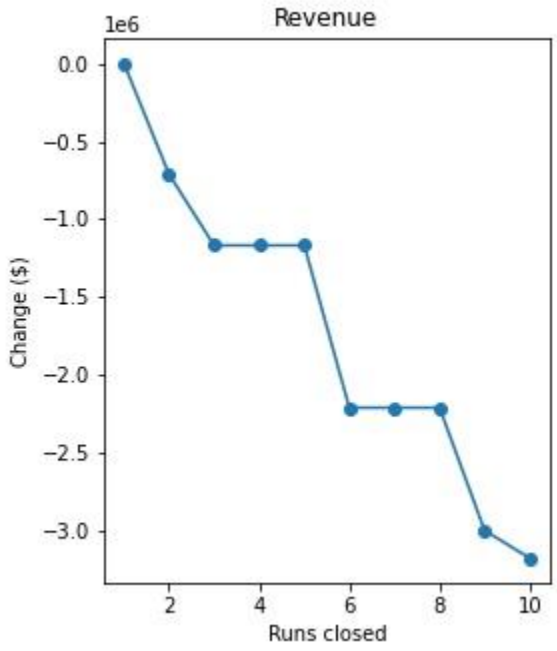
After comparing the linear and random forest model it seems the random forest model has a lower cross-validation mean absolute error by almost $1. It also exhibits less variability. Random forest model is chosen for its better performance for the next step to predict the big mountain resort ticket price.

Model Findings

One day adult ticket is currently priced at $81 for big mountain resort. Assuming average visitors ski for 5 days and 350,000 visitors in the coming season, the model supports increasing ticket price by $1.99 while adding a run, increasing the vertical drop by 150 ft, installing an additional chair lift and adding 2 acres of snow making.

The model also predicts closing one run makes no difference. Closing 2 and 3 successively reduces support for ticket price and so revenue. If Big Mountain closes down 3 runs, it seems they may as well close down 4 or 5 as there's no further loss in ticket price. Increasing the closures down to 6 or more leads to a large drop.





Conclusion

The price predicting model supports increasing the adult ticket price to $83 or even higher for Big Mountain. The model, however, does not account for the additional capital expenditure and on-going operation cost since this data has not been provided. The resort is already positioned in the premium segment of the market and priced competitively. They may need to add additional enhancements to the facility to support the price increase. Upgrading the facility to charge higher price and attracting more visitors would increase resorts revenue to support additional operating costs.

Next step could be to improve the model to get a better price prediction by sourcing and incorporating data for operating cost and visitor volume across the U.S. A cross functional team of business experts could be formed to try the model and test the business assumptions.