Guided Capstone Project Report

In this project, we performed an analysis on ski resort data to sole a problem for Big Mountain Resort: How can we use the values of Big Mountain Resort’s facilities to change their ticket pricing strategy before this upcoming season such that their additional profit from the new ticket prices will cover at least the $1,540,000 in increased operational costs from the new chair lift?

We started with a dataset from Alesha Eisen, database manager, and slimmed down our data by removing features that were either missing a lot of data or ones we deemed irrelevant or unnecessary.

With our new slim dataset, we performed exploratory data analysis to find what features of the data seem to play a role in ticket pricing. Two features that seemed to have a high correlation with ticket prices were how many resorts per 100k people and the number of resorts per 100k square miles in the state where the given resort is located.

After our exploratory data analysis, we preprocessed the data and began to train our AI model with it. We tried a few different models with different methods, such as filling in missing values using the mean or the median of the values for the same metric from the other resorts and scaling data so further spread values became closer and potentially easier for the algorithm to handle.

We checked the accuracy of our models with a few metrics, such as the coefficient of determination (R^2, shows how much of the variation in the result can be predicted by the sample data), the mean absolute error (MAE, the difference, on average, from the AI predicted result and the actual result), and mean squared error (MSE, the average squared distance between the AI predicted result and the actual result). We checked the R^2 score for the results of each AI model against the R^2 score for the original data and compared the MAE and MSE for each model.

The two algorithms we tested were linear regression and random forest. We also used cross-fold validation, where the data is split into even groups and the AI is trained on all but one group then tested on the last group, then rotated until each group has been the group left out of training and used for testing.

The final model we decided to use filled in missing values using the median value for their respective features in the data, did not used feature scaling, and used the random forest algorithm. With this model, we were able to determine that Big Mountain resort would realistically be able to raise their prices from the current $81 to $95.87 with an expected MEA of $10.39. While there is a relatively large MEA, it still appears as though there is room for an increase in prices.

Suppose that the $95.87 that the AI estimated is $10.39 above what the actual value should be. This means that the price could go up to $85.48 and still be reasonable. This is $4.48 above what the current prices are. We can expect 350,000 visitors this year, and can reasonably assume that they will each get somewhere around 5 day tickets. If this is true, we can expect to sell 1,750,000 tickets this season. This would be a *massive* increase in profit at $7,840,000 just from ticket sales, which would absolutely cover the costs of the new chair lift.

 you may think this jump in prices sounds like a lot, the number of features we have compared to the other resorts along with our ticket prices suggest that you could absolutely raise prices and it would still be worth paying that much to visit Big Mountain.

A graph of a graph

Description automatically generated with medium confidenceA graph of a vertical drop

Description automatically generatedThe above shows where Big Mountain’s ticket prices lie compared to other resorts. It is on the high end for sure, but still not too far from the middle.

These two histograms show where Big Mountain lies compared to other resorts based on two of the facilities that the AI deemed the most significant when it came to ticket prices. There are several other distributions for some of the important facilities that convey a similar point; Big Mountain has much higher quality facilities than it charges its customers for. Big Mountain’s numbers of important facilities lie much higher on their respective histograms than ticket prices, so ticket prices could very reasonably move up to match these facilities and to help support their costs.

If you’d like to move forward with changes like this, the AI is very versatile and can help you further. It has determined that you could close your least popular run and maintain current ticket prices so you don’t miss out on any revenue. If you’d like to experiment with this AI in the future, it could be given to you and any of your business analysts could experiment with an interactive dashboard to see what changes you may be able to make and how they can be expected to affect business.