Big Mountain Resort in Montana is a ski resort that serves about 350,000 customers per year. They currently base their ticket price ($81) on the average ticket price of resorts in its market segment. There is suspicion that guests would be willing to pay a larger premium on tickets given the amount and quality of facilities offered. The question that was investigated was: **Can we increase profits for Big Mountain Resorts by 15% over the course of the next season by increasing ticket prices to be more in line with the resort offerings relative to other resorts in the market share?**

A raw dataset originally containing 330 resorts and their features including ticket prices was utilized for the analysis and model building. The adult weekend ticket price was chosen as the target feature, with the goal of predicting the appropriate market price for Big Mountain’s tickets based on these market prices. Analysis revealed that aside from some relatively expensive ticket prices in California, Colorado, and Utah, most prices appear to lie in a broad range from around $25 to over $100. The histogram below shows Big Mountain’s current position in the distribution of ticket prices across the country.

A graph of a number of tickets

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Some new features were created to add to the dataset and use in modeling. These included the number of resorts per state area, the number of resorts per capita, several features describing the share of the state total each resort has of certain resources, and the ratios of lifts to total skiable area and number of runs.

Models that were trained and tested included a linear regression model as well as a random forest (RF) model. Missing price values were imputed with the median price. The primary evaluation metrics used for the results of the models were cross-validation (CV) scores of R2 value and mean absolute error (MAE). The CV scores for the linear regression model, after limiting the model to the 8 highest importance features, were R2 = 0.68 and MAE = $11.80. The CV scores for the RF model (with 69 estimators) were R2 = 0.71 and MAE = $9.60. The RF model overall gave the best predictions (highest R2 and lowest MAE) therefore it was chosen as the winning model. The model predicts that the market can support raising Big Mountain’s ticket price to from $81.00 to $95.87.

A graph of a number of runs

AI-generated content may be incorrect.A graph of snow making

AI-generated content may be incorrect.A graph with numbers and lines

AI-generated content may be incorrect.The top four highest importance features for predicting ticket price are the number of fast quad chair lifts, area of the resort covered by snow makers, total vertical drop, and total number of runs. As can be seen from the distributions below, Big Mountain lies well above the average for all these categories, leading to the high predicted/suggested ticket price.

A graph of a vertical drop

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With the projected number of customers for the season, and an average of five tickets per customer, the cost of the new chair lift which was recently installed, is covered by an increase in ticket price of $0.88. The model suggests that adding another run with increased vertical drop and adding another chair lift to support it allows for an increase in ticket price by $1.99. We have limited data on the operational costs or overhead of adding these additional features, however given the fact that the cost of the newest chair lift addition is covered by a relatively small increase in ticket price, it may be a worthwhile return on investment to make this change.

The data set lacks any information on past sales data, i.e. the number of tickets sold per season. Other missing information that may be useful would be operational and maintenance costs for snow making machines and chair lifts. When compared holistically to other resorts in the country, Big Mountain's facilities lie in the upper end of what is offered across the country, and the model suggests that this supports a higher ticket price than is currently being charged. This information should be shared with business executives who must make a judgement whether a somewhat lower price relative to the resort offerings is the desired business strategy, or if an increase in ticket price is warranted. If found to be generally useful, the predictive model should be packaged and deployed in a user-friendly interface or app which can be used by a less technical audience to make further predictions.