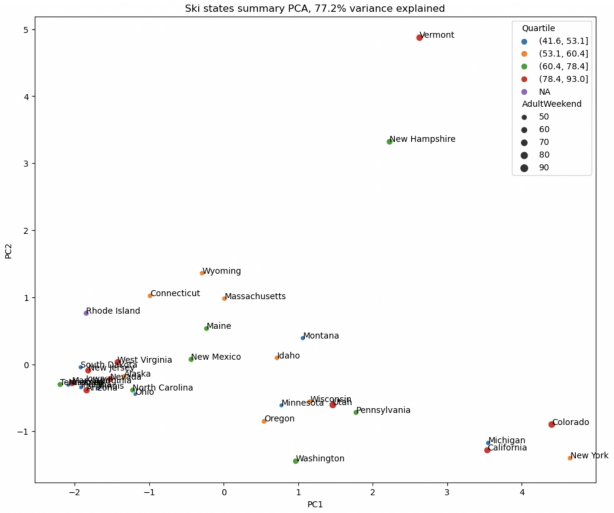
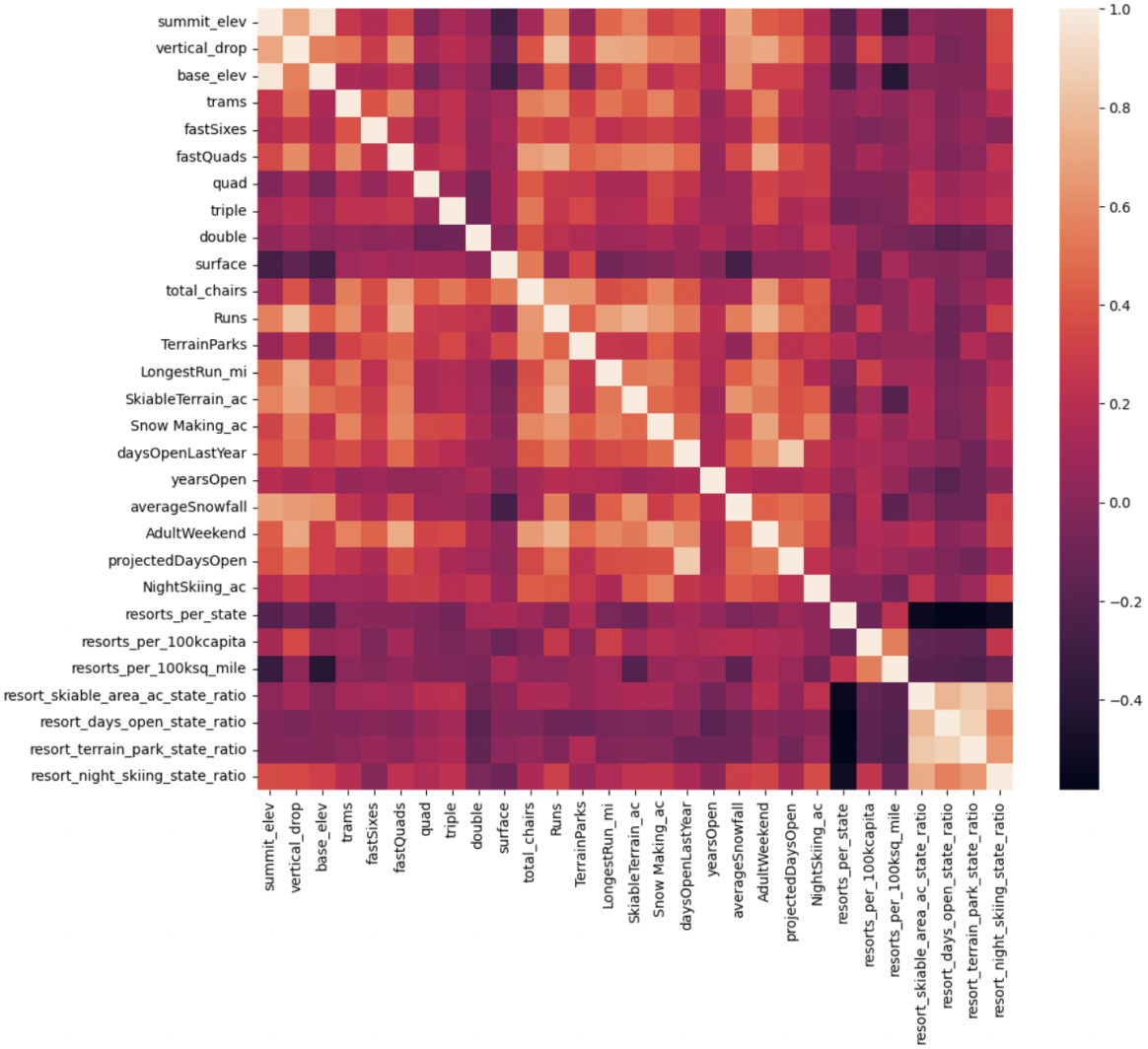
Big Mountain Resort in Montana has 105 trails and an annual visitor attendance of about 350,000 who come to ski or snowboard. An additional chairlift was installed at the resort recently which increased their operational costs by $1.54M. To accommodate this change, the business leaders of Big Mountain Resort want guidance on how to select an appropriate ticket price for its visitors, and also what the impact of a number of operational changes will be on the value of the visitor ticket price. Big Mountain Resort needs an investment strategy to use to increase its visitor ticket price beyond the 7.3% premium on top of the average price set by resorts in its market segment to recoup at least the additional operational cost of the new chairlift over the next year. Further, they need to know what cost cutting measures Big Mountain Resort can take without changing the perceived value of the ticket.

The data provided to me by the BMR business leaders described various features of ski resorts within the market share that BMR belongs to. In wrangling this data, it was revealed that 14% of resorts were missing both weekday and weekend visitor ticket prices, so those were removed from the dataframe. The remaining resorts contained between 0 and 20% missing data values. When comparing weekday and weekend visitor ticket price data of the remaining resorts, the data frame revealed that more resorts were missing weekday price values than weekend price values, so the weekday series was dropped. To assist with the predictive model, additional data on historical, population, and geographic values per state was imported from wikipedia.org and merged with our data frame to provide more insight on each resort. At the end of the data wrangling, the volume of resorts in our data frame decreased from 330 to 277.

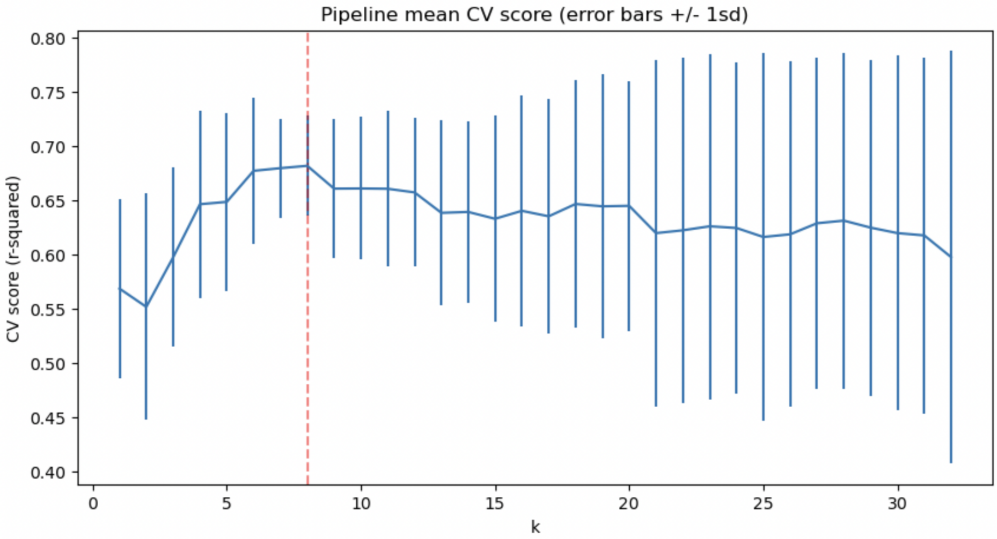
In continuing our investigation of the state/resort differentiation, we scaled the data and fit the PCA transformation. Then we constructed a scatterplot using the average ticket price per state data and the first two components of our PCA. Resorts in Montana are shown to be 1 standard deviation from the mean.



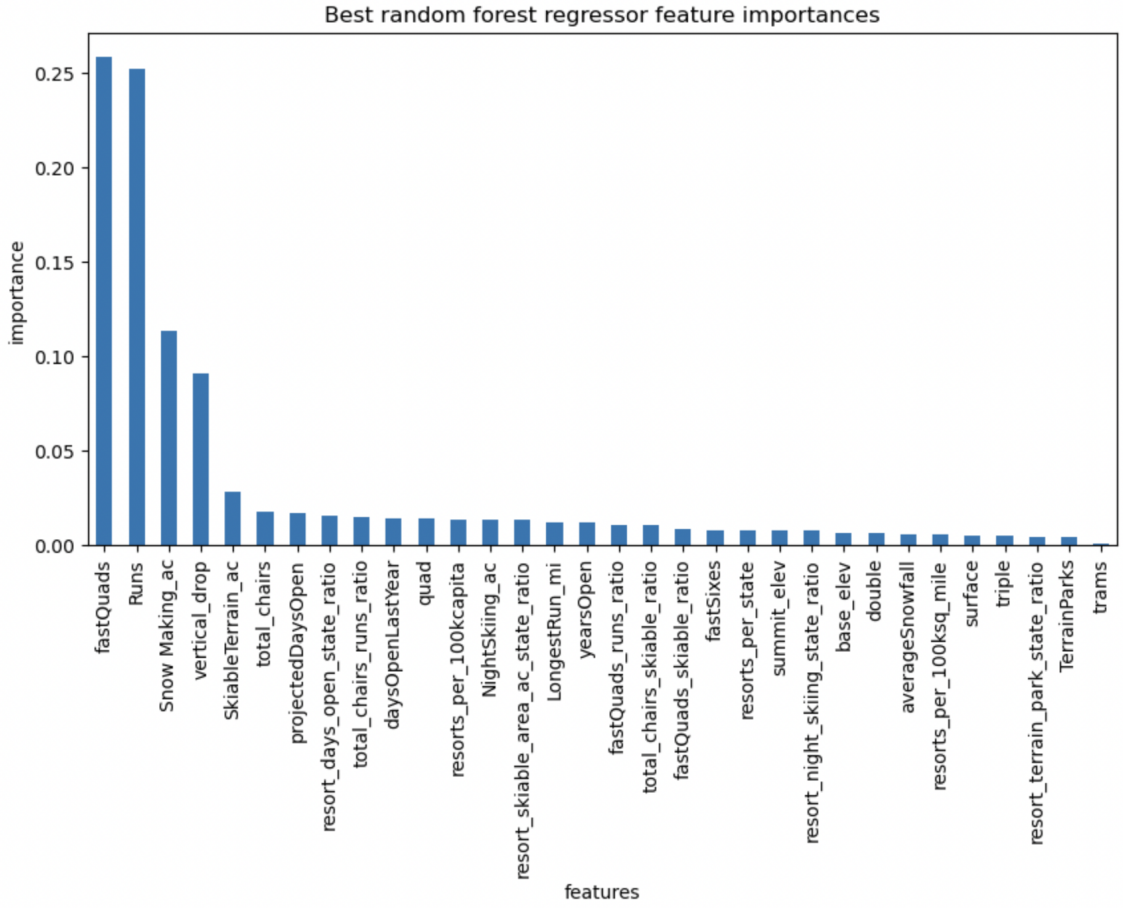
To investigate relationships between features for our predictive model, we used a heat map. We also added four additional rates of features that includes ratio of resort skiable area to total state skiable area, ratio of resort days open to total state days open, ratio of resort terrain park count to total state terrain park count, and ratio of resort night skiing area to total state night skiing area. The heat map revealed that summit and base elevation are highly correlated, but both are also negatively correlated to number of resorts per state. There seemed to be some positive correlation between the ratio of night skiing area with the number of resorts per capita. Adult weekend ticket price has reasonable correlations to fast quads, runs, total chairs and snowmaking equipment. Of the new rates of features, the ratio of resort night skiing area to total state night skiing area had the strongest correlation to weekend ticket price.



To assess the performance of predicting a ticket price using the average price of a ticket over the entire market segment, a linear regression model was constructed. I used a 70/30 train/test split of the data. In assessing the model performance, we determined there is over 80% of the variance on the train set and over 70% on the test set. We determined that we could expect this model to estimate a ticket price within around $9 of the real price, an improvement over guessing using the average ticket price. Cross-validation of this model revealed that it was significantly varying, and best_params applied indicated 8 features total.



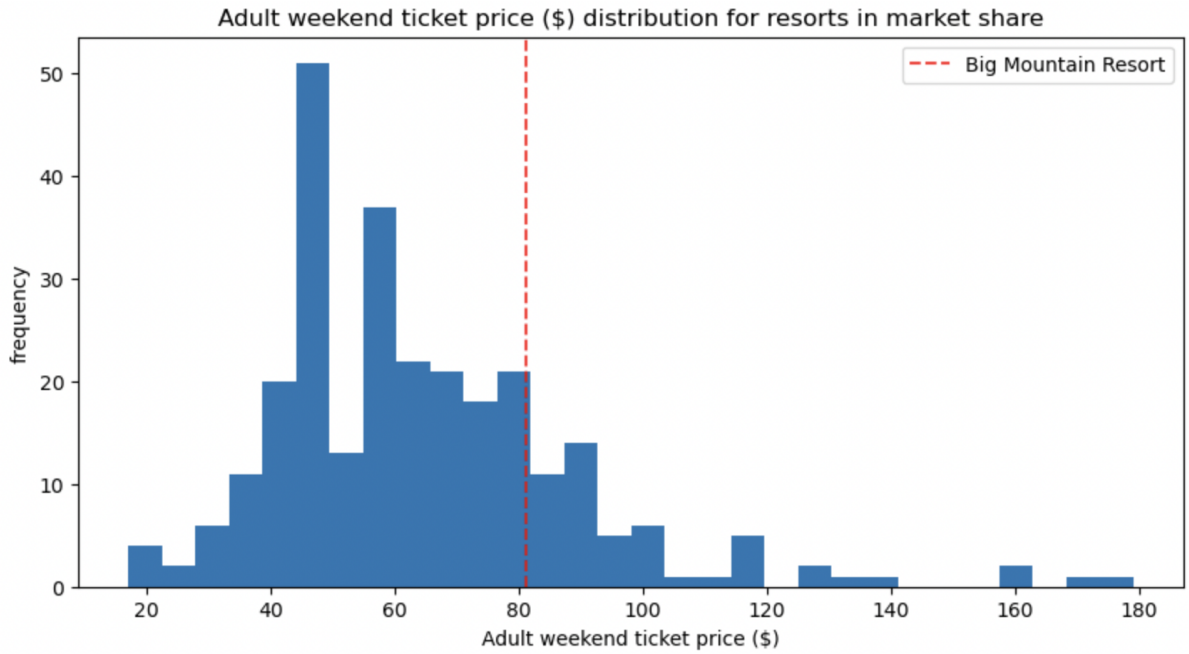
Random forest regressor model was also tried with reset parameters and iterated over again. This new model shared the following dominant features with the one previously described: fastQuads, Runs, Snow Making_ac, and vertical_drop.



It also had a cross-validation mean absolute error of around $1 less than the linear regression model and it contained less variability too. Moving forward, the random forest model will be used to predict the ticket price for Big Mountain Resort. Cross-validation of the data set volume

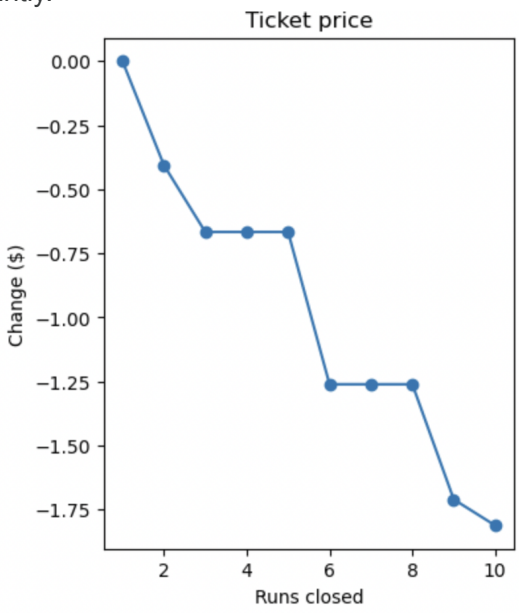
indicated there is enough to make a good prediction of ticket price.

An adult weekend ticket at Big Mountain is currently priced at $81.



Our model suggests that a $1.99 ticket price increase in conjunction with adding a run 150 feet lower down and installing a new chair will lead to an annual revenue increase of $3.75m given that a visitor skis 5 days and 350,000 visitors are projected for the following season. The model does not account for additional operating costs on top of existing overhead to run the resort since the data set was lacking this information. We can assume the additional chairlift will increase operating costs

by $1.45m. Our model also indicated that closing one chair would not impact the ticket price, but two or more would devalue it significantly.



Adding a small amount of snowmaking acreage also had little to no impact on ticket price. Removing a small amount of snowmaking acreage also did not impact the ticket price. I would recommend investigating how much acreage could be removed without reducing the ticket price. The resort might begin this test by closing off a run supported by snowmaking machines that has low skiier usage.

The model suggests a new ticket price of $83, and maybe a higher price when paired with new business investments. Big Mountain resort contains amenities and features that put it in the high-end part of the market segment, and it has a competitively valued ticket price. Upgrading the facilities at Big Mountain Resort to return a higher price while attracting more visitors would offer a higher value within its market segment. To improve the model, operating cost for each of the resort's features should be considered. To address these operational changes, the executives could invite business experts to try the model out and provide feedback. To make this model available for business analysts, it could be packaged into a dashboard accessible within the resort's network.