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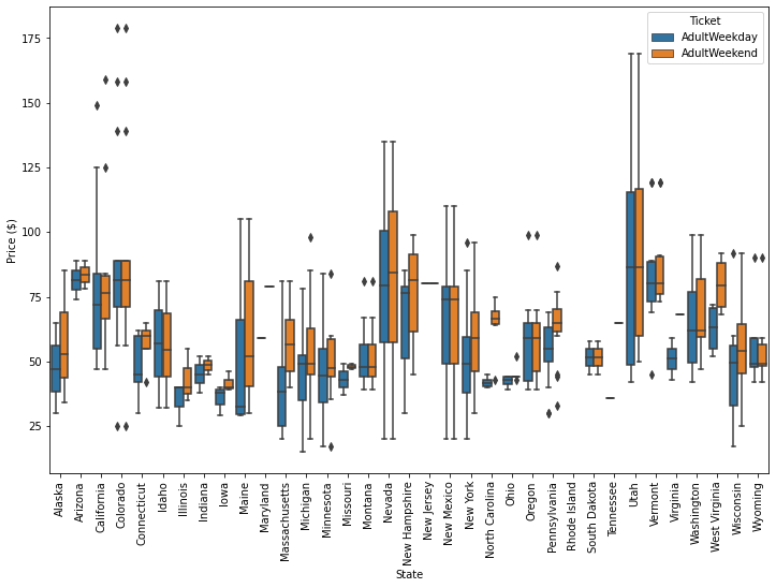
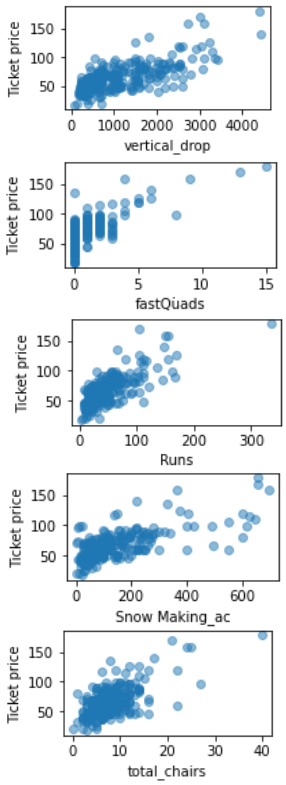
Capstone Project 1: Summary

Our client, The Big Mountain Resort, located in the state of Montana, recently requested my team's help adjusting and/or verifying the legitimacy of their ticket pricing based on the facilities and resources the resort offers its customers. The company had been relying on a marketing-focused ticket-pricing strategy, and decided to charge a "premium" cost to appear more desirable and at the top of the rankings among other resorts, however, this inhibits a proper investment strategy, as these claims are not backed up by the quality of the facilities. In order to provide the client with a more sound, data-driven business strategy, my team and I must come up with an accurate ticket pricing model based on other resorts found both nationwide and statewide and determine where the client falls within the market pricing distribution. This data will then be presented to the client and used to provide suggestions towards Big Mountain's ticket pricing and facility-based investment strategies.

To begin, our client provided our team with information about the resort and the facilities that may be of interest to us when making comparisons. Our baseline data was provided by our database manager in the form of a CSV file. This included the data on 330 ski resorts in the United States, and 27 features of the resorts to compare against the Big Mountain Resort. The first steps were to gather, clean, and transpose the data so that we may begin to make comparisons and visualizations. We first wanted to know how much each resort charged for their adult tickets, and the best way to visualize this was using a bar-and-whisker plot to show the price variations per state (pictured right). We can see from this graph that the ticket pricing varies greatly from state-to-state, so the next logical step was to observe the presence and potential influence of each resort's facilities to determine if they reflect the ticket prices. Another important piece of data to investigate was the average population of each state and if a more dense population by state was a determining factor on pricing. Predicting the ticket pricing of the resorts, and thus for Big Mountain, is the next major step. The main factors that we first explored that may have an impact on resort popularity and furthermore how much the resort can get away with charging for tickets. Note that the particular ticket prices we are observing are Adult Weekend ticket prices because the prices between itself



and the Adult Weekday tickets are identical in Montana, have fewer missing values, and skew higher among most other states, as you can see in the figure above. After observing the main components of the resort data, we determined that the main factors to explore that could have potential to influence ticket prices are: total state area (sq mi), total state population, resorts per state, total skiable area, and total days open. These led us to form our two main ratio components: resorts_per_100kcapita and resorts_per_100ksq_mile, and used principal component analysis (PCA) to observe the relationship between the two. One of the main reasons this comparison is of interest to us is because while Montana may have the third largest total state area, it is ranked much lower on the list of total state population, thus the state is less densely populated. Through the same scope, we can use scatter plots to observe any positive correlations between ticket prices and other features the resorts offer to determine if any features influence ticket sales. The five features with the most distinct positive correlations include: vertical_drop (vertical change in elevation from highest lift drop point to base), fastQuads (number of fast four person chairs), Runs (number of runs in the resort), SnowMaking_ac (total area covered by snow making machines), and total_chairs (sum of all the chairlifts at the resort). These trends can be seen on the right.



Next, we began processing our data analyses by separating the ski data of the Big Mountain Resort and using the other resort's models that are generated to predict our own resort's figures. We ran a test/train split and, after imputing any missing values, used the predicted model to create two separate models: the linear regression model and the random forest regression model. These two models verified the features with the highest "importance" in determining ticket price were the same as the original five features mentioned, excluding total_chairs. The random forest regressor proved to be the more reliable model, so we used this model to further examine the four features and the saved individual data of the Big Mountain Resort. The current ticket price is $81.00, and while this value is above the national market average and the highest ticket price in the state of Montana, there is still room to increase the price so that it may match the market standard based on the facilities offered and the attractiveness of these facilities to customers. The modeled ticket price is $95.87, so the business managers of the resort can use that honest, data-driven value to determine how much more they wish to charge per ticket.

The client also requires our help formulating a development plan to improve facilities in order to support this higher ticket price. Our team came up with four scenarios, and decided on the scenario with the most favorable results. We have concluded that the best business model for our client's ticket pricing comes from our second scenario: Increase the highest vertical drop by adding 150 feet at the bottom of the run, requiring the installation of a new chair lift. This scenario supports a ticket price increase by $1.99, and is the most favorable option for the resort as it supports minimal improvements for a greater payoff.