Guided Capstone Project Report:
2021 Data Analysis for Facility Capitalization

To: Big Mountain Resort
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Big Mountain Resort (BMR) is visited by 350,000 skiing/snowboarding customers annually. This year, having recently installed a new lift to improve visitor distribution, BMR saw increases in their operating cost by $1.54M this season. Already pricing higher than average, management seeked to optimize the pricing in order to draw the most visitors, instead of curving towards the average. In our analysis, data regarding ski resorts and their ticket prices were used to build models and test out different scenarios. The best case scenario indicated that an increase in vertical drop would support a higher ticket value for Big Mountain Resort.

Data sources of BMR and other resorts' in addition to the US state and population databases were wrangled and trained towards discovering strategies that best capitalize BMR's facilities. The original csv from client contained 330 entries and 27 columns (330 x 27), including details from Big Mountain Resort, and ended with a manageable version (277, 25). In this phase, relevant state and population data were acquired from public sources to be fitted and analyzed together with the manageable version dataset. Features were identified/refined through features correlations heatmap, and scatterplots of numeric features against ticket price (see figure 1 and 2). Having our variables and target features, a baseline model was first constructed. Using the average pricing of all the resorts, the baseline model tested a 70/30 split of the data, resulting with metrics; R square = -0.03, Mean Absolute Error = 19.13, and Mean Squared Error = 581.43. In comparison, the linear regression model and random forest model created had a significant reduced mae. The random forest regression model showed a slightly lowered cross-validation mae by $1 compared to the linear regression, and less variability.

The random forest model was refitted onto the data as a whole, and 4 scenarios were tested. In the first scenario, we tested how the ticket price would be effected if we closed down up to 10 runs. Results (see fig 3) show that closing 1 run makes no difference to ticket price nor revenue, however 2-3 will cause a drop. between 4 to 5 runs there is no effect. After 6 there will be a larger drop. In the second scenario, we tested what would happen if we increased the vertical drop by adding a run to a point 150 feet lower down but requiring the installation of an additional chair lift to bring skiers

back up, without additional snow making coverage Results show that by adding a run to increase the vertical drop, model supports an increase to ticket prices by $8.61. In the third scenario, we tested similarly to scenario 2, the extending of the vertical drop, however instead, 2 acres of snow making was added. Results indicated that the addition of 2 acres of snow making increased the ticket price to $9.90, and seems insignificant. Lastly, we tested the scenarios for increasing the longest run by 0.2 miles, which results showed it made no difference.

Deficiencies, or areas we could improve upon would be operating costs, such as snow making, cost of operating other types of lifts, or other resort's operating costs. The model price being higher than the already high price level compared to local resorts could be a result of being near the top in all of the key features, where BMR competitors were not. I believe business executives at Big Mountain suspected that they were undervaluing their facilities, and thus needed data based confirmation.

Fig 1) Feature Correlation Heatmap

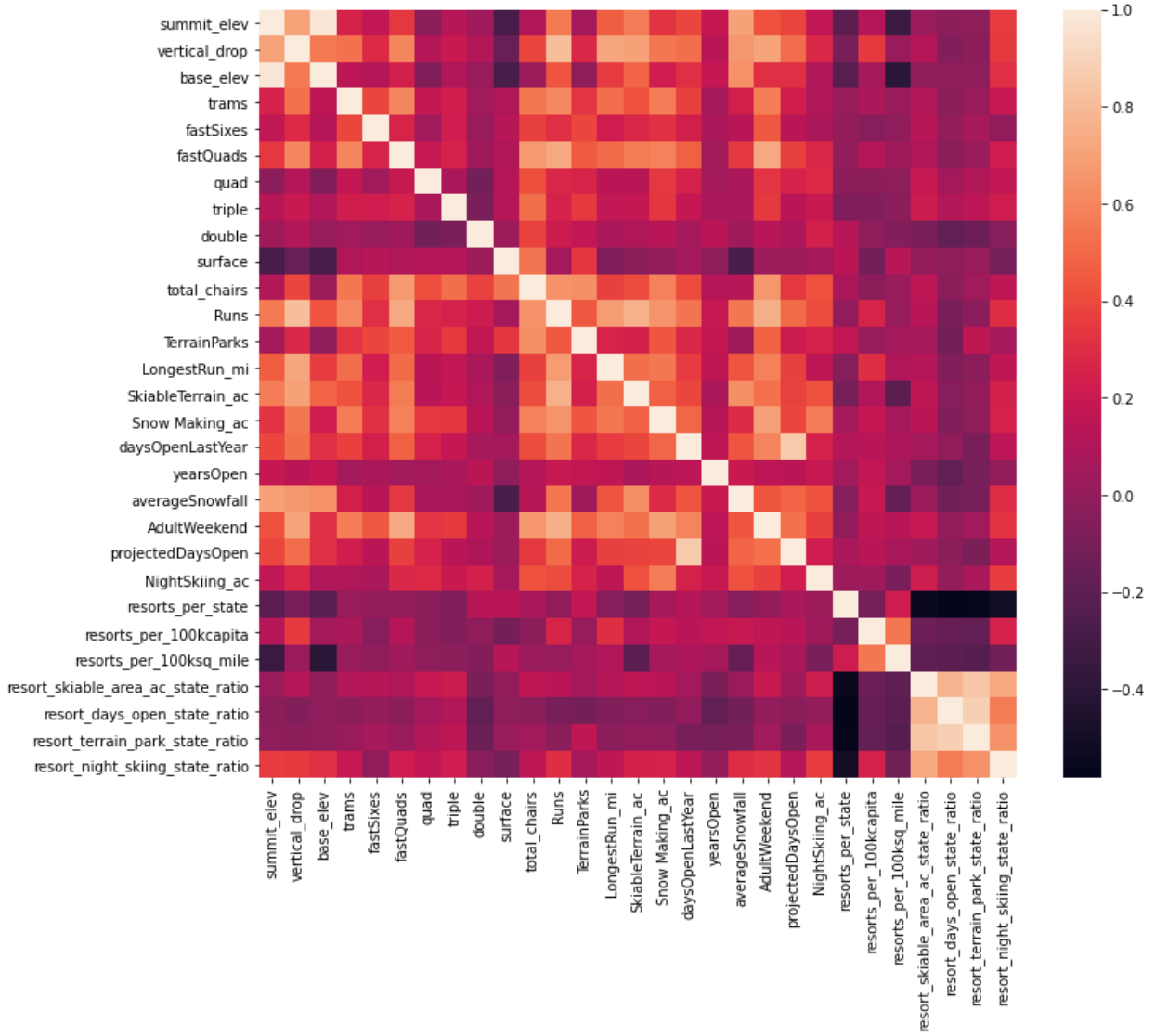

Fig 2) Scatterplots of Numeric Features Against Ticket Price

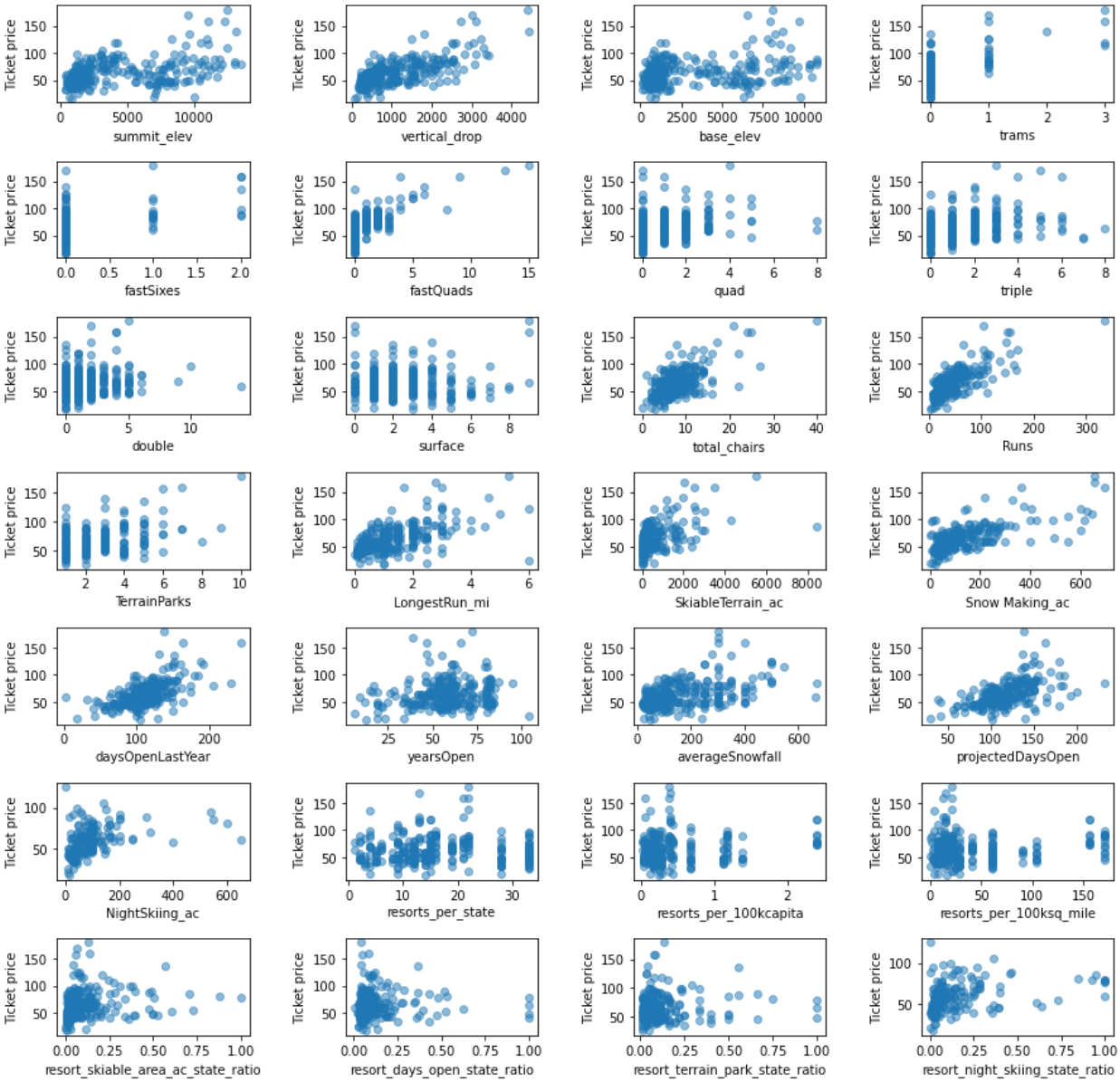

Fig 3) Ticket Price Change Due to Runs Closed