Springboard: Data Science Guided Capstone Project

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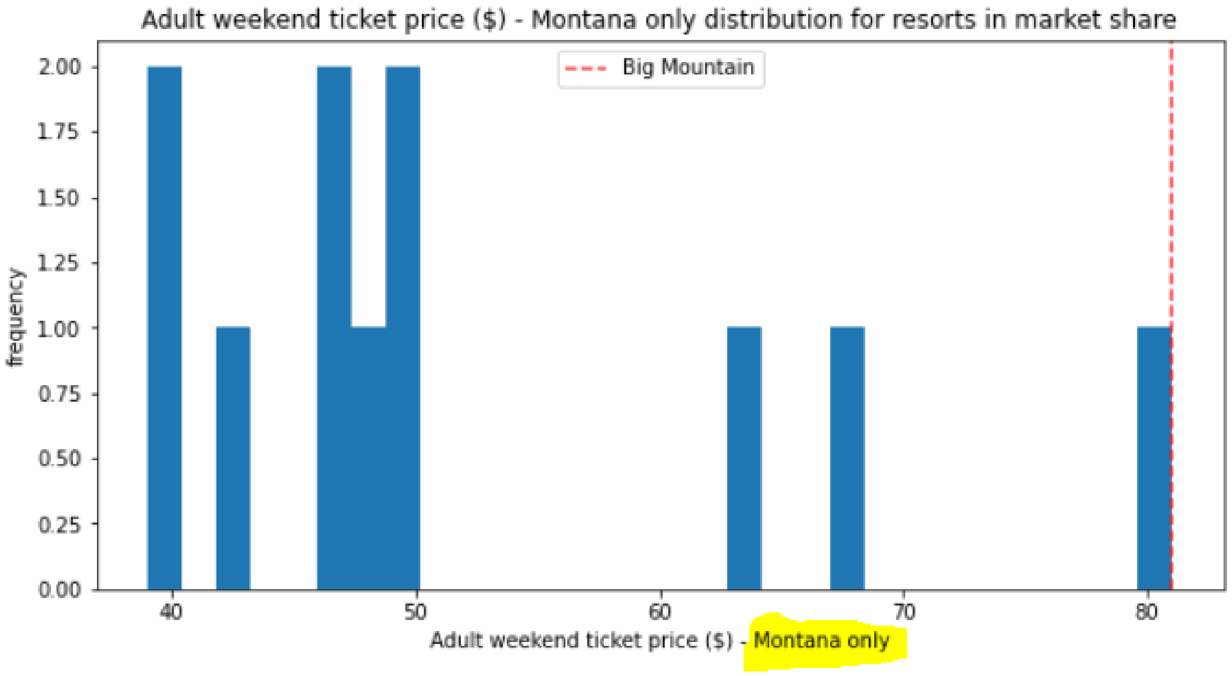
Introduction

Big Mountain Resort is a ski resort in Montana

- It offers unique views of Glacier National Park and Flathead National Forest
- The current pricing strategy assumes a premium above the average price for regional alternatives



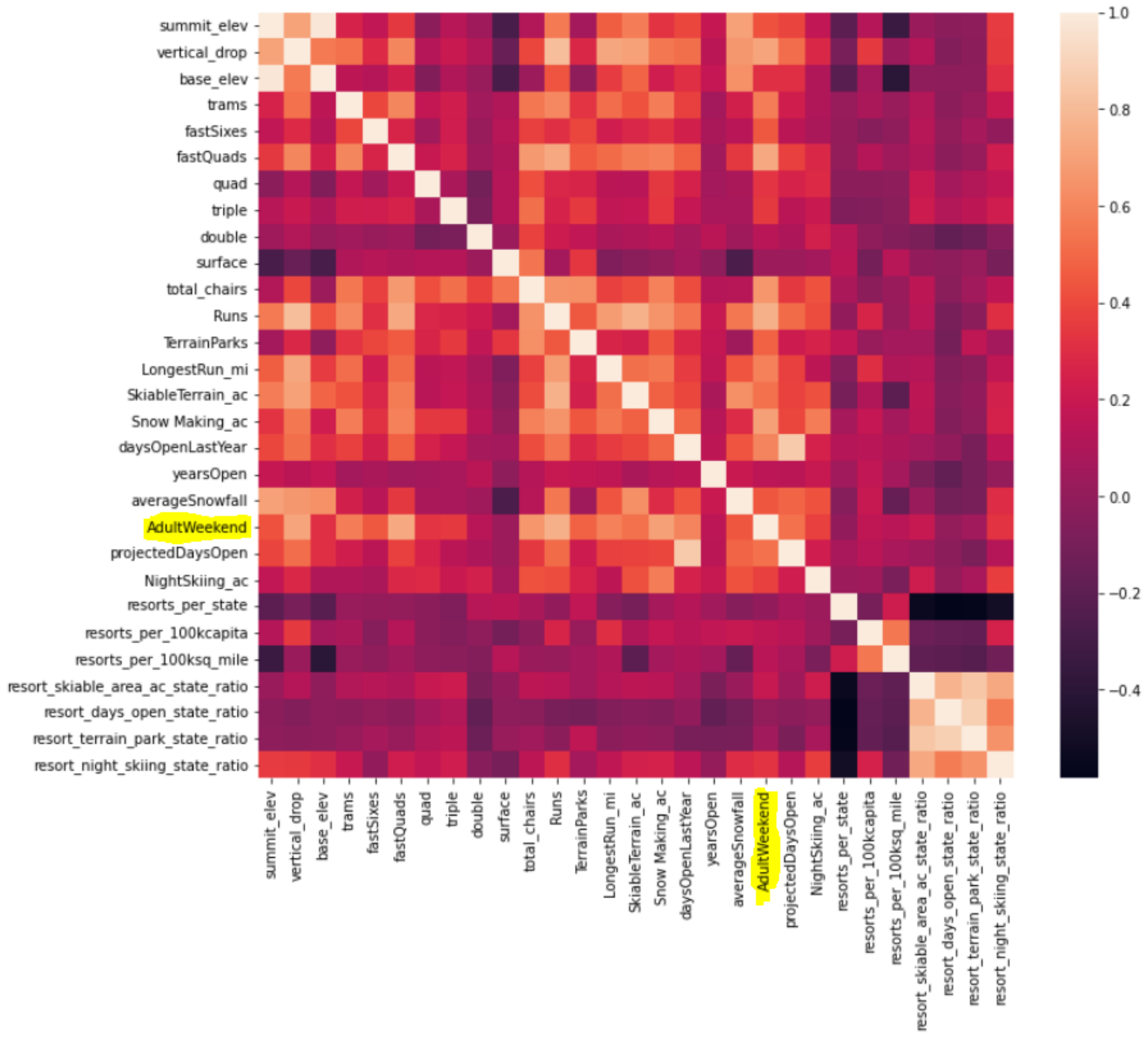
Problem Identification

Big Mountain Resort has committed to adding a new chair, with additional operational costs of $1,540,000

- We must find an increased ticket price to cover the additional operational costs of the new chair
- Management would also like revenue-saving insight into closing down the ten least-used runs
- Attendance is expected to be 350,000 guests for the upcoming season

Modeling and Analysis Findings

- Initial correlation analysis for AdultWeekend = Ticket Price
- Vertical Drop, Fast Quads, Total Chairs, Runs, and Snow Making Accrued were strongly correlated with AdultWeekend
- Resort Night Skiing State ratio was a calculated feature* that was also strongly correlated with AdultWeekend



* [resort night skiing accrued / state total night skiing accrued]

Modeling and Analysis Findings

- Used both linear regression (lr) and random forest (rf) models along with cross-validation scores
- rf std vs. lr std = 1.35 < 1.62, meaning random forest has less variability
- rf mae vs. lr mae = 9.53 < 11.79, meaning the random forest is more accurate (less error)

```
lr_mae_mean = np.mean(-1 * lr_neg_mae['test_score'])
lr_mae_std = np.std(-1 * lr_neg_mae['test_score'])
lr_mae_mean, lr_mae_std
```

```
(10.499032338015295, 1.6220608976799666)
```

```
mean_absolute_error(y_test, lr_grid_cv.best_estimator_.predict(X_test))
```

```
11.793465668669324
```

```
rf_neg_mae = cross_validate(rf_grid_cv.best_estimator_, X_train, y_train,
                            scoring='neg_mean_absolute_error', cv=5, n_jobs=-1)
```

```
rf_mae_mean = np.mean(-1 * rf_neg_mae['test_score'])
rf_mae_std = np.std(-1 * rf_neg_mae['test_score'])
rf_mae_mean, rf_mae_std
```

```
(9.644639167595688, 1.3528565172191818)
```

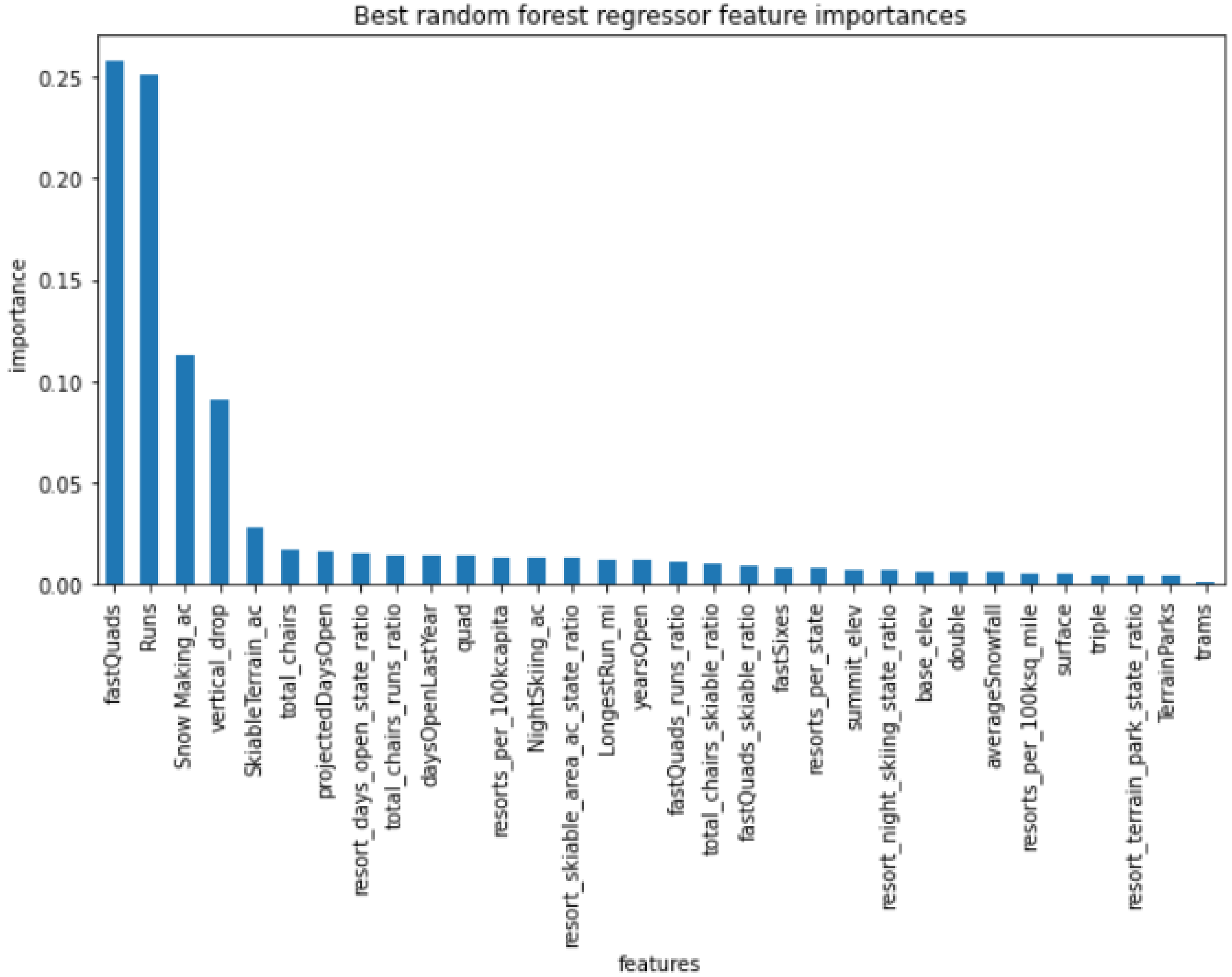
```
mean_absolute_error(y_test, rf_grid_cv.best_estimator_.predict(X_test))
```

```
9.537730050637332
```

Modeling and Analysis Findings

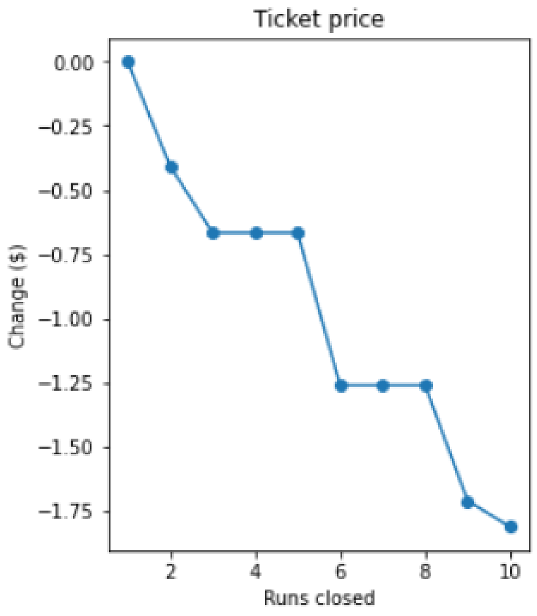
- Fast Quads, Runs, Snow Making Accrued, Vertical Drop, Skiable Terrain Accrued, and Total Chairs were the top features in the Random Forest model analysis
- All consistent with the correlation coefficients from the linear regression model output, except for Skiable Terrain Acccrued. Which had the greatest negative coefficient (inverse relationship) value

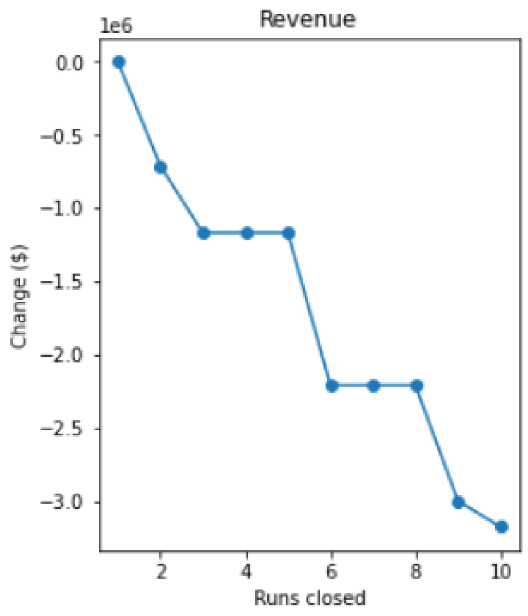
```
vertical_drop        10.767857
Snow Making_ac        6.290074
total_chairs          5.794156
fastQuads             5.745626
Runs                  5.370555
LongestRun_mi         0.181814
trams                -4.142024
SkiableTerrain_ac    -5.249780
dtype: float64
```



Modeling and Analysis Findings

- The slope of the relationship for the resort closing the ten least used runs proved to be negative (descending) for both Ticket Price and Revenue change
- Closing one run made no difference
- However, closing down all ten runs could decrease the potential ticket price increase by $1.75





Recommendation:

Add a run and increase the vertical drop by 150 feet. Don't close any of the ten least used runs.

- Assuming no changes to fast quads (new operating costs) or skiable terrain accrued
- Using the Random Forest model to test changes in other top features and output a predicted ticket price increase
- The optimal scenario was adding one run, increasing the vertical drop by 150 feet, and installing an additional chair lift (already committed). This scenario outputs a ticket price increase of $1.99

Summary and Conclusion

While **Big Mountain Resort** has a premium resort price in the State of Montana, it does possess premium facility offerings and only a middle-tier resort price compared to its overall peers in the market

The resort should look further into its night skiing offerings and think about taking on the additional operational costs for adding new fast quads.