# Problem Identification

**Background :** Big mountain resort recently invested $1.54 million on a new ski lift to increase customer satisfaction. It has been a concern that big mountain is underutilizing its facility.

**Problem :** How can big mountain Resort capitalize on operation efficiency by adjusting their ticket price?

# Recommendations & Key Findings

After modelling our data, we found that Big Mountains “modelled ticket price” comes in at $95.87, **an increase of $14.87 from the current ticket price.**

The addition of a new run & chair lift with an increased vertical drop of 150 ft **supports a $2 ticket price increase** independent from our model price, which will bring in an additional $3.5 million dollars per year, assuming 350,000 guests per season.

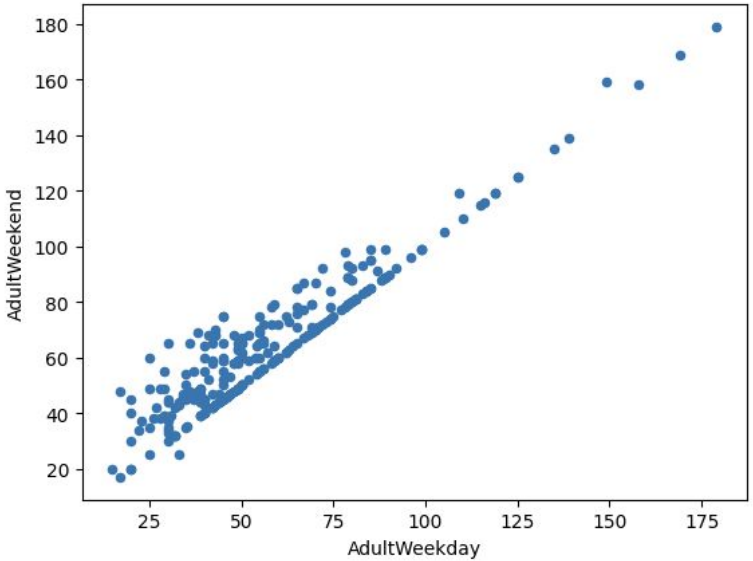
**We recommend a slight increase of $5-7 per ticket, which will be able to generate an additional $7.5-11 million per year, assuming 350,000 guests per season.**

Outside of this, we also recommend closing down some less popular runs, as this will decrease operation costs, while having no impact on ticket price. Closing 4-5 runs would be ideal for reduced spending while still being able to charge a premium for ticket prices.

# Data Wrangling

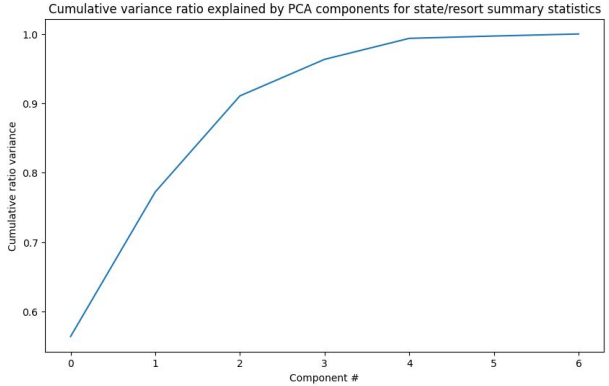
First, we replaced missing or incorrect values in the dataset, and cleaned the data up prior to exploring the features.

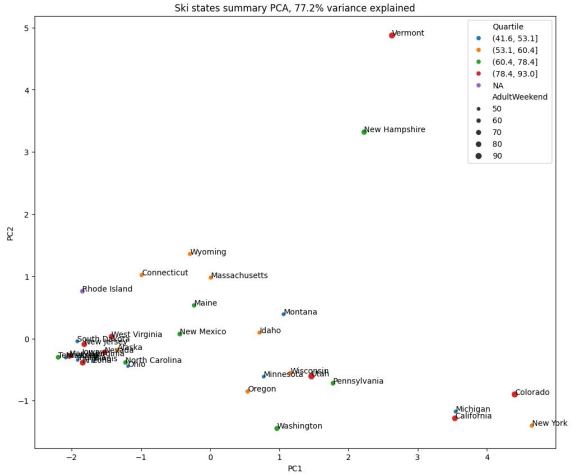
We identified ticket price for weekday vs weekend was very close for resorts charging less than $100 a ticket, so our model was built using the weekend ticket prices.



# Exploratory Data Analysis

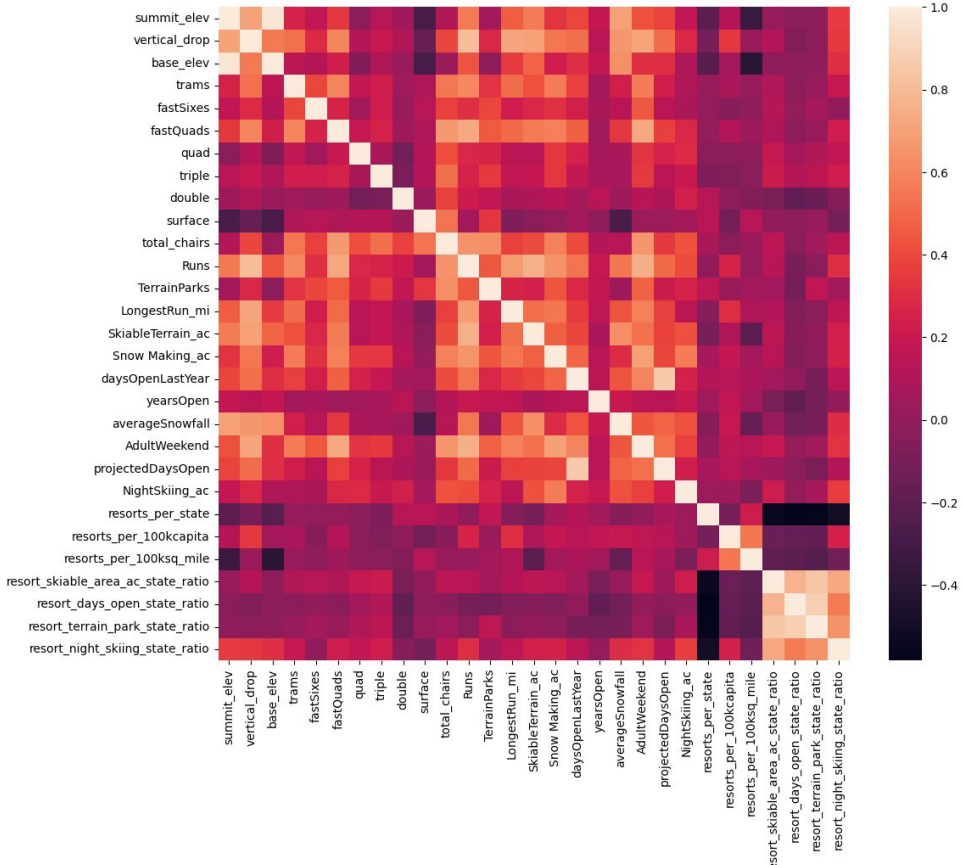
After exploring the data, we found that over 75% of the variance in our dataset comes from the first 2 components, and over 95% for the first 4.




With this information, we created a PCA plot to help us understand the relationship between our data and the 2 components that explain 77.2% of the variance in our dataset. New hampshire and Vermont, can be considered outliers in our example.

# Exploratory Data Analysis




Correlation heatmap used to identify the most important features per resort that have an impact on ticket price.

The most important features in the dataset were found to be:

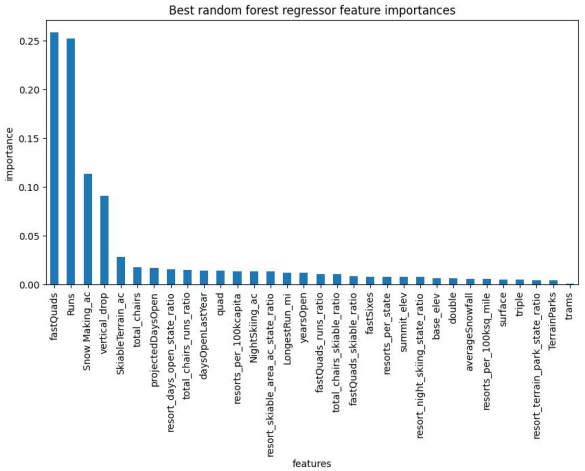
- *fastQuads*
- *Runs*
- *Snow Making*
- *Night skiing ratio per state*
- *Runs*
- *Total chairs*

# Modelling Results & Analysis

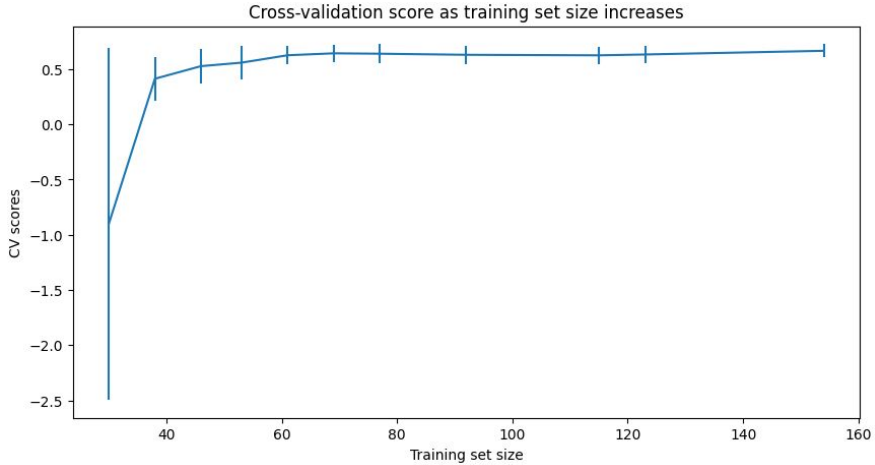
***To create a model, we went with the suggested 70:30 train:test split ratio.***

Our best model identified was a Random Forest Model, which achieved the following on our data set:

- Use of 69 estimators for the RF model pipeline
- Imputation of the median for missing values
- No data scaling




Feature importance determined by our random forest model




CV score shown to level off around 40-50 datapoints, suggesting our model is sufficient.

# Modelling Results & Analysis

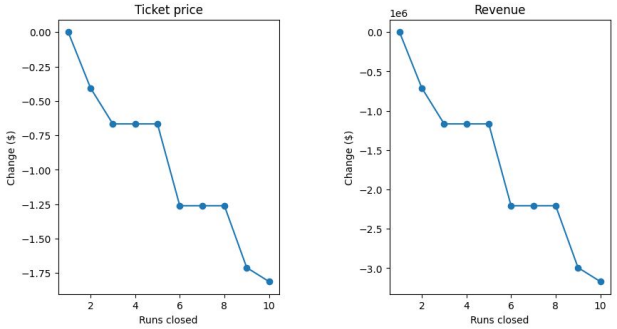
Once our model was defined, we calculated the expected price ticket for Big Mountain resort, and determined that $95.87 is a fair price for our weekend ticket, based on our current features. From here, we simulated different scenarios for Big Mountain Resorts next moves:

1. Closing up to 10 of the least used runs → **closing 1 run makes no difference, closing 2-5 has a slight negative effect, closing 6 or more leads to larger drops in ticket price.** ***(see graph below)***

2. Adding a run, increasing the vertical drop by 150 ft, and an additional chair lift → **supports ticket price increase by $2**

3. **Increasing snow making while adding this new run with an increased vertical drop has no impact to ticket price, so it doesn't seem to be necessary.**

4. **Increasing the length of our longest run by .2 miles and adding 4 acres of snow making capabilities has no effect on ticket price, so this change is not necessary.**



# Conclusion

Here, we identified the key features that have the greatest impact on ticket price, and modelled Big Mountain resort to give us insight on what Big Mountain *could* be charging for their resort tickets.

**A $5-7 ticket price increase seems safe and reasonable when comparing this new price ($86-88) to our modelled price ($95.87)**

**This will bring in an additional $7.5-11 million dollars per season.**

**We also recommend closing between 2-6 runs, which will have minimal impact on ticket price going forward, and will save money in operations at Big Mountain Resort.**

Future work includes further optimization of our model and implementation of more features, to increase confidence in our model.