Research on Factors that affect ski resort pricing

IS 507 Final Executive Summary

Xinyuan Chen(xc44@illinois.edu), Yizhan Xue (netID: yizhanx2@illinois.edu)

After the Winter Olympics held successfully in 2022, the ski become a more famous sport and attracted a large number of tourists for ski entertainment. As of 2019, there are 6114 ski resorts worldwide while 470 ski resorts operated in the United States to the statistic by Lange, D. (2020). Analysis of resort data from thousands of ski resorts will have commercial value by providing meaningful advice for customers and resort managers. We have collected data on the metrics of major ski resorts around the world, including weather, ski resort infrastructure, prices, and opening hours. The dataset used for the study includes 19 variables (or indicators) of 512 ski resorts worldwide, the description of the dataset is shown in the table1. The most important variable is the Day Pass Price for Adults (we will call it DayPrice below), which is what our four research questions focus on. Our research focuses on the following questions: How to help tourists choose the most cost-effective ski resorts? What factors decide whether a ski resort is an expensive or an economic ski resort? What factors do the ski resort managers design their pricing strategy based on? Aside from pricing, what factors should investors be most aware of when managing a ski resort?

To solve these questions, statistics and analysis for prices can be divided into two main types of questions, regression, and classification. Regression is a statistical approach used to describe the simultaneous associations of several variables with one continuous outcome, while classification refers to predicting the values of a finite set of a nominal variables based on a set of independent variables, each value of the nominal variable is a class. Returning to our question, the regression problem can be used to address our third research question: A ski resort manager can use the model in our research to predict a reasonable DayPrice for his ski resort based on ski resort metrics or determine whether the current pricing strategy of the ski resort is reasonable. The classification problem can be as specific as classifying ski resorts into two categories based on DayPrice, economic or expensive, and determining the classification boundaries based on other indicators of the ski resort so that we can know which indicator increases or decreases can determine whether a ski resort is economic or expensive. It can help to solve our first and second questions. Customers can also determine if the price positioning of a new ski resort matches the price it gives based on this classification model.

Specifically, the methods that the researchers used are the Multiple Linear Regression (MLR), the Principal Component Analysis (PCA), and the Logistic Regression (LR). The experiment built an MLR model for regression and an LR model for classification, both models use DayPrice as the target value. The difference is before training the LR model, DayPrice was changed to nominal variable e 0 and 1, the classification criterion is the median DayPrice in the dataset. The performance of the regression model we built is not ideal but still has an acceptable performance. This model predicts the DayPrice of a ski resort as a reference based on the visible metrics of that ski resort. The correlations (To describe the relationship between one variable with another, the value close to 1 means a high positive correlation) of how elements affect DayPrice are shown in figure 1. The performance of the classification model reaches a very high level, and users can use the classification model we built to determine whether a ski resort is economical or expensive at a high accuracy rate. The ROC value (shown in table 2) is a direct indicator of model performance. The ROC value close to 1.0 shows our model is reliable.

There are still limitations to our research, such as the fact that the pricing strategy of a ski resort does not only come from its inherent facilities and the natural environment of the ski area. The customers of a ski resort and their evaluation of that ski resort also profoundly affect the price of a ski resort. When ski resorts set their prices, and when users judge whether a ski resort's prices are affordable or not, regular customer reviews should also be added as an indicator in the classification or regression model, just like the research of the article by Ormiston, D. et al. (1998). We can identify potential indicators and use the questionnaire to get responses from skiers about the satisfaction level of these indicators. After collecting users' feedback on ski resorts, we can further use clustering algorithms to cluster users into several categories and analyze different categories of users separately to improve ski resort facilities to meet users' needs.

In conclusion, we collected data on a variety of ski resort metrics and used statistical methods to initially process these data and use them to build our price-based multiple linear regression and logistic regression classification, models. The data is partially displayed in Table 3. The models we built all achieved usable performance. Users can use the models to determine whether ski area DayPrice are reasonable, and ski area managers can use the models to modify pricing strategies and discover the ski area metrics that most affect their pricing strategies. Our research is commercially valuable in practical applications.

Reference

Lange, D. (2020, November 25). *Number of ski resorts United States 1990-2020*. Statista. Retrieved May 12, 2022, from https://www.statista.com/statistics/206534/number-of-ski-resorts-operating-in-the-us-since-1990/

Ormiston, D., Gilbert, A., & Manning, R. E. (1998). *Indicators and standards of quality for ski resort management*. *Journal of travel research*, *36*(3), 35-41.

Appendix: Tables and Figures

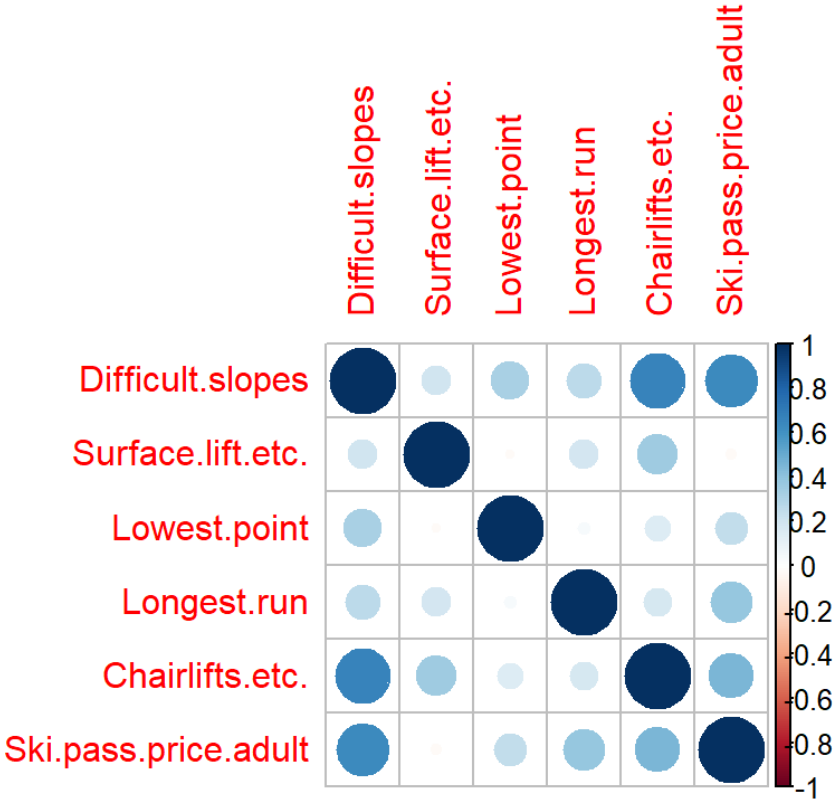

Figure 1

Variable	Definition	Data Type
Resort	The name of the ski & snowboard resort.	chr(character)
Continent	The name of the continent in which the resort is located	chr
Country	The name of the country in which the resort is located	chr
Highest point	The highest mountain point at the ski resort	num(number)
Lowest point	The lowest possible point to ski at the ski resort	num
Child friendly	Is the ski resort child friendly or not?	chr
Ski pass prices adult	The price shows what it costs for 1 adult for 1 day in the main season in Euro €.	int
Season	Shows when the resort normally	chr

	start and end the ski season.	
Beginner slopes	The total amount of “beginner” slopes in kilometer at the resort.	int
Intermediate slopes	The total amount of “intermediate” slopes in kilometer at the resort.	int
Difficult slopes	The total amount of “difficult” slopes in kilometer at the resort.	int
Total slopes	The sum of “beginner slopes” + “intermediate slopes” + “difficult slopes”	int
Longest run	The longest possible run at the ski resort, without using any lifts.	int
Snowparks	Does the resort have one or more snowparks, or not?	chr
Nightskiing	Does the resort offer skiing on illuminated slopes?	chr
Summer skiing	Does the resort offer summer skiing or not?	chr
Surface lift etc.	The amount of lifts in this category: T-bar, Sunkidslift, Rope lifts and people mower	int
Chairlift etc.	The total amount of chairlifts.	int
Gondola etc.	The amount of lifts in this category: Gondola, Train lifts, Funicular, Combined gondola and chairlifts, Helicopter lifts, Snowcats and Aerial tramways.	int
Total lifts	The sum of “surface lifts etc” + “gondola etc” + “chairlifts etc”	int
Lift capacity	How many passengers can the lift system at the ski resort more in one hour?	num
Total lifts open	The amount of current open and runnings lifts at the ski resort.	chr
Snow cannons	The total amount of snow cannons at the ski resort.	num
Avg snow last 5 seasons	The average snow depth for the last 5 seasons.	chr

Table 1

	modnames	dsids	curvetypes	aucs
1	m1	1	ROC	0.9654731
2	m1	1	PRC	0.7888287

Table 2

Show 10 entries Search:

	Difficult.slopes	Surface.lift.etc.	Lowest.point	Longest.run	Chairlifts.etc.	Ski.pass.price.adult
1	5	8	0.992	0	4	54
2	3	7	0.99	16	8	30
3	0	3	0.981	5	0	29
4	2	9	0.98	2	1	29
5	2	2	0.98	0	6	29
6	25	6	0.973	7	5	54
7	0	6	0.95	15	2	30
8	3	5	0.95	7	3	40
9	5	9	0.95	4	4	44

Showing 1 to 10 of 515 entries Previous 1 2 3 4 5 … 52 Next

Table 3