



Analysis of Environmental and Human Habit Factors on Where People Drink the Most Beer, Wine and Spirits

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Abstract. As we all know, people in almost all countries are inseparable from alcohol. Alcohol has multiple functions. Different alcohols have different functions and different manufacturing methods. This article will study the drinking preferences and habits of different groups of people in different regions. In terms of method, we will use multiple linear regression to analyze which types of drinking are the mainstream in the world, and through cluster analysis, we will find out which countries have similar drinking patterns. What are the similarities. For factor analysis, we will analyze those countries where alcohol consumption is high. Finally, we can conclude that drinking preferences in different regions have a certain relationship with the environment and habits.

Keywords: Multiple Linear Regression · Cluster analysis · factor analysis · SPSS · python

1 Introduction

Wine is a manifestation of human life and customs. Different countries and nations have different wine customs. The history, culture, religious belief, living habits and even character characteristics of a nation can be reflected from wine customs. Throughout the world wine custom, will make us appreciate a colorful, lively beautiful picture scroll. The three most popular wines in the world are beer, spirits and wine. Therefore, the type and quantity of alcohol consumed in different regions and countries, as well as the amount of alcohol consumed. It is necessary to analyze them quantitatively.

In China, there are many alcoholic drinks with medicinal value, which can help people's health. Therefore, there are many papers analyzing the effect of alcoholic drinks on people's body Rimm et al. review the effect of specific types of alcoholic drink on coronary risk. [1] Daniel et al. used survival analysis, specifically multi-level and multi-failure Cox mixed effects models, to calculate the hazard ratios of ARHA [2]. Ulrik et al. The aim of this study was to assess the effects of wine compared with other types of alcoholic beverages on risk for alcohol-induced cirrhosis [3]. Ravin et al. their aim was to determine the association between intake of total alcohol or individual alcoholic beverages and bone mineral density (BMD) [4]. However, there are some studies investigating

the preferences and sales of different wines in different regions. Zhao et al. examines the effects of socioeconomic and demographic factors on Australian individuals' participation in beer, wine and spirits consumption using unit-record data during 1991–2001. A trivariate probit formulation allows for participation in the three alcoholic beverages to be modelled jointly accounting for correlation via unobserved personal characteristics [5]. Thomas et al. To estimate the separate influences of age, period and cohort on the consumption of beer wine and spirits in the United States. They used the Linear age–period–cohort models controlling for demographic change with extensive specification testing [6]. Gary et al. provide an analysis of the relationship between annual advertising expenditures and sales, using a time series regression procedure, for beer, wine, and liquor sold in the United States from 1971 to 2012 [7]. There are also some researchers who study whether drinking different alcohol will affect the sales of other products. Eric et al. aim to investigate whether people who buy wine buy healthier food items than those who buy beer [8]. Food and beverage trends in 2017 can be attributed mainly to the rise and impact of the spending power and consumer demands of the millennial generation. So there are also some studies on alcohol, and the group that is surveyed is teens. Rutger et al. used multiple regression analyses to investigate among adolescents whether (i) drinking motives are related to beverage preference; (ii) beverage preference is related to alcohol use (drinking levels and risky drinking occasions); (iii) the association between beverage preference and alcohol use is moderated or mediated by drinking motives [9]. Julie et al. their research was in the rise of single-serve packaging and the myriad of new and innovative wine and spirit packaging options Quality, product integrity, transparency, traceability, and labeling of nutritional and calorie content are some of the keys to capturing the millennial market [10].

All over the world, during festivals, wine is an indispensable thing for every household. On the basis of traditional cluster analysis, using the method of aggregation and clustering, it can be concluded that the drinking of alcoholic beverages of similar ethnic groups in similar regions The number of types is similar, indicating that there are republics and differences in the drinking of people around the world, and it has a certain enlightening effect on the world's wine industry and wine suppliers. The paper in organized as follows: Chapter 2 introduce the preliminaries of the regression analysis and Collinearity diagnostics, Chapter 3 Cluster analysis; Chapter 4 further study factor analysis; Chapter 5 conclude the reasons for the differences and republics in the drinking of alcoholic beverages by people around the world.

2 Regression Analysis

Linear regression of data in spss in the model summary, as the Table 1 shows $R = 0.874.87.4\%$ The change in the total alcohol content of beverages consumed per liter of the population can be explained by the dependent variable, the average amount of beer, spirits, and red wine consumed per person. It shows that there is a strong linear relationship between the two, and the goodness of fit is high. After analysing the variance, the significance is less than 0.001, indicating that there is indeed a linear relationship between the independent variable and the dependent variable. After the work, we can get $\text{total_litres_of_pure_alcohol} = 0.722 + 0.18*\text{beerservings} + 0.16*\text{spiritservings} +$

0.16*wine servings. In the t test, we can draw that the coefficients and constants before the independent variable are significantly different from zero. There are coefficients a, b, c, constant d in front of the independent variables, the null hypothesis $H_0: Y \neq ax + by + cz + d$, the alternative hypothesis $H_1: Y = ax + by + cz + d$, through the significance in the coefficient table are less than 0.001, we reject the null hypothesis, and the alternative hypothesis H_1 holds. In the linear regression model, we can see that spirit servings and wine servings have the same impact on total total litres of pure alcohol, and beer servings have the greatest impact on the dependent variable, indicating that the drinking volume of beer is the largest in the world.

The reason for the large amount of beer drinking. First of all, in terms of taste, beer is a foamy low-alcohol beverage that can be drunk freely. All alcoholic beverages can make the human body dependent, but beer is an iced beverage. When it is chilled to 8–10 degrees in summer, the taste is the best. This temperature is neither particularly bitter nor sweet, and the taste is extremely unique. Especially in the scorching sun, after the mouth is dry, drinking a cup, the entrance turns out to be refreshing and pure, the body's thirsty cells are instantly filled with beer, and the sense of satisfaction is overwhelming. Secondly, in terms of production, the production of beer is relatively simple. Beer brewing can be roughly divided into malting (small and medium-sized beer workshops can be directly purchased) → malt crushing (feeding, moisturizing, crushing) → wort preparation (saccharification, filtration), boiling, adding hops, spin sinking) wort fermentation (cooling and inoculating yeast), beer filling and other main processes, for raw materials, barley grains are required to be hypertrophic, rich in starch, strong germination power, and have fresh straw aroma. It has a starchy taste, and the starch content should be above 60% (the more the better). When brewing beer, two or six-row barley is usually used, the barley is germinated, and then "wort" is made. It is also very easy to obtain raw materials. The global planting of oats remains at 9.86 million hectares.

In modern times, young people have become the main force of new consumption of alcohol. With the domestic, young and female consumers have the fastest growth rate of alcohol consumption since 18 years. Then the most popular choice among young people is red wine. For red wine, the consumption of European and American countries is relatively high in the world. The highest country is the United States, followed by France, and then Italy. For spirits, currently the world's most popular The welcome spirits include Chinese liquor and European brandy, which is a kind of distilled liquor, which is brewed from fruit after fermentation, distillation and storage. Whiskey is a kind of strong distilled spirit made from grains, aged in oak barrels for many years, and blended to about 43%. When you say vodka, you will think that drinking in the ice and snow can replenish qi and resist the cold. Therefore, vodka is also a very popular strong drink in the cold countries of northern Europe. There is also a famous spirit in America, the national liquor of Mexico, agave. After cutting off the leaves of the agave grass, the huge fruit of the stem is boiled, and the starch is converted into sugar juice. Aged for a mellow tequila. Mexican agave is divided into three categories, which can only be called Tequila if it is brewed with 51% blue agave as raw material in certain regions. Rum is a Cuban specialty, a wine made by fermenting and distilling sugar cane molasses. The alcohol content is 38% ~ 50%, and there are three types of black, white and gold.

Table 1. Model summary

Model summary					
Model	R	R square	Adjusted R-square	Error in Standard Estimation	Durbin Watson
1	.935 ^a	.874	.872	1.3491	1.942
a. Predictor: (constant), wine_servings, spirit_servings, beer_servings					
b. dependent variable: total_litres_of_pure_alcohol					

In addition to these wines studied, there are rice wine, fruit wine, kumiss in the world. The distance is 0.722, indicating that the contribution of other alcohol corresponding variables in the world except beer, spirit, and wine is 0.722 L of pure alcohol.

In the diagnosis of collinearity, the tolerances of the three independent variables are all greater than 0.5, and the VIF is less than 10, so there is no linear relationship between the independent variables.

3 Cluster Analysis

Analyze the differences and commonalities of drinking beverages with different alcohol content in different countries around the world. As shown in the Fig. 1, When using aggregate clustering, using the elbow method, the work found that the optimal number of clusters was 3. See the Fig. 2, in the scatter plot, the horizontal axis represents the drinking volume of beer, the vertical axis represents the drinking volume of spirits, and the size of the scatter points represents the drinking volume of red wine.

As shown in Fig. 2, the red part represents most European and American countries, which drink a lot of wine and beer due to factors such as culture, geography, climate, diet, etc., while the purple part represents most Asian countries, For the consumption of spirits, China is very representative. In modern times, people's drinking behavior is more common, wine is more closely related to people's destiny, wine is widely integrated into people's lives, and wines that are close to "life" Culture has been unprecedentedly enriched and developed. In China, birthday banquets, wedding banquets, funeral banquets, etc., as well as related wine customs and drinking rituals, have become an important part of life. Although at present, the drinking structure of China is very different between young and middle-aged people, now, many young Chinese people choose to drink some low-alcohol wine and fruit wine, especially in modern society, women's Drinking more and more, compared with white wine, these wines have lower alcohol content and are healthier. However, Chinese liquor culture is actually a social culture. When dealing with Chinese people, no matter what the occasion is, the real drinking, even if it is a form of drinking, needs to express the content of the spiritual level. Therefore, in most banquets, people will still choose white wine.

However, the green part is some countries with less alcohol consumption and types. Most of these countries are religious countries, and many of them are in the Middle East. For example, Mecca in Saudi Arabia, a holy place for Muslim pilgrims, not only

completely prohibits the production and sale of alcohol, but also strictly checks the luggage of foreign passengers at the airport, with the aim of completely eliminating alcohol products. Inflow. Selling and drinking alcohol in public places faces long prison terms and even caning. Pakistan has also implemented a ban on the production and sale of alcoholic beverages in the country, but non-Muslim minorities can apply for a drinking license from the government and enjoy the benefits of five bottles of liquor and 100 bottles of beer a month. In many Muslim countries there will be prohibition laws, in which the drinking and sale of alcohol is prohibited. The Quran prohibits drinking alcohol. Over time, not allowed to drink alcohol has become a living custom of the Hui people. The same is true in some Islamic countries. In Yemen, according to Islamic teachings, the reference and sale of alcoholic beverages is completely banned nationwide in Yemen, with the exception of Aden and Sanaa. There are some authorized restaurants, hotels and nightclubs in Aden and Sana'a that can cite and sell alcohol, and in addition to these authorized places, non-Muslim foreigners are also allowed to drink appropriate alcoholic beverages in their own premises. However, there is a similar case in Africa, where Sudan is located in northeastern Africa. Since 1983, the country has issued a Prohibition Act, which prohibits the production, sale and consumption of alcoholic beverages in the country. This decree only applies to Muslims. Non-Muslim foreign tourists can drink alcohol in private places. It is also prohibited to drink alcoholic beverages in public places.

It is not difficult to see that many geographically close or adjacent countries are grouped together, but there are exceptions. As the Fig. 3 shown, South Africa and Iceland are grouped together. Crops in South Africa have their own concentrated production areas. Wheat is an important food crop after maize. The Northwest Province, the Western Cape Province, and the Mediterranean climate zone in the southwest of the province have reliable rainfall and mild and rainy winters, which provide the growth of wheat. Good environment, and most of Iceland is also in a temperate coniferous forest climate, only the Atlantic coast is affected by the North Atlantic warm current, belonging to a temperate broad-leaved forest climate, which is also conducive to the growth of wheat, resulting in beer in two far apart. Regions, also grouped together.

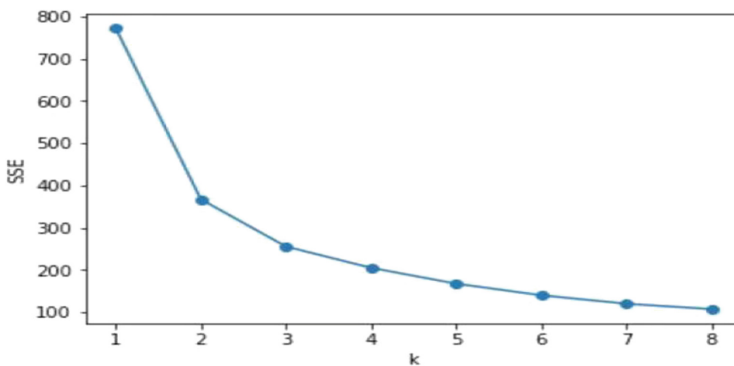


Fig. 1. The result for elbow method

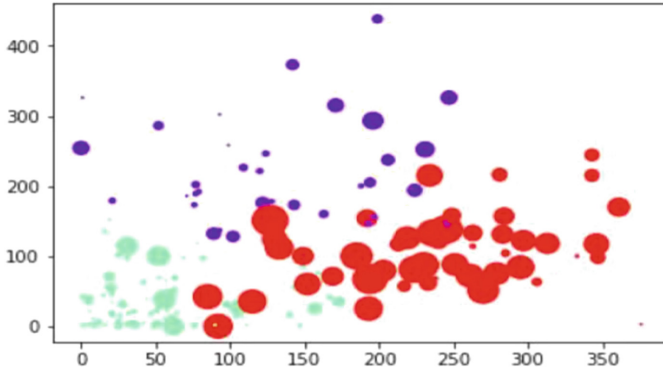


Fig. 2. Scatter Plot for Cluster Analysis

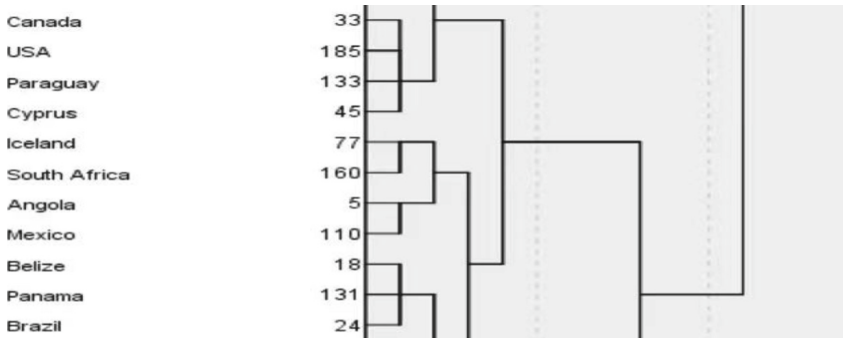


Fig. 3. Clustering in Iceland and South Africa

In China, the main liquor that Chinese people drink is baijiu. Chinese people love and baijiu, which is influenced by history and culture. In ancient China, people were proficient in brewing technology. Liquor can also play some medicinal functions such as promoting blood circulation and removing blood stasis.

We can see that many Asian countries are grouped together, such as China, Mongolia, and the Philippines are grouped together, but South Korea is not traditionally grouped with Asian countries, but with some African countries, seeing the Fig. 4. The main reason for clustering into one category is that the drinking amount of beer is very similar and relatively large. In Korea, fried chicken and beer are standard, representing a special food culture. Koreans like to eat fried chicken at night. Drinking, because the alcohol content of beer is low, you can drink it all night, and the refreshing taste of beer can dilute the greasy feeling of fried chicken. The reason why Koreans like fried chicken so much is because fried chicken is cheap in Korea, and Korean consumers themselves are not interested in fruit. The freshness of vegetables is very high, and Korean fruits and vegetables are very expensive, so many Koreans choose to eat fried chicken.

In the cluster analysis, it is not difficult to see that after some European countries are clustered together, the drinking volume of alcohol is the largest, especially beer.

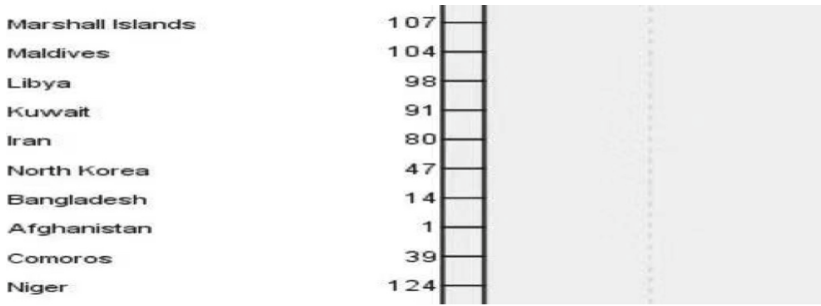


Fig. 4. Clustering about South Korea

There are about 10,000 craft breweries around the world, and there is already a beer community in Europe when beer spreads in the U.S. or globally. That is, a community, a small town has a small winery. Most wineries are family-run with limited production and supply, serving only small circles around the community or small town. This model has existed for hundreds of years, and even with the rise of the American craft brewing revolution, the United States relies on community. Residents can come for a drink while walking their dogs. The second reason is the excellent supply of raw materials. Most of China's wheat is imported from abroad (Australia), malted at home, and sold to wineries. But for the time being, we are not as good as foreign countries in malting, especially special malt. In the United Kingdom, Belgium, Germany and other countries, the entire industrial chain from wheat planting to malting processing is very complete, and the quality of malt (from base wheat to special wheat) is very stable. At present, for China, the malt that can be obtained (not locally grown, but imported wheat is processed domestically) is limited to basic malt and light-colored Munich, and there is still a big gap in flavor-type special malt. For hops, Europe has a very complete and rich variety of hops. The American beer revolution broke out with the development of hops, but it brought an impact on the European hop market. Good hops can bring different flavors to the beer. There are actually many hop aromas, such as fruit aroma, stone fruit aroma, citrus aroma and so on. At present, the only hops that China can produce is Qingdao Dahua, a hop imported from the United States and planted in Xinjiang in the early days. The development and cultivation of hops is a long process, requiring large areas of land and decades of cultivation and development. The third important raw material is yeast yeast, which can be said to be the soul of beer. The development of yeast requires at least a yeast laboratory, at least a team of dozens of people, and a bunch of equipment. Compared with the research and development of hops, the start of yeast can be said to be very fast. So far, well-known dry yeast manufacturers (Fermentis, Raman, etc.) and wet yeast (White Labs, Wyeast, etc.) have gathered almost exclusively in Europe and the United States factor analysis.

4 Factor Analysis

In the next step, the work conducts factor analysis. First, KMO test and bartlett test are performed. The KMO value is close to 0.6, and the significance is less than 0.05. It can be proved that there is a correlation between the original data, and factor analysis can be performed. Seeing the Table 2, it is the common factor variance table, the work can draw that the explanatory power of the factor obtained by dimension reduction is 0.78, 0.45, and 0.56 for the independent variable. Defining the factor obtained by dimension reduction as the average alcohol consumption of the people in the country, it can be seen from the data The consumption of alcohol in European countries is relatively large, so the consumption of alcohol is generally higher than in other regions, such as Croatia, Belarus, France, and the United Kingdom, most of which belong to Europe. Compared with other places, Europeans have more alcohol consumption. I love to drink, because Europeans and Americans usually drink a lot of dairy products, milk, butter, cheese, etc. Their stomachs will produce an enzyme that can decompose alcohol, and they need to drink to relieve greasy. In Europe, the weather is more humid and cold, especially in Northern Europe. People also drink high alcohol levels because of the weather. However, like Burkina Faso, Burundi, the alcohol consumption in these countries is not particularly high, but the alcohol consumption is high, Africans like to drink some fruit wine, beer, generally higher alcohol content than other regions, it is related to the way they make wine. The same wine, for the reason of different alcohol content, take wine as an example, wine is made from fresh grapes and grape juice, and the sugar in the grape fruit is decomposed by yeast to produce carbon dioxide and alcohol, so the alcohol content depends on Sugar content in grapes. Typically, the alcohol content is 10 to 15 percent. Therefore, different regions, because of different light conditions, temperature, soil, and climate, produce different wines from grapes. In France, because the climate is relatively wet and cold, the degree will be lower, about 10% to 13%. In the United States, Chile and the Americas, the climate is hot, and the alcohol content can reach 15%. For some spirits, it is actually processed according to the wine. For example, brandy, wine is properly distilled, and some wines are made with added alcohol.

Table 2. Common factor variance

Common factor variance		
	initial	extract
beer_servings	1.000	.777
spirit_servings	1.000	.469
wine_servings	1.000	.556

Extraction method: principal component analysis

5 Conclusion

Through the analysis, it is concluded that the drinking preferences of different regions are quite different due to the local climate, culture, religion and eating habits. For enterprises that make wine, they should combine the wine preferences and drinking habits of different regions to make local wines. For people in different regions, the types and methods of promoting wine are different from a health point of view, people try to understand the characteristics of different wines. Find a drinking style and type of alcohol that suits you. Proper drinking is good for the body. Drinking can relieve pain, soothe the nerves and help sleep, prevent tumors, and strengthen bones. However, excessive drinking is harmful to the body, and different alcohols do different damage to the body. Drinking too much liquor for a long time will cause chronic alcoholism, lead to myocardial degeneration, increase the burden on the heart, and reduce the defense function of the respiratory tract. Excessive consumption of beer can cause gout. A large amount of beer contains a lot of purines. After entering the human body, it is very easy to produce too much uric acid, and it is prone to gout if it cannot be excreted from the body. For red wine, if you drink it in large quantities, it will have a great impact on the heart, which will lead to alcoholic myocarditis, and in fact, it will increase the load on the brain, liver, and pancreas. For pharmaceutical companies, it is also necessary to manufacture medicines for diseases caused by different alcohols according to the structure of alcohol, as well as the physique and living habits of people in different regions, so that the treatment of diseases caused by excessive drinking will be more efficient. In summary, we can see that most of the total alcohol intake of people in the world is through the intake of beer. Through cluster analysis, we can find that the drinking of people in different regions has a great relationship with climate, diet, culture, and ethnicity. Through factor analysis, it can be concluded that the alcohol content of wine consumed in different regions is significantly different, which is related to climate and brewing methods.

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