**Components That Influence the Rating of Wine**

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**Components That Influence the Rating of Wine**

1. **Introduction and statement of hypothesis**

**Research Purpose and Motivation**

Humans have a rich history of brewing and tasting wine.

**Statement of Hypothesis**

* + Sulphates has positive effect on the quality rating of wine.
  + Chlorides has negative effect on the quality rating of wine.

1. **Description of data sources and methodology**

**Description of Data**

I obtained the dataset from Kaggle, one machine learning website with a lot of useful datasets. The original dataset is uploaded by Kaggle user “ruthgn”, while I subtracted some irrelevant variables and only kept one dependent variable: Quality, and two independent variables: Sulphates and Chlorides.

* Quality: This variable is measured by ratings provided by customers and wine experts. The data range from 0 to 10. 0 refers to “very bad” while 10 refers to “very good”. Data type of the variable is float.
* Sulphates: Sulphates usually exist as sulfur dioxide molecules and sulfite ions in wine. The amount of Sulphates is measured as viscosity (g/dm3). Data type of the variable is float.
* Chlorides: We could consider chlorides as salt exists in wine. The amount of Chlorides is measured as viscosity (g/dm3). Data type of the variable is float.

**Methodology**

Considering that this is the assignment that measures our ability of data analysis by visualizations. I would use histogram to check if the independent variables are normally distributed so that they don’t disturb the rules of simple regression. I would use two scatter plots with regression lines to check my two hypotheses.

However, examine hypotheses by eyes is not serious enough. I would use simple regression method as well to see if my hypotheses are correct.

1. **Analysis/visualizations (with explanations)**

**Histogram of Chlorides**

Chart, histogram

Description automatically generatedwine <- read.csv(file = 'C:\\Users\\wuzho\\Downloads\\Wine.csv')

Ch <- wine$chlorides

hist(Ch, breaks=1000, main="Chlorides Viscosity", col="darkmagenta")

We could tell from the diagram that the distribution of Chlorides is skewed. We may need to remove observants with Chlorides larger than 0.15.

Chart, histogram

Description automatically generated**Histogram of Sulphates**

Su <- wine$sulphates

hist(Su, breaks=1000, main="Sulphates Viscosity", col="darkmagenta")

We could tell from the histogram that the distribution of Sulphates is also skewed. We need to remove observants with value larger than 1.0.

**Data Cleaning**

From the data cleaning suggestions above, we removed observants with unsatisfactory value.

df<-wine[!(wine$chlorides > 0.15 | wine$sulphates > 1),]

After data cleaning, we still have 6337 observants.

**Scatter plot of Chlorides**

x <- df$chlorides

y <- df$quality

plot(x, y, main = "Regression Chlorides", xlab = "Chlorides", ylab = "Quality Ratings", pch = 1, frame = FALSE)

abline(lm(y ~ x, data = df), col = "blue")

Table

Description automatically generated

**Scatter Plot of Sulphates**

x <- df$sulphates

y <- df$quality

plot(x, y, main = "Regression Sulphates", xlab = "Sulphates", ylab = "Quality Ratings", pch = 1, frame = FALSE)

abline(lm(y ~ x, data = df), col = "blue")

Table

Description automatically generated

**Simple Linear Regression**

1. SLR on quality and chlorides

res <- lm (quality ~ chlorides, data = df)

res

Text

Description automatically generated

1. SLR on quality and sulphates

res <- lm (quality ~ sulphates, data = df)

res

Text

Description automatically generated with medium confidence

1. **Summary**

From the previous image, Sulphates has positive effect on the quality rating of wine, and Chlorides has negative effect on the quality rating of wine. In summary, the data shows that my conjecture is correct.