

BANA7051 Assignment 1

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2024-08-30

A. Sample size of the data.

first load the data, and then take the sample size with `nrow()` function.

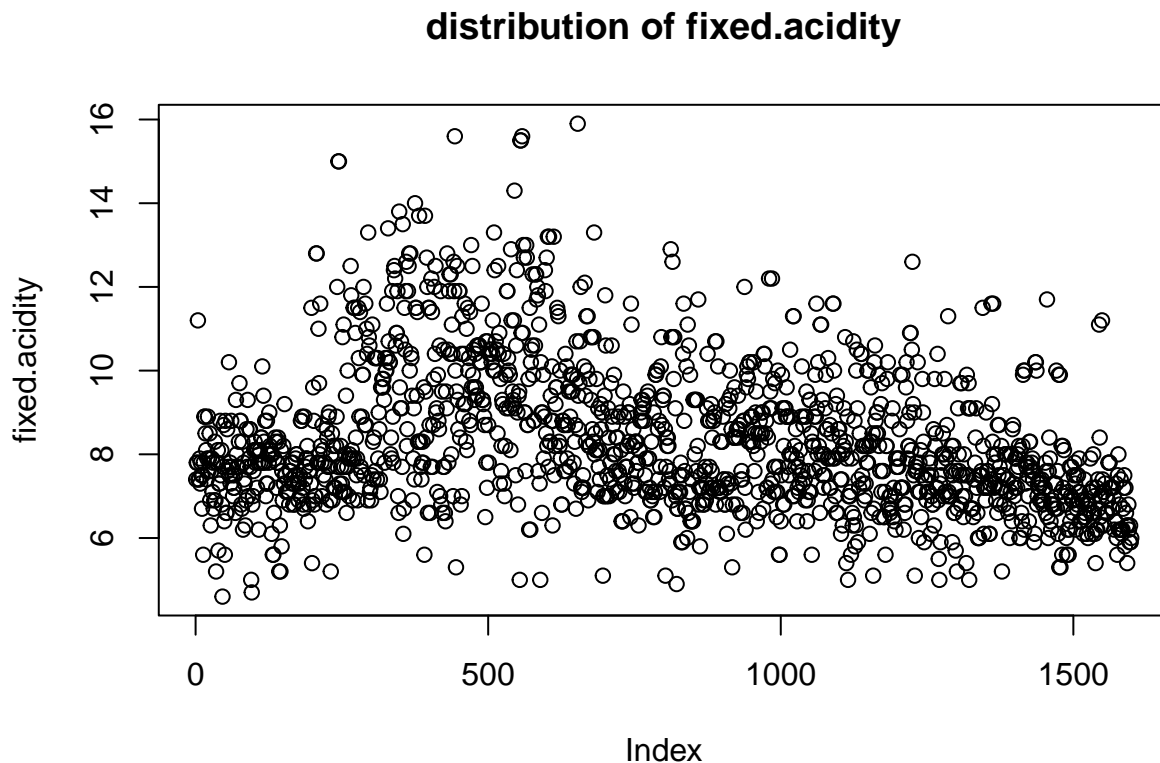
```
wine <- read.csv("data/winequality-red.csv", sep = ";")
wine <- select(wine, c("fixed.acidity", "volatile.acidity", "citric.acid"))
sample_size <- nrow(wine)
print(paste('sample size is ', sample_size))
```

```
## [1] "sample size is 1599"
```

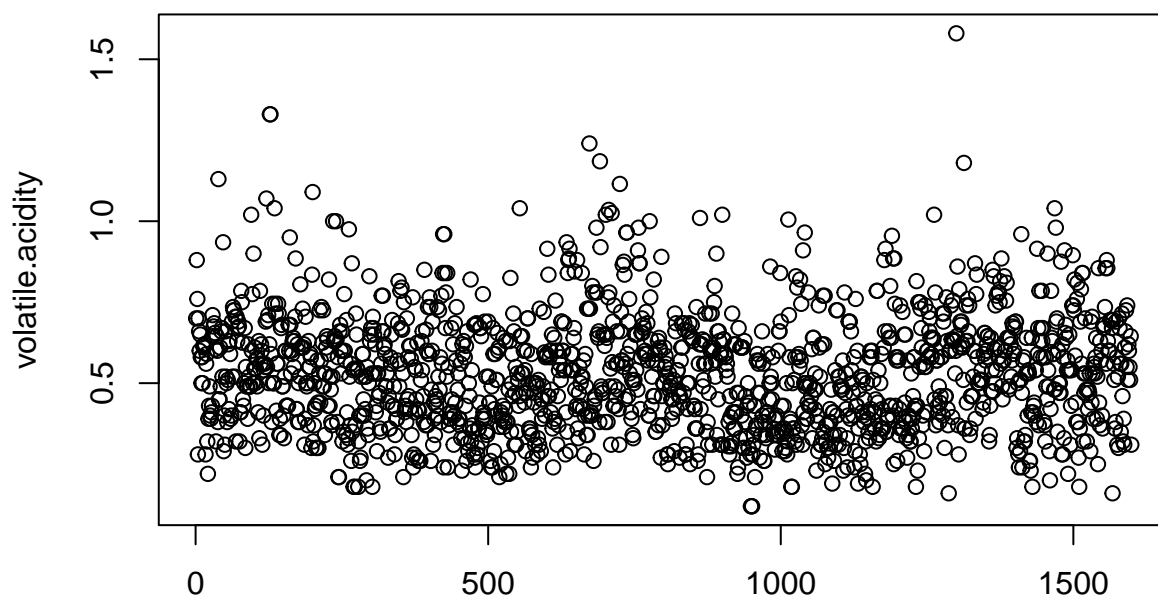
B. Identify outliers

Draw a plot for each of the variables:

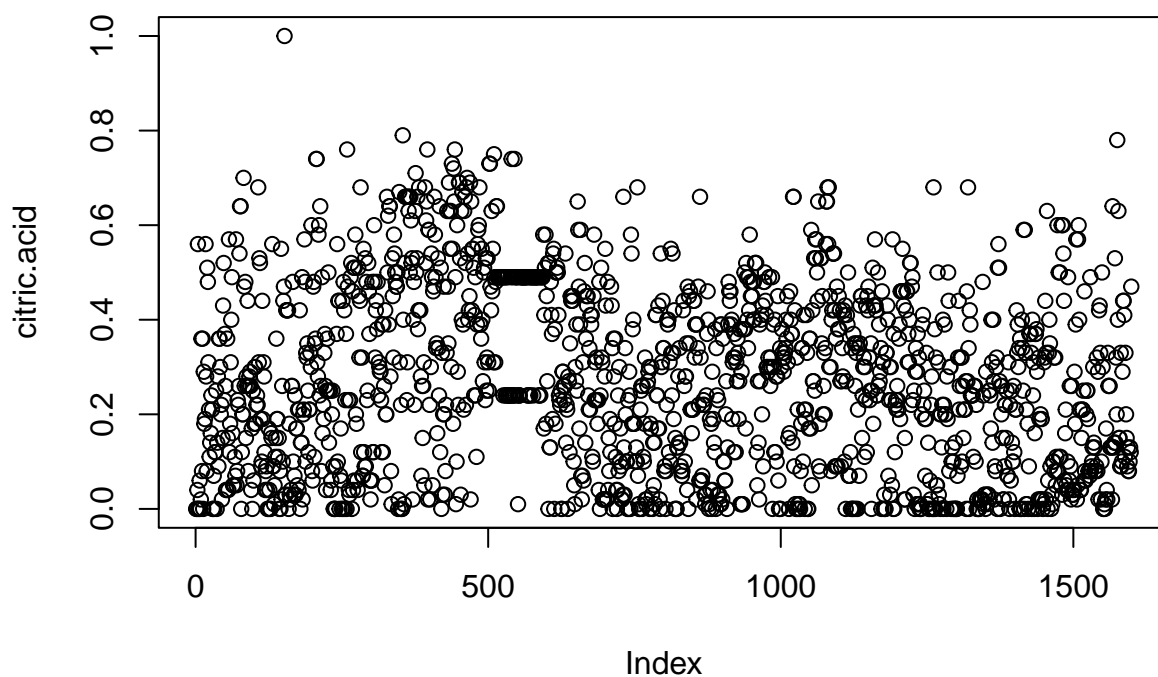
```
for (col_name in colnames(wine))
  plot(wine[[col_name]], main = paste("distribution of", col_name), ylab = col_name)
```



distribution of volatile.acidity



distribution of citric.acid



One outlier can be observed in the citric.acid variable.

C. Summarize of data.

The `summary()` function provides a basic summary of Min, 1st Quantile, median, third quantile, max:

```
summary(wine)
```

```
## fixed.acidity  volatile.acidity  citric.acid
## Min.   : 4.60    Min.   :0.1200  Min.   :0.000
## 1st Qu.: 7.10    1st Qu.:0.3900  1st Qu.:0.090
## Median : 7.90    Median :0.5200  Median :0.260
## Mean   : 8.32    Mean   :0.5278  Mean   :0.271
## 3rd Qu.: 9.20    3rd Qu.:0.6400  3rd Qu.:0.420
## Max.   :15.90    Max.   :1.5800  Max.   :1.000
```

Moreover, I would like to include standard deviation to give a little bit more insight:

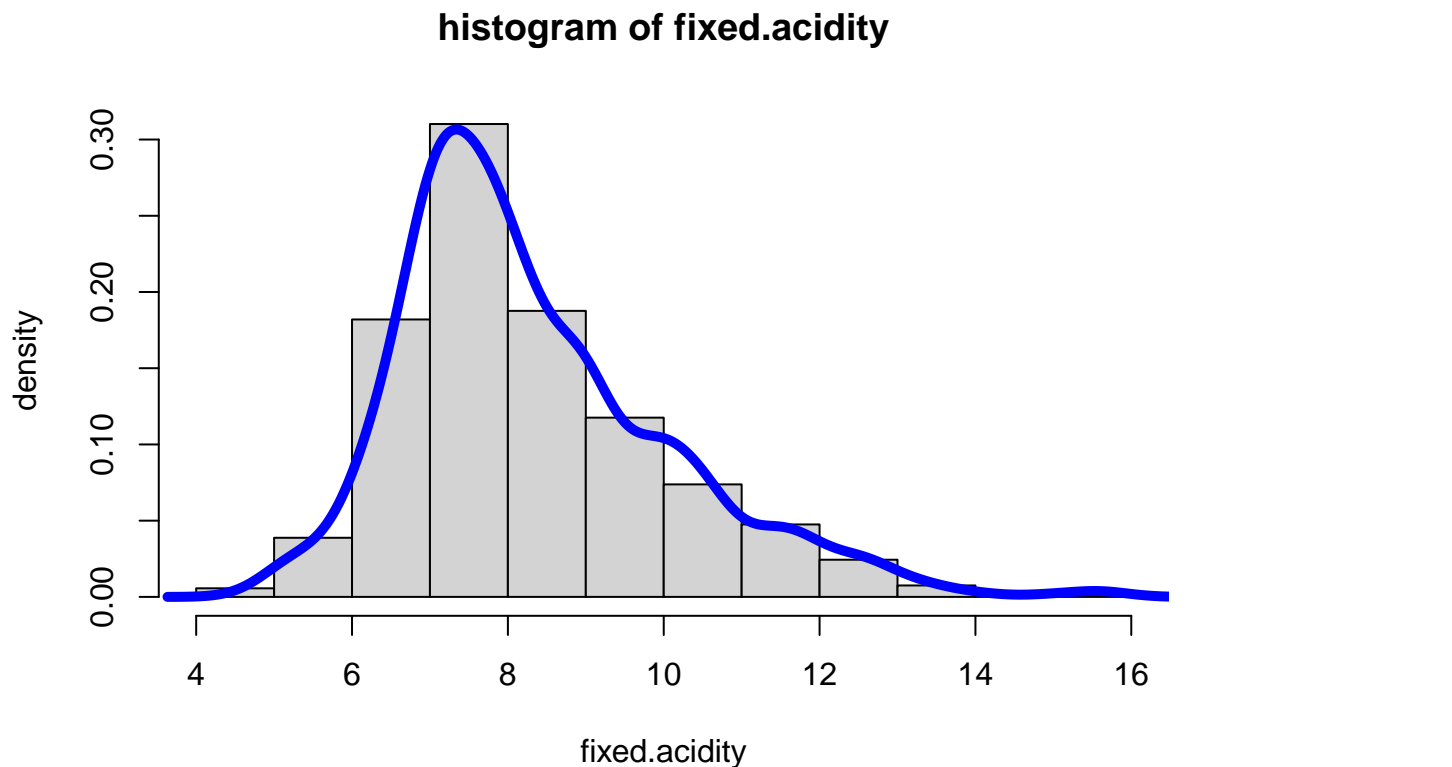
```
for (col_name in colnames(wine)) {
  sd = sd(wine[[col_name]])
  print(paste("standard deviation of ", col_name, ": ", round(sd, 2)))
}
```

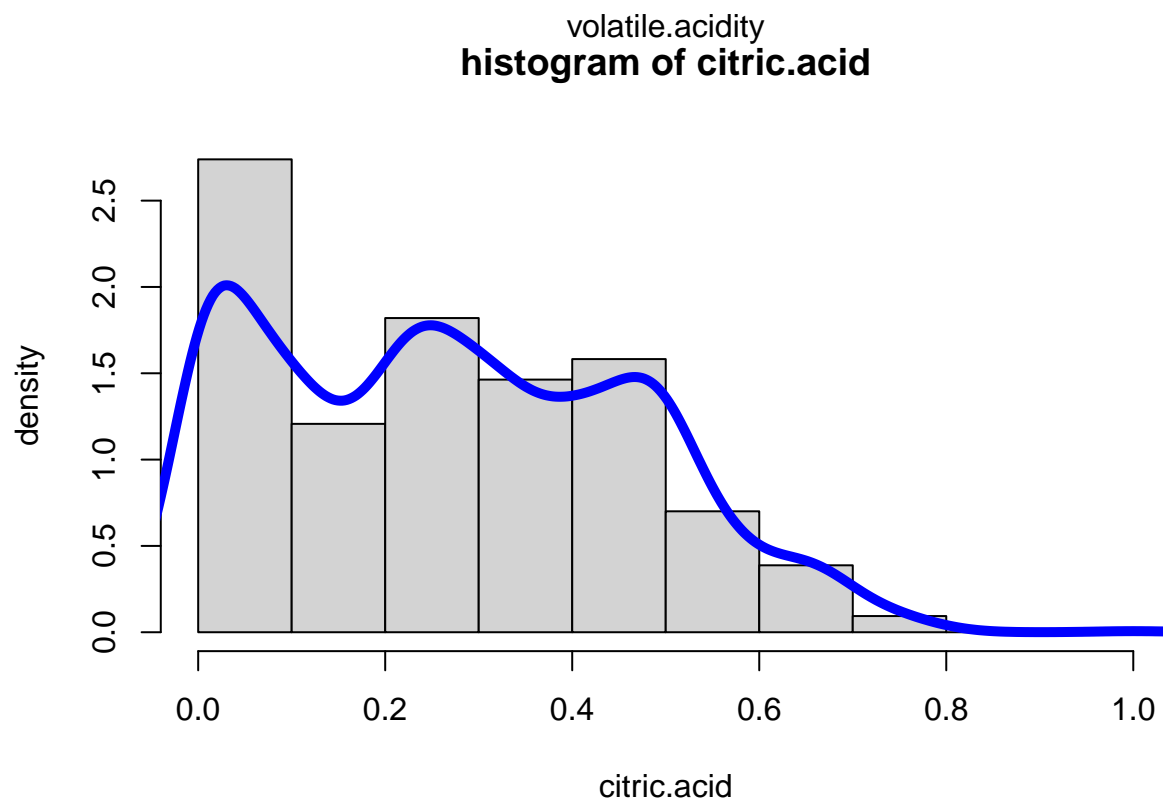
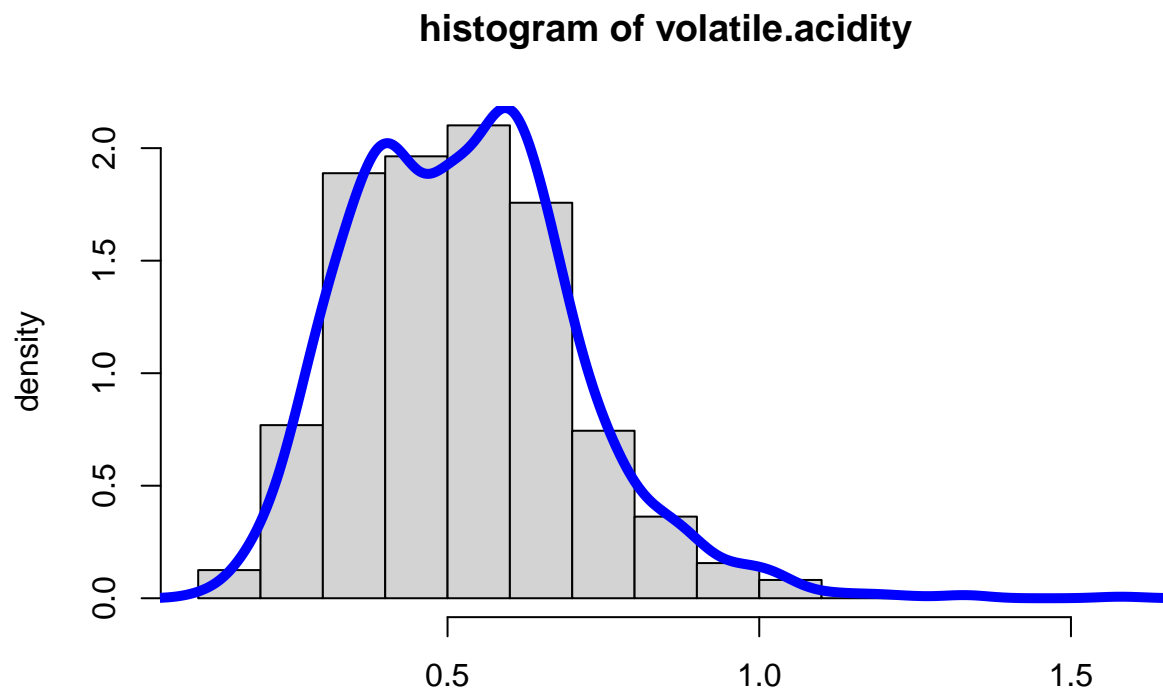
```
## [1] "standard deviation of fixed.acidity : 1.74"
## [1] "standard deviation of volatile.acidity : 0.18"
## [1] "standard deviation of citric.acid : 0.19"
```

D. Visualize the distribution of each variable.

Draw a histogram of each variable with `hist()` function, and draw a density curve on top of it.

```
for (col_name in colnames(wine)) {
  hist(wine[[col_name]], main = paste("histogram of", col_name), freq = F, xlab = col_name, ylab = "density", col = "gray", lwd = 1)
  lines(density(wine[[col_name]]), lwd = 5, col = "blue")
}
```





E. Any skewed distribution in D?

The fixed.acidity variable appears to be right skewed. So does the citric.acid variable.

F. What data mining methods are used in this paper?

The author discussed linear/multiple regression (MR), neural networks (NN), and support vector machines (SVM). MR can be seen as a reduced form of NN when there's no layer of hidden node. Empirical results shows that SVM outperformed NN (and also MR) in this study case, especially for white wine.