1) Mean = 407.5
   The mean reaction time of people aged 6-80 years old is 407.5ms

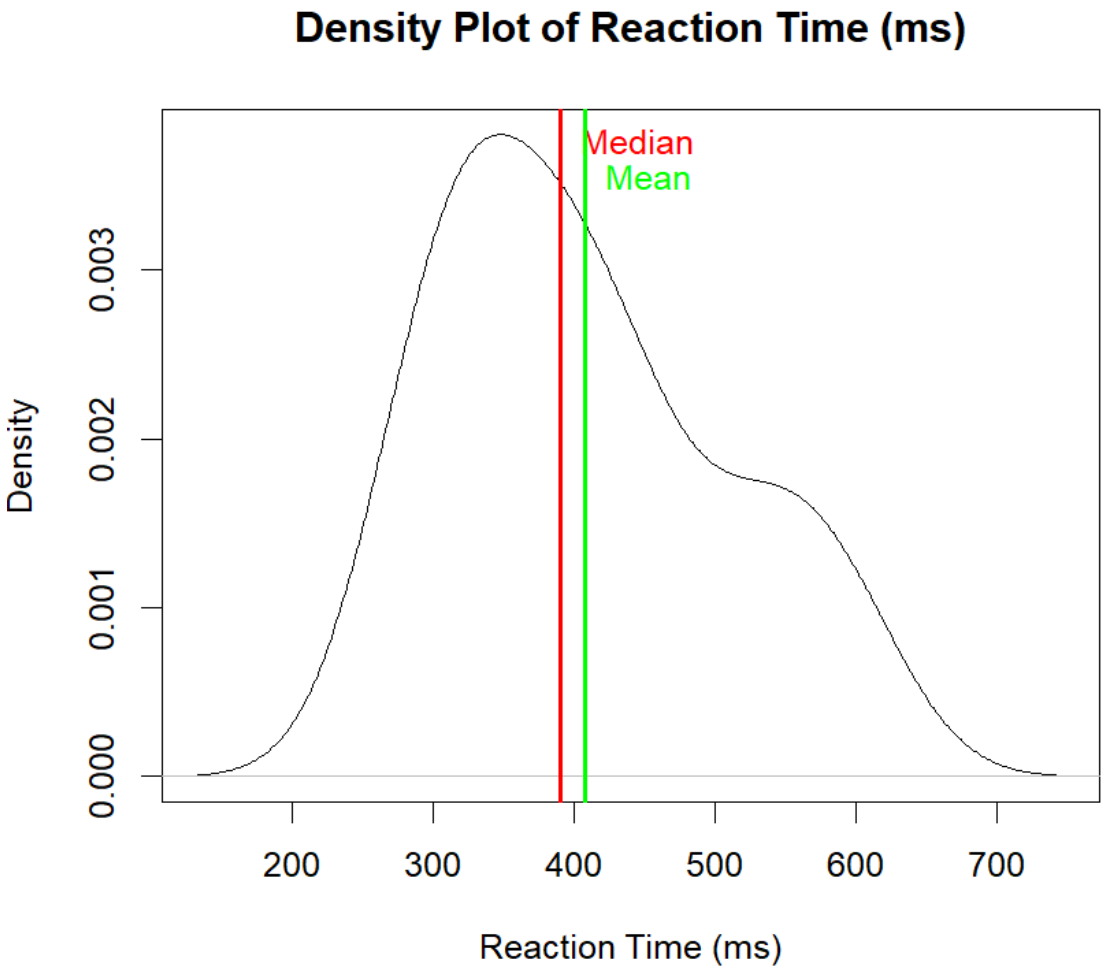
2) Thirty percent of the people aged 6-80 years old have reaction time above 436ms

3) To determine if the conditions are valid for using the mean as an appropriate statistic for typical reaction time of individuals, graphs such as a histogram, density plot, boxplot, and Q-Q plot are employed to provide a comprehensive assessment of the distribution of reaction times.

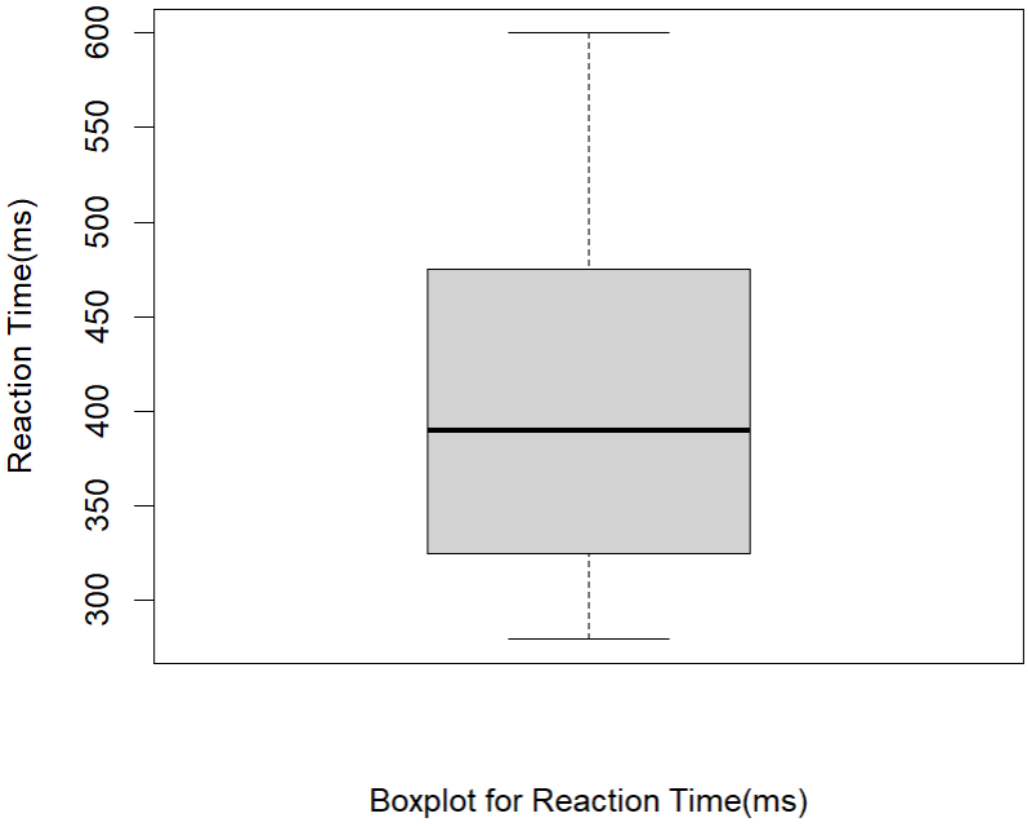
   After analyzing the histogram of reaction time, it is observed that the mode is larger than the mean and median, indicating that the data are left skewed. Therefore, the mean is not an appropriate statistic for the typical reaction time of individuals.

For better representation, a density plot is used. After analyzing the density plot of reaction time, it is observed that the distribution exhibits a positive skew, indicating that

the data are skewed left. Therefore, the mean is not an appropriate statistic for the typical reaction time of individuals further supporting the histogram.

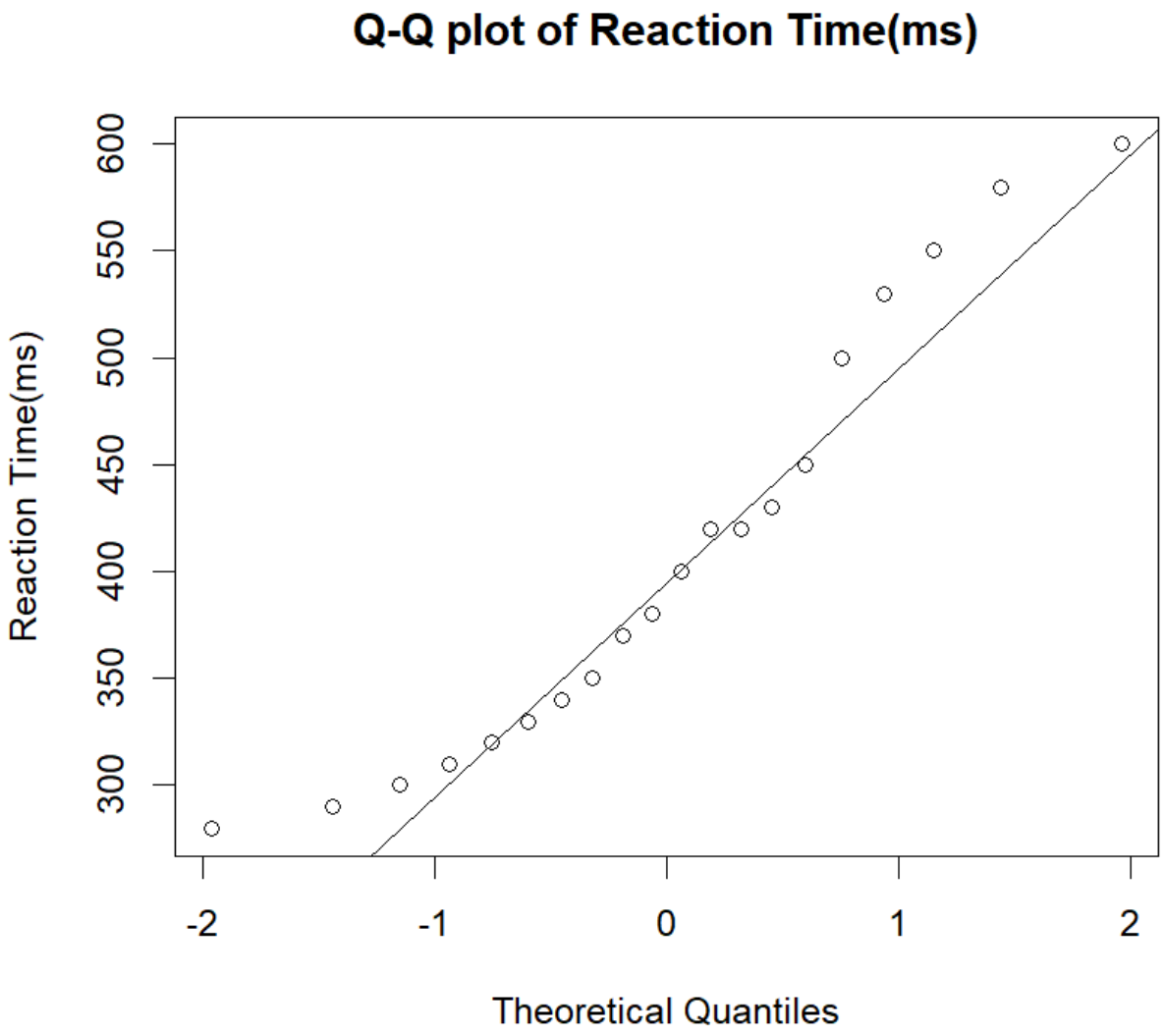


For further investigation, a boxplot is used. Upon examining the box plot for reaction time, it states that the dataset is skewed towards the lower values thus, confirming that the dataset is positively skewed. This observation does not support the use of the mean as an appropriate statistic for the typical reaction time of individuals.



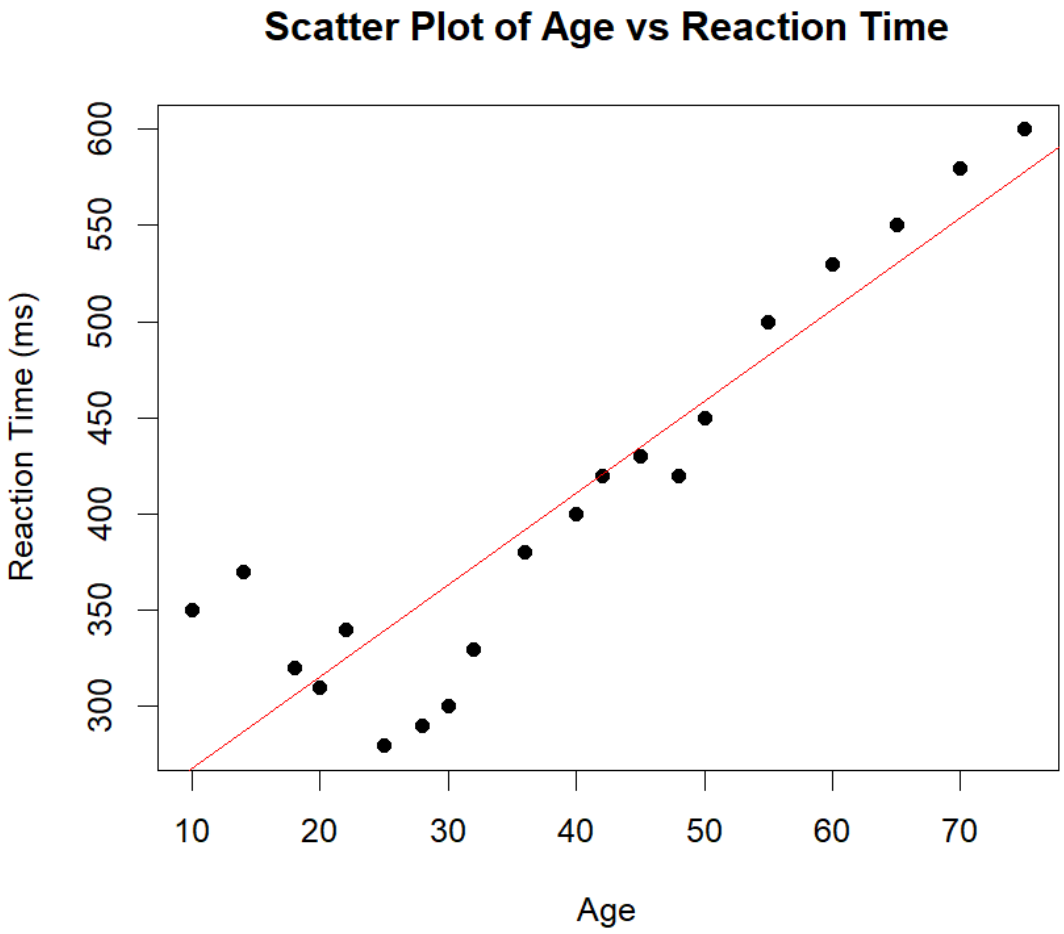
Boxplot for Reaction Time(ms)

In addition, a Q-Q plot is used to confirm the observation. After analyzing the Q-Q plot, it is evident that the reaction time deviates from the line at the upper region due to the data being positive skewed. Therefore, using the mean as a statistic for representing typical reaction time is inappropriate.



4) **Influence of age on the reaction time**

A scatter plot is used to investigate the relationship between age and reaction time.

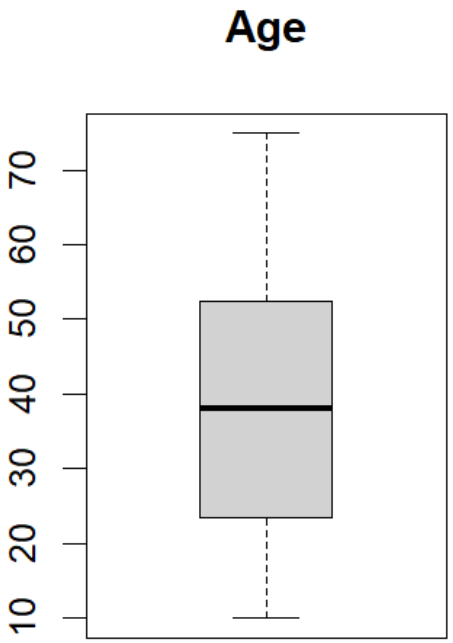


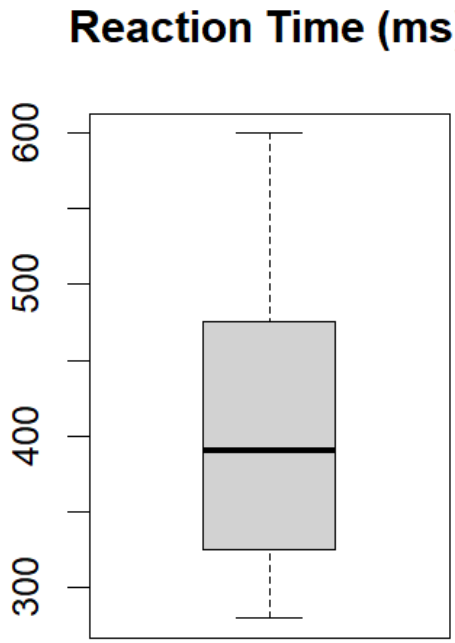
The scatter plot for age vs reaction time displays a positive correlation. The scatter plot does not seem to display any outliers but a boxplot is used to conclude if there are any outliers present.

Correlation coefficient, r = 0.9135

The correlation coefficient between age and reaction time is 0.91. This confirmed a strong positive linear correlation between the two variables. It is observed that when the age increases, the reaction time increases.

A boxplot is used to identify any outliers present in the data.

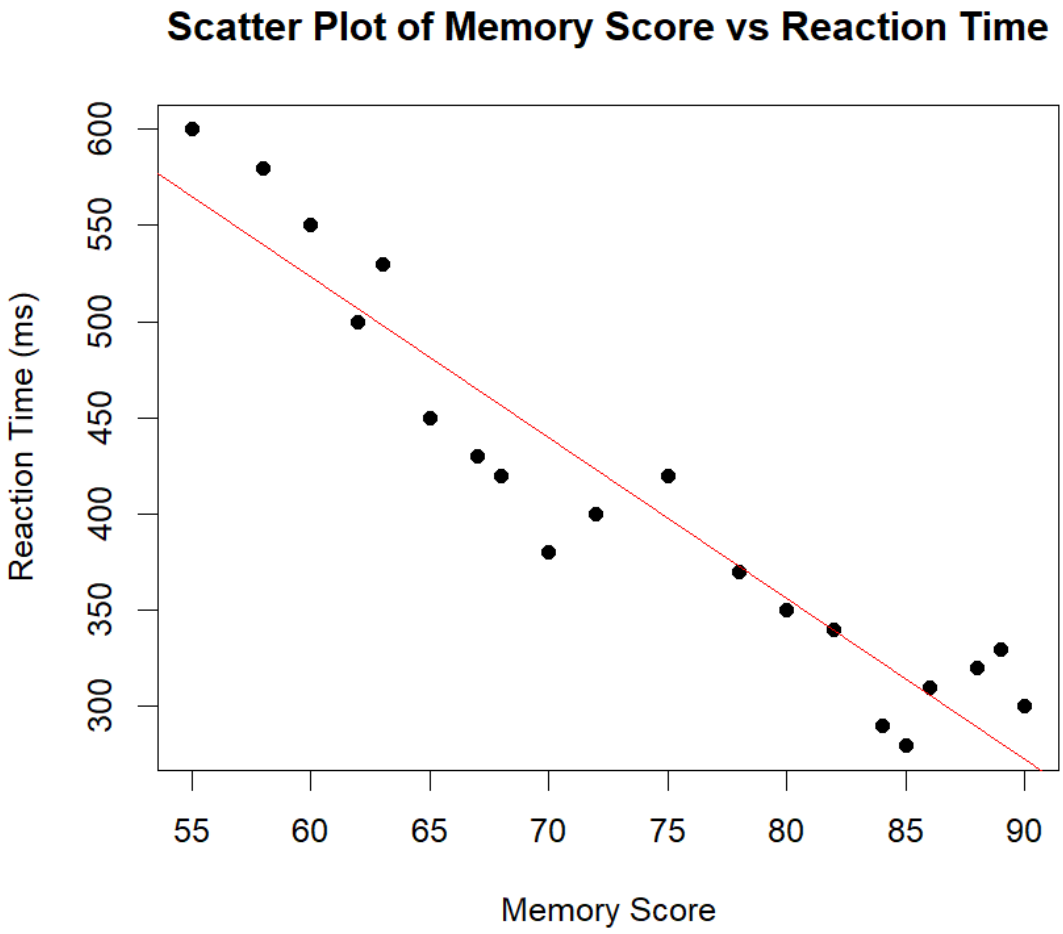




The boxplot does not seem to display any outliers. Therefore, it is concluded that there are no outliers.

Influence of memory score on the reaction time

A scatter plot is used to investigate the relationship between memory score and reaction time.

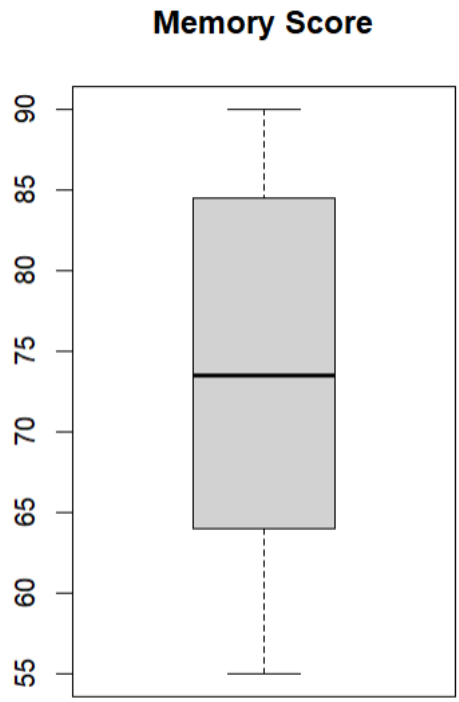


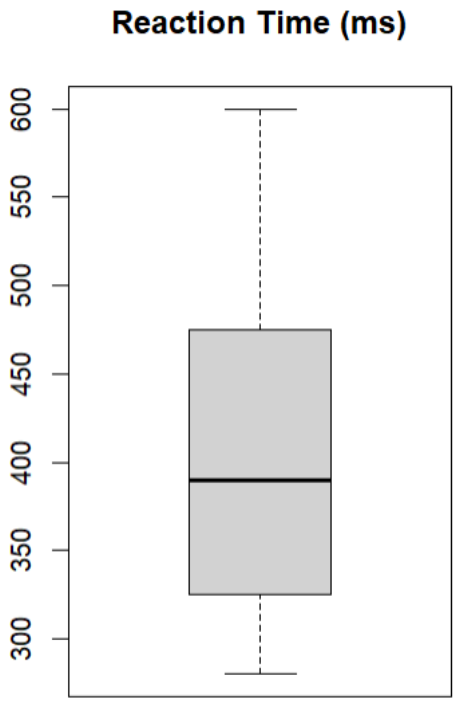
The scatter plot for memory score vs reaction time displays a negative correlation. The scatter plot does not seem to display any outliers but a boxplot is used to conclude if there are any outliers present.

Correlation coefficient, r = -0.9478

The correlation coefficient between memory score and reaction time is -0.95. This confirmed a strong negative linear correlation between the two variables. Therefore, when the memory score increases, the reaction time decreases.

A boxplot is used to identify any outliers present in the data.

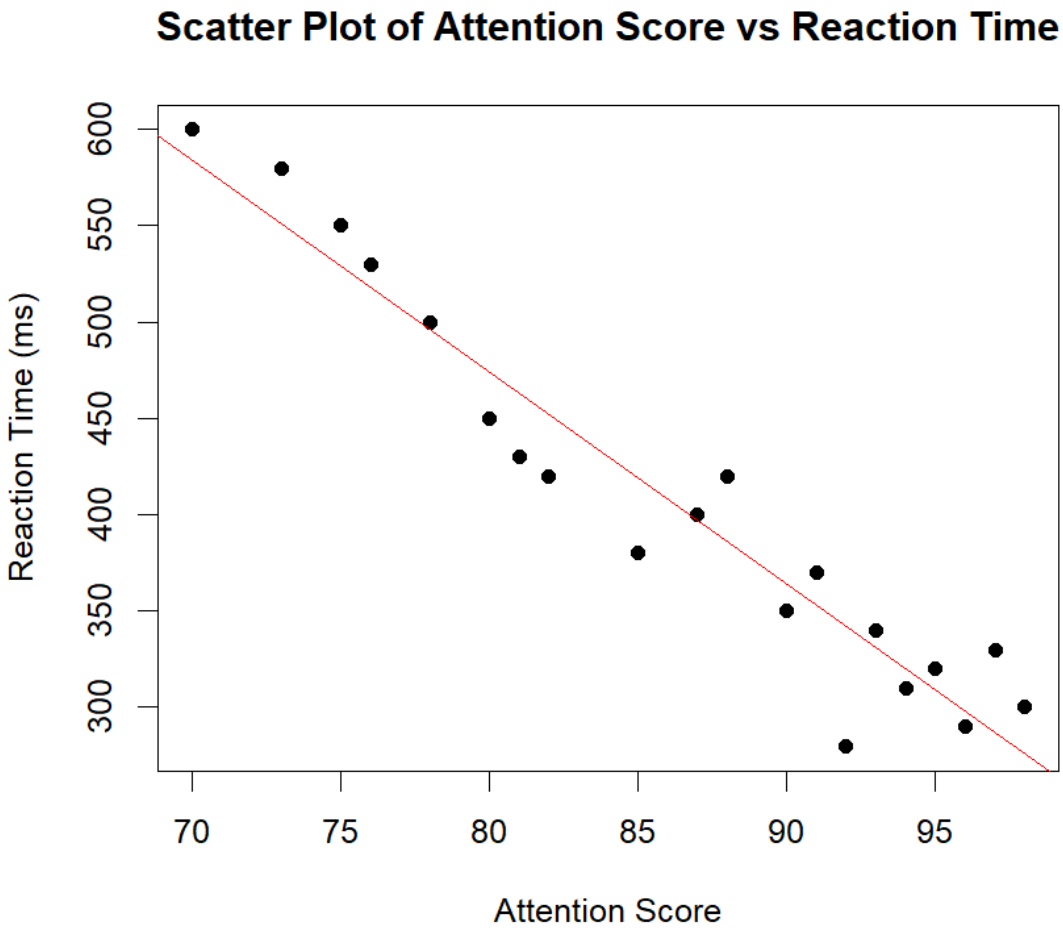




The boxplot does not seem to display any outliers. Therefore, it is concluded that there are no outliers.

Influence of attention score on the reaction time

A scatter plot is used to investigate the relationship between attention score and reaction time.

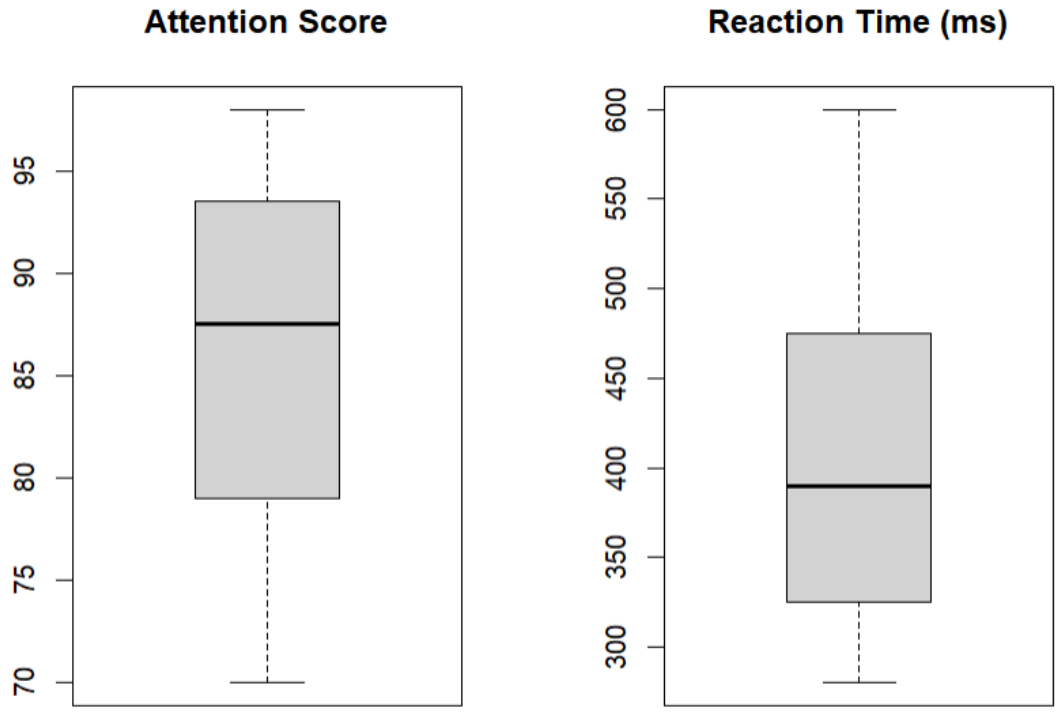


The scatter plot for attention score vs reaction time displays a negative correlation. The scatter plot does not seem to display any outliers but a boxplot is used to conclude if there are any outliers present.

Correlation coefficient, r = -0.9616

The correlation coefficient between attention score and reaction time is -0.96. This confirmed a strong negative linear correlation between the two variables. Therefore, when the attention score increases, the reaction time decreases.

A boxplot is used to identify any outliers present in the data.



The boxplot does not seem to display any outliers. Therefore, it is concluded that there are no outliers.

R Code:

```
#1)
library(readxl)

df <- read_excel("Dataset 1.xlsx")
#print(head(df))

# Filter the data frame
filtered_df <- df[df$Age >= 6 & df$Age <= 80, ]
#print(filtered_df)

mean_value <- mean(filtered_df$'Reaction Time (ms)')
print(mean_value)

#2)
quantile_value <- quantile(filtered_df$'Reaction Time (ms)', probs = 0.7)
print(quantile_value)

#3)
```

```
hist(filtered_df$'Reaction Time (ms)', xlab = "Reaction Time (ms)", main = "Histogram of Reaction Time (ms)")
mode_value <- as.numeric(names(which.max(table(filtered_df$'Reaction Time (ms)'))))
median_value <- median(filtered_df$'Reaction Time (ms)')
abline(v = median_value, col = "red", lwd = 2)
text(median_value, par("usr")[4] - 0.05 * diff(par("usr")[3:4]), "Median", col = "red", pos = 4)

abline(v = mean_value, col="green", lwd = 2)
text(mean_value, par("usr")[4] - 0.1 * diff(par("usr")[3:4]), "Mean", col = "green", pos = 4)

abline(v = mode_value, col="blue", lwd = 2)
text(mode_value, par("usr")[4] - 0.15 * diff(par("usr")[3:4]), "Mode", col = "blue", pos = 4)

density_estimate <- density(filtered_df$'Reaction Time (ms)')
plot(density_estimate,
    xlab = "Reaction Time (ms)",
    main = "Density Plot of Reaction Time (ms)")
abline(v = median_value, col = "red", lwd = 2)
text(median_value, par("usr")[4] - 0.05 * diff(par("usr")[3:4]), "Median", col = "red", pos = 4)

abline(v = mean_value, col="green", lwd = 2)
text(mean_value, par("usr")[4] - 0.1 * diff(par("usr")[3:4]), "Mean", col = "green", pos = 4)

boxplot(filtered_df$'Reaction Time (ms)', xlab = "Boxplot for Reaction Time(ms)", ylab = "Reaction Time(ms)")

qqnorm(filtered_df$'Reaction Time (ms)', ylab = "Reaction Time(ms)", main = "Q-Q plot of Reaction Time(ms)")
qqline(filtered_df$'Reaction Time (ms)')

#4)
#Influence of age on the reaction time
a.correlation <- cor(filtered_df$Age, filtered_df$'Reaction Time (ms)')
print(a.correlation)

plot(filtered_df$Age, filtered_df$`Reaction Time (ms)`,
    main = "Scatter Plot of Age vs Reaction Time",
    xlab = "Age",
    ylab = "Reaction Time (ms)",
    pch = 16)

a_lm_model <- lm(`Reaction Time (ms)` ~ Age, data = filtered_df)
```

```
# Add regression line
abline(a_lm_model, col = "red")

par(mfrow = c(1,2))
boxplot(filtered_df$Age, main="Age")
boxplot(filtered_df$`Reaction Time (ms)`, main="Reaction Time (ms)")

#Influence of memory score on the reaction time
par(mfrow = c(1,1))
m.correlation <- cor(filtered_df$'Memory Score', filtered_df$'Reaction Time (ms)')
print(m.correlation)

plot(filtered_df$'Memory Score', filtered_df$`Reaction Time (ms)`,
    main = "Scatter Plot of Memory Score vs Reaction Time",
    xlab = "Memory Score",
    ylab = "Reaction Time (ms)",
    pch = 16)

m_lm_model <- lm(`Reaction Time (ms)` ~ `Memory Score`, data = filtered_df)

# Add regression line
abline(m_lm_model, col = "red")

par(mfrow = c(1,2))
boxplot(filtered_df$`Memory Score`, main="Memory Score")
boxplot(filtered_df$`Reaction Time (ms)`, main="Reaction Time (ms)")


#Influence of attention score on the reaction time
par(mfrow = c(1,1))
at.correlation <- cor(filtered_df$'Attention Score', filtered_df$'Reaction Time (ms)')
print(at.correlation)

plot(filtered_df$'Attention Score', filtered_df$`Reaction Time (ms)`,
    main = "Scatter Plot of Attention Score vs Reaction Time",
    xlab = "Attention Score",
    ylab = "Reaction Time (ms)",
    pch = 16)

lm_model <- lm(`Reaction Time (ms)` ~ `Attention Score`, data = filtered_df)

# Add regression line
abline(lm_model, col = "red")
```

```
par(mfrow = c(1,2))
boxplot(filtered_df$`Attention Score`, main="Attention Score")
boxplot(filtered_df$`Reaction Time (ms)`, main="Reaction Time (ms)")
```