Ch02 R Codes

Ping-Yang Chen

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Textbook: Montgomery, D. C. (2012). *Design and analysis of experiments*, 8th Edition. John Wiley & Sons.

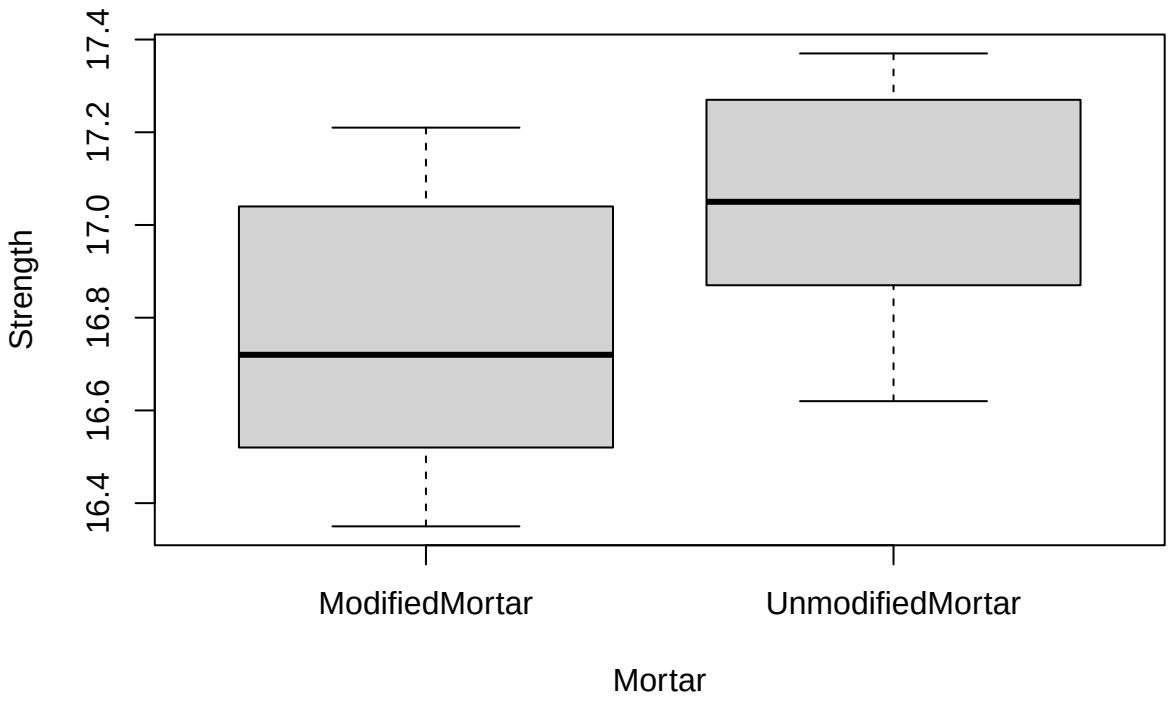
Chapter 2

Read Table 2.1

```
df1 <- read.csv(file.path("data", "2_TensionBondStrength.csv"))
```

Draw grouped boxplot

```
library(reshape2)
df1_L <- stack(df1, select = c("ModifiedMortar","UnmodifiedMortar"))
colnames(df1_L) <- c("Strength", "Mortar")
boxplot(Strength ~ Mortar, data = df1_L)
```



- `mean()`
- `median()`
- `min()` for the minimum,
- `max()` for the maximum,
- `sd()` for the standard deviation and
- `IQR()` for the interquartile range.

- The `summary()` function combines several of these statistics into one function call.

```
sd(df1$ModifiedMortar)
```

```
## [1] 0.3164455
```

```
sd(df1$UnmodifiedMortar)
```

```
## [1] 0.2479158
```

```
summary(df1)
```

```
##        j         ModifiedMortar  UnmodifiedMortar
##  Min.   : 1.00   Min.   :16.35   Min.   :16.62
##  1st Qu.: 3.25   1st Qu.:16.53   1st Qu.:16.90
##  Median : 5.50   Median :16.72   Median :17.05
##  Mean   : 5.50   Mean   :16.76   Mean   :17.04
##  3rd Qu.: 7.75   3rd Qu.:17.02   3rd Qu.:17.23
##  Max.   :10.00   Max.   :17.21   Max.   :17.37
```

```
t.test(df1$ModifiedMortar, df1$UnmodifiedMortar,
       alternative = "two.sided",
       paired = FALSE, var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  df1$ModifiedMortar and df1$UnmodifiedMortar
## t = -2.1869, df = 18, p-value = 0.0422
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.54507339 -0.01092661
## sample estimates:
## mean of x mean of y
##    16.764    17.042
```

t-test unequal variance

Read Table 2.1

```
df2 <- read.csv(file.path("data", "2_Fluorescence.csv"))
```

```
sd(df2$Nerve)
```

```
## [1] 1917.992
```

```
sd(df2$Muscle)
```

```
## [1] 960.5061
```

```
summary(df2)
```

```
##   Observation        Nerve          Muscle
##  Min.   : 1.00   Min.   : 450   Min.   :1130
##  1st Qu.: 3.75   1st Qu.:3689   1st Qu.:1950
##  Median : 6.50   Median :4825   Median :2650
##  Mean   : 6.50   Mean   :4228   Mean   :2534
##  3rd Qu.: 9.25   3rd Qu.:5262   3rd Qu.:3262
##  Max.   :12.00   Max.   :6625   Max.   :3900
```

```r
t.test(df2$Nerve, df2$Muscle,
       alternative = "two.sided",
       paired = FALSE, var.equal = FALSE)
```

```
##
##  Welch Two Sample t-test
##
## data:  df2$Nerve and df2$Muscle
## t = 2.7353, df = 16.191, p-value = 0.01456
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   382.3096 3005.1904
## sample estimates:
## mean of x mean of y
##  4227.917  2534.167
```