One-Way Analysis

Srikar

2021-08-11

Objective:

To check the significance of the factor,"method" on the dataset 'Diet'

Important Terminologies:

*1)**One-Way analysis**- one-way analysis of variance is a technique that*
#can be used to compare whether two samples means are significantly different or not.

*2)**Post-Hoc test**- ANOVA results do not identify which particular differences between pairs of means are significant. Post hoc tests are used to explore differences between multiple groupmeans while controlling the experiment-wise error rate.*

Data Description:

The data set contains information on 76 people who undertook one of three diets (referred to as diet A, B,C and D).
#The aim of the study was to see which diet was best for losing weight. The variable 'Method' describes the various dieting methods
#and WeightL shows how much weight the participants had lost in pounds

```
library(readxl)
data <- read_excel("C:/Users/Srikar/Desktop/Study stuff/R/Sem 5/Design of Exp/Practical 2/dataset.xlsx")
```

```
## Registered S3 methods overwritten by 'tibble':
##   method     from
##   format.tbl pillar
##   print.tbl  pillar
```

```
head(data)
```

```
## Warning: `...` is not empty.
##
## We detected these problematic arguments:
## * `needs_dots`
##
## These dots only exist to allow future extensions and should be empty.
## Did you misspecify an argument?
```

```
## # A tibble: 6 x 2
##   Method WeightL
##   <chr>    <dbl>
## 1 A           21
## 2 A           47
## 3 A           27
## 4 A           75
## 5 A           30
## 6 A           20
```

Hypothesis Testing

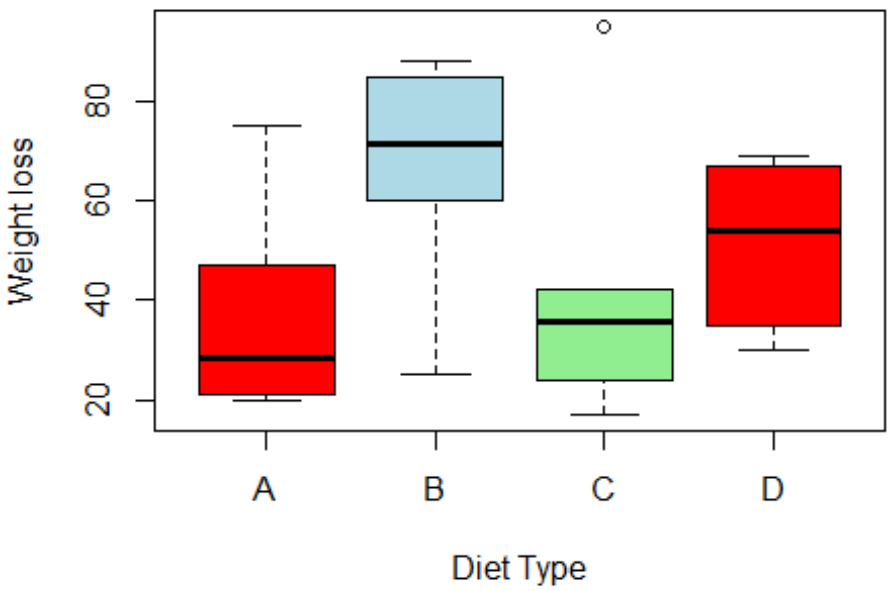
Null Hypothesis (H 0): *There is no significant difference in the different diets*

#Alternative Hypothesis (H 1): *At least two diets have significant difference*

Procedure

#1)Plotting boxplot

```
boxplot(data$WeightL~ data$Method, xlab = "Diet Type",
        ylab = "Weight loss", col = c("red", "light blue", "light green"))
```




```
#2)Computation of Test Statistic and ANOVA table:

model = aov(data$WeightL ~ data$Method)
summary(model)

##             Df Sum Sq Mean Sq F value Pr(>F)
## data$Method  3   3178  1059.4   1.969  0.153
## Residuals   19  10224   538.1

#3)Pairwise Comparison of Means:


library(multcompView)

## Warning: package 'multcompView' was built under R version 3.6.3


exp_tukey = TukeyHSD(model <- aov(data$WeightL ~ data$Method, data = data) )
extract_p(exp_tukey)

## $`data$Method`
##       B-A       C-A       D-A       C-B       D-B       D-C
## 0.1450803 0.9834165 0.7397366 0.2645427 0.6777483 0.9047637
```

Analysis

1) The Pr(>F) value obtained for the data is 0.153. The alpha-value is equal to 0.05. As the

Pr(>F) value is greater than the alpha-value, we may accept the null hypothesis (H0) and reject the alternative hypothesis (H1). Thus, we can say that the mean weight of the different diets are same

2) All of them are not significant as we observe the values of the pariwise comparison test as well

Conclusion:

There is no significance between the different diets followed and all have yeilded the same amount of weight loss