Lab 7

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An experiment was conducted on 20 chicks where al the twenty chicks are treated alike in all respects except the feeding treatmentsand each feeding treatments. Each feeding treatment is given to 5 chicks. Weight gain of baby chicks fed on different feeding materials composed of tropical feed stuffs is given below. To analyze the given data and obtain various conclusions by using CRD.

H0: There is no significant difference in weights of the chicks due to the tropical feed H1: There is a significant difference in weights of the chicks due to the tropical feed Alpha level = 0.05

library(readxl)  
ds=read\_excel("/Users/Jeevan/Desktop/Question1.xlsx")  
attach(ds)  
head(ds)

## # A tibble: 6 x 2  
## Feed Gain  
## <chr> <dbl>  
## 1 A 55  
## 2 A 49  
## 3 A 42  
## 4 A 21  
## 5 A 52  
## 6 B 61

model <- aov(Gain ~ Feed, data=ds)  
summary(model)

## Df Sum Sq Mean Sq F value Pr(>F)   
## Feed 3 26235 8745 12.11 0.000218 \*\*\*  
## Residuals 16 11559 722   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Since p-value = 0.000151 < 0.05 = alpha value, we reject the null hypothesis and proceed with post-hoc test. The alternate hypothesis: there is a significant difference between mean weights of the chicks due to tropical feed, is accepted.

library(agricolae)

## Warning: package 'agricolae' was built under R version 3.5.2

out <- LSD.test(model, "Feed", p.adj = "bonferroni", alpha = 0.01)  
out

## $statistics  
## MSerror Df Mean CV t.value MSD  
## 722.425 16 84.75 31.71441 3.772509 64.12932  
##   
## $parameters  
## test p.ajusted name.t ntr alpha  
## Fisher-LSD bonferroni Feed 4 0.01  
##   
## $means  
## Gain std r LCL UCL Min Max Q25 Q50 Q75  
## A 43.8 13.62718 5 8.691646 78.90835 21 55 42 49 52  
## B 71.0 31.02418 5 35.891646 106.10835 30 112 61 63 89  
## C 81.4 22.87575 5 46.291646 116.50835 42 97 81 92 95  
## D 142.8 34.90272 5 107.691646 177.90835 85 169 137 154 169  
##   
## $comparison  
## NULL  
##   
## $groups  
## Gain groups  
## D 142.8 a  
## C 81.4 ab  
## B 71.0 b  
## A 43.8 b  
##   
## attr(,"class")  
## [1] "group"

The result of the post-hoc test is obtained successfully.

The given data represents the number of units of production per day turned out by differentworkers using 4 different types of machines. To test whether the five men differ with respect to mean productivity and if the mean productivity is the same for the four different machines types.The experiment was carried out in a Randomized Complete Block Design (RCBD).

Blocks H0: There is no significant difference between the means of the different blocks. HI: There is a significant difference between atleast one pair of means of the different blocks. Factor 2 H0: There is no significant difference between the means of the different treatments. H1: There is a significant difference between atleast one pair of means of the different treatments. Alpha level = 0.05

library(readxl)  
df=read\_excel("/Users/Jeevan/Desktop/Question2.xlsx")  
head(df)

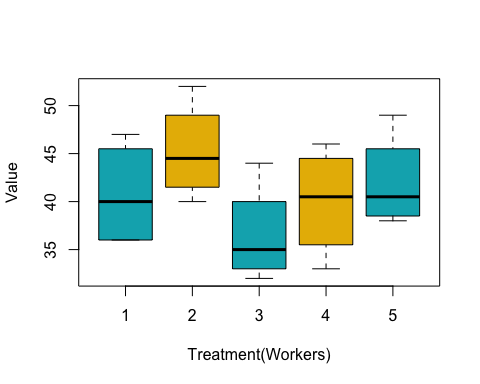
## # A tibble: 6 x 3  
## Workers Machine Value  
## <dbl> <chr> <dbl>  
## 1 1 A 44  
## 2 1 B 36  
## 3 1 C 47  
## 4 1 D 36  
## 5 2 A 46  
## 6 2 B 40

attach(df)

df$Workers<-as.factor(df$Workers)  
df$Machine<-as.factor(df$Machine) #block=Machine= ABCD   
str(df)

## Classes 'tbl\_df', 'tbl' and 'data.frame': 20 obs. of 3 variables:  
## $ Workers: Factor w/ 5 levels "1","2","3","4",..: 1 1 1 1 2 2 2 2 3 3 ...  
## $ Machine: Factor w/ 4 levels "A","B","C","D": 1 2 3 4 1 2 3 4 1 2 ...  
## $ Value : num 44 36 47 36 46 40 52 43 34 36 ...

boxplot(df$Value~ df$Workers, xlab = "Treatment(Workers)", ylab = "Value",col = c("#00AFBB", "#E7B800"))



m1<- aov(df$Value ~ df$Workers + df$Machine)  
summary(m1)

## Df Sum Sq Mean Sq F value Pr(>F)   
## df$Workers 4 161.3 40.33 6.026 0.006748 \*\*   
## df$Machine 3 348.2 116.07 17.345 0.000116 \*\*\*  
## Residuals 12 80.3 6.69   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Probability value for treatment is less than 0.05. Hence, the treatments are significantly different. We proceed with post-hoc test.

lm1 <- lm(df$Value ~ df$Workers+df$Machine)  
library(lsmeans)

## Loading required package: emmeans

## Warning: package 'emmeans' was built under R version 3.5.2

## The 'lsmeans' package is now basically a front end for 'emmeans'.  
## Users are encouraged to switch the rest of the way.  
## See help('transition') for more information, including how to  
## convert old 'lsmeans' objects and scripts to work with 'emmeans'.

lsm1 <- lsmeans(lm1,"Workers")  
pairs(lsm1)

## contrast estimate SE df t.ratio p.value  
## 1 - 2 -4.50 1.83 12 -2.460 0.1648   
## 1 - 3 4.25 1.83 12 2.323 0.2030   
## 1 - 4 0.75 1.83 12 0.410 0.9933   
## 1 - 5 -1.25 1.83 12 -0.683 0.9564   
## 2 - 3 8.75 1.83 12 4.784 0.0033   
## 2 - 4 5.25 1.83 12 2.870 0.0852   
## 2 - 5 3.25 1.83 12 1.777 0.4285   
## 3 - 4 -3.50 1.83 12 -1.913 0.3612   
## 3 - 5 -5.50 1.83 12 -3.007 0.0678   
## 4 - 5 -2.00 1.83 12 -1.093 0.8067   
##   
## Results are averaged over the levels of: Machine   
## P value adjustment: tukey method for comparing a family of 5 estimates

Results are averaged over the levels of: Machines P value adjustment: tukey method for comparing a family of 5 estimates