

Stats Lab Exp 9

Model for One Way Anova

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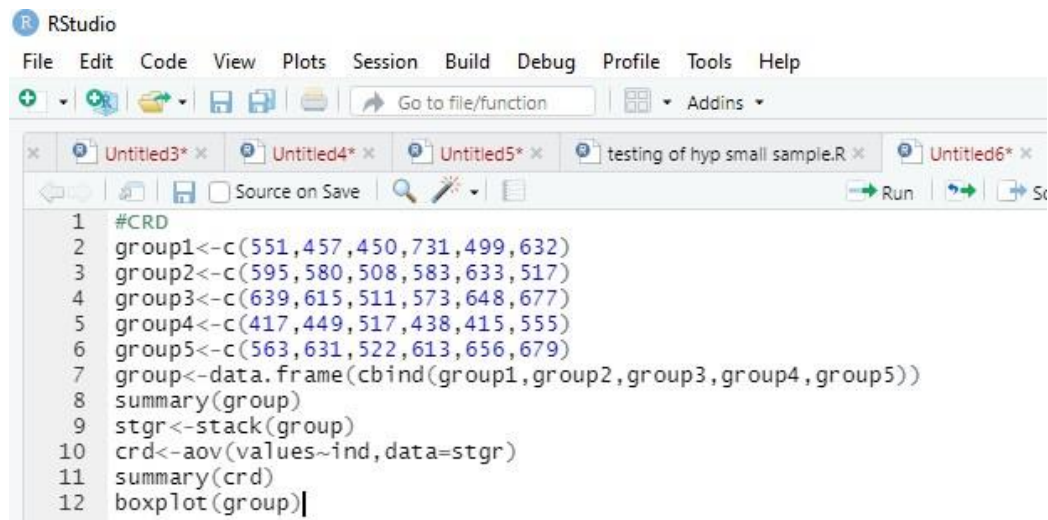
Course - MAT2001 L19-L20

Date: 13-06-2021

CRD and RBD

Code for CRD:

```
#CRD
group1<-c(551,457,450,731,499,632)
group2<-c(595,580,508,583,633,517)
group3<-c(639,615,511,573,648,677)
group4<-c(417,449,517,438,415,555)
group5<-c(563,631,522,613,656,679)
group<-data.frame(cbind(group1,group2,group3,group4,group5))
summary(group)
stgr<-stack(group)
crd<-aov(values~ind,data=stgr)
summary(crd)
boxplot(group)
```

A screenshot of the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for file operations and a search bar. The main editor window shows a script with 12 lines of R code, numbered 1 to 12. The code defines five groups of data, combines them into a data frame, and performs an ANOVA test. The code is as follows:

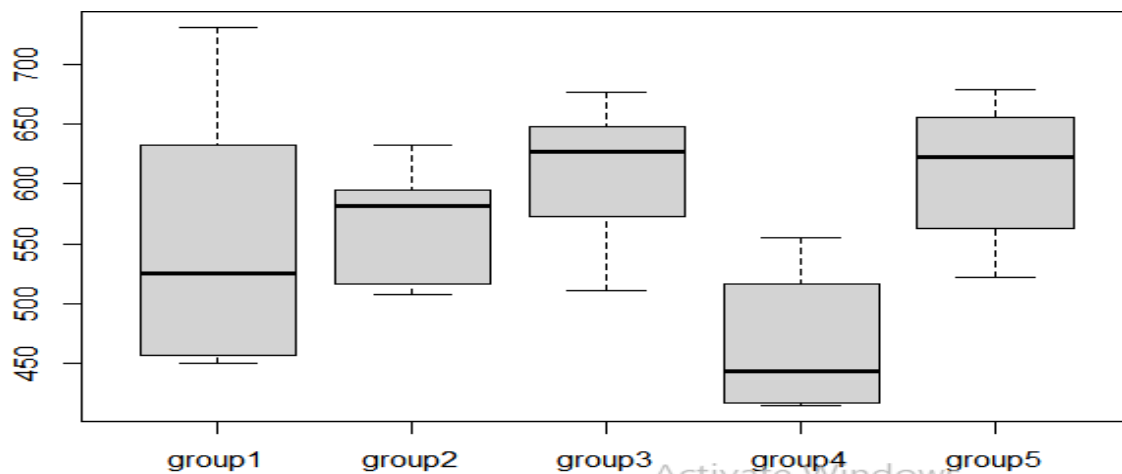
```
1 #CRD
2 group1<-c(551,457,450,731,499,632)
3 group2<-c(595,580,508,583,633,517)
4 group3<-c(639,615,511,573,648,677)
5 group4<-c(417,449,517,438,415,555)
6 group5<-c(563,631,522,613,656,679)
7 group<-data.frame(cbind(group1,group2,group3,group4,group5))
8 summary(group)
9 stgr<-stack(group)
10 crd<-aov(values~ind,data=stgr)
11 summary(crd)
12 boxplot(group)
```

The script is titled 'testing of hyp small sample.R'. The bottom status bar shows 'Run' and 'Source on Save' options.

```

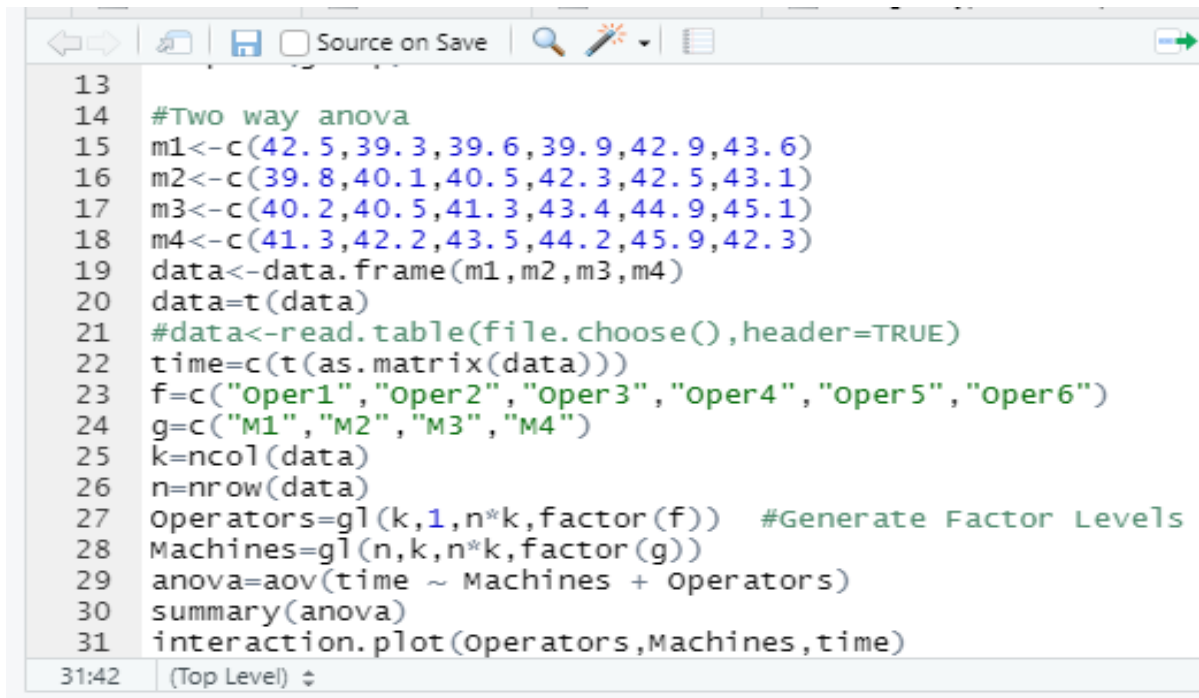
12:15 (Top Level) R Script
Console Terminal Jobs
> #CRD
> group1<-c(551,457,450,731,499,632)
> group2<-c(595,580,508,583,633,517)
> group3<-c(639,615,511,573,648,677)
> group4<-c(417,449,517,438,415,555)
> group5<-c(563,631,522,613,656,679)
> group<-data.frame(cbind(group1,group2,group3,group4,group5))
> summary(group)
      group1      group2      group3      group4      group5
Min.   :450.0   Min.   :508.0   Min.   :511.0   Min.   :415.0   Min.   :522.0
1st Qu.:467.5   1st Qu.:532.8   1st Qu.:583.5   1st Qu.:422.2   1st Qu.:575.5
Median :525.0   Median :581.5   Median :627.0   Median :443.5   Median :622.0
Mean   :553.3   Mean   :569.3   Mean   :610.5   Mean   :465.2   Mean   :610.7
3rd Qu.:611.8   3rd Qu.:592.0   3rd Qu.:645.8   3rd Qu.:500.0   3rd Qu.:649.8
Max.   :731.0   Max.   :633.0   Max.   :677.0   Max.   :555.0   Max.   :679.0
> stgr<-stack(group)
> crd<-aov(values~ind,data=stgr)
> summary(crd)
      Df Sum Sq Mean Sq F value Pr(>F)
ind      4  85356    21339   4.302 0.00875 **
Residuals 25 124020     4961
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> boxplot(group)
>

```



Code for Question Number 2: RBD

```
#Two way anova
m1<-c(42.5,39.3,39.6,39.9,42.9,43.6)
m2<-c(39.8,40.1,40.5,42.3,42.5,43.1)
m3<-c(40.2,40.5,41.3,43.4,44.9,45.1)
m4<-c(41.3,42.2,43.5,44.2,45.9,42.3)
data<-data.frame(m1,m2,m3,m4)
data=t(data)
#data<-read.table(file.choose(),header=TRUE)
time=c(t(as.matrix(data)))
f=c("Oper1", "Oper2", "Oper3", "Oper4", "Oper5", "Oper6")
g=c("M1", "M2", "M3", "M4")
k=ncol(data)
n=nrow(data)
Operators=gl(k,1,n*k,factor(f)) #Generate Factor Levels
Machines=gl(n,k,n*k,factor(g))
anova=aov(time ~ Machines + Operators)
summary(anova)
interaction.plot(Operators,Machines,time)
```



```
13
14 #Two way anova
15 m1<-c(42.5,39.3,39.6,39.9,42.9,43.6)
16 m2<-c(39.8,40.1,40.5,42.3,42.5,43.1)
17 m3<-c(40.2,40.5,41.3,43.4,44.9,45.1)
18 m4<-c(41.3,42.2,43.5,44.2,45.9,42.3)
19 data<-data.frame(m1,m2,m3,m4)
20 data=t(data)
21 #data<-read.table(file.choose(),header=TRUE)
22 time=c(t(as.matrix(data)))
23 f=c("Oper1", "Oper2", "Oper3", "Oper4", "Oper5", "Oper6")
24 g=c("M1", "M2", "M3", "M4")
25 k=ncol(data)
26 n=nrow(data)
27 operators=gl(k,1,n*k,factor(f)) #Generate Factor Levels
28 Machines=gl(n,k,n*k,factor(g))
29 anova=aov(time ~ Machines + Operators)
30 summary(anova)
31 interaction.plot(Operators,Machines,time)
```

31:42 (Top Level) ↕

```

Console Terminal x Jobs x
~/
> #Two way anova
> m1<-c(42.5,39.3,39.6,39.9,42.9,43.6)
> m2<-c(39.8,40.1,40.5,42.3,42.5,43.1)
> m3<-c(40.2,40.5,41.3,43.4,44.9,45.1)
> m4<-c(41.3,42.2,43.5,44.2,45.9,42.3)
> data<-data.frame(m1,m2,m3,m4)
> data=t(data)
> #data<-read.table(file.choose(),header=TRUE)
> time=c(t(as.matrix(data)))
> f=c("Oper1","Oper2","Oper3","Oper4","Oper5","Oper6")
> g=c("M1","M2","M3","M4")
> k=ncol(data)
> n=nrow(data)
> Operators=gl(k,1,n*k,factor(f)) #Generate Factor Levels
> Machines=gl(n,k,n*k,factor(g))
> anova=aov(time ~ Machines + Operators)
> summary(anova)
              Df Sum Sq Mean Sq F value    Pr(>F)
Machines      3  15.92    5.308     3.339 0.04790 *
Operators     5  42.09    8.417     5.294 0.00533 **
Residuals    15   23.85     1.590
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> interaction.plot(Operators,Machines,time)
> |

```

