Anova family task

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tutorialanova <- read.csv(file.choose(), header = T)  
attach(tutorialanova)

# check normality

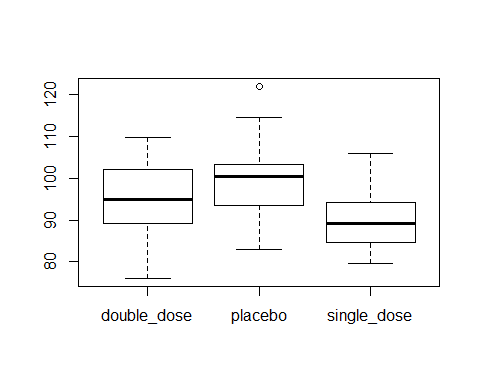
library(knitr)  
library(moments)  
skewness(FBS)

## [1] 0.3448501

shapiro.test(FBS)

##   
## Shapiro-Wilk normality test  
##   
## data: FBS  
## W = 0.98356, p-value = 0.2549

boxplot(FBS~Treatment, data = tutorialanova)



# p- value in shapiro test is more than 0.05 so the sample is normally distributed # we will apply parameteric test (ANOVA FAMILY)

#one way ANOVA

anova1 <- aov(FBS~Treatment, data = tutorialanova)  
summary(anova1)

## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1556 777.8 12.06 2.12e-05 \*\*\*  
## Residuals 96 6191 64.5   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

TukeyHSD(anova1)

## Tukey multiple comparisons of means  
## 95% family-wise confidence level  
##   
## Fit: aov(formula = FBS ~ Treatment, data = tutorialanova)  
##   
## $Treatment  
## diff lwr upr p adj  
## placebo-double\_dose 4.968588 0.2621729 9.67500286 0.0360170  
## single\_dose-double\_dose -4.740552 -9.4469665 -0.03413654 0.0479501  
## single\_dose-placebo -9.709139 -14.4155544 -5.00272442 0.0000110

## the general p-value is highly significant so we will reject null hypothesis.

# then in post hook test the single dose is the most significant in the level of FBS.

# two way ANOVA

anova2 <- aov(FBS~Treatment+vitamin.B, data = tutorialanova)  
summary(anova2)

## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1556 777.8 11.989 2.28e-05 \*\*\*  
## vitamin.B 1 27 27.4 0.423 0.517   
## Residuals 95 6164 64.9   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

TukeyHSD(anova2)

## Tukey multiple comparisons of means  
## 95% family-wise confidence level  
##   
## Fit: aov(formula = FBS ~ Treatment + vitamin.B, data = tutorialanova)  
##   
## $Treatment  
## diff lwr upr p adj  
## placebo-double\_dose 4.968588 0.2471754 9.69000036 0.0367548  
## single\_dose-double\_dose -4.740552 -9.4619640 -0.01913903 0.0488457  
## single\_dose-placebo -9.709139 -14.4305519 -4.98772691 0.0000119  
##   
## $vitamin.B  
## diff lwr upr p adj  
## yes -no -1.052185 -4.266619 2.162248 0.517367

# p value of vitamine is more than 0.05 so it is not significant and hasn’t any effect on FBS

# still single dose is most significant and more efficient

# one way ANCOVA

ancova1 <- aov(FBS~Treatment+Age, data = tutorialanova)  
summary(ancova1)

## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1556 777.8 11.971 2.31e-05 \*\*\*  
## Age 1 18 17.9 0.276 0.601   
## Residuals 95 6173 65.0   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

TukeyHSD(ancova1)

## Warning in replications(paste("~", xx), data = mf): non-factors ignored:  
## Age

## Warning in TukeyHSD.aov(ancova1): 'which' specified some non-factors which  
## will be dropped

## Tukey multiple comparisons of means  
## 95% family-wise confidence level  
##   
## Fit: aov(formula = FBS ~ Treatment + Age, data = tutorialanova)  
##   
## $Treatment  
## diff lwr upr p adj  
## placebo-double\_dose 4.968588 0.2435334 9.69364238 0.0369341  
## single\_dose-double\_dose -4.740552 -9.4656060 -0.01549701 0.0490643  
## single\_dose-placebo -9.709139 -14.4341939 -4.98408489 0.0000120

# p value of Age is more than 0.05 so it is not significant.

# p value of single dose is the most significant

# two way ANCOVA

ancova2 <- aov(FBS~Treatment+vitamin.B+Age, data = tutorialanova)  
summary.aov(ancova2)

## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1556 777.8 11.908 2.46e-05 \*\*\*  
## vitamin.B 1 27 27.4 0.420 0.519   
## Age 1 23 23.4 0.359 0.551   
## Residuals 94 6140 65.3   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# p value of vitamine b and age is not significant. so there is no effect on FBS.

# one way MANOVA

manova1 <- manova(cbind(FBS,HbA1c) ~Treatment, data = tutorialanova)  
summary.aov(manova1)

## Response FBS :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1555.7 777.85 12.062 2.123e-05 \*\*\*  
## Residuals 96 6191.0 64.49   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response HbA1c :  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Treatment 2 0.01540 0.0076980 1.7034 0.1875  
## Residuals 96 0.43384 0.0045191

# the p value of FBS is only significant and there is any efficacy of treatments on HBA1c.so the treatment only affect FBS

# two way MANOVA

manova2 <- manova(cbind(FBS, HbA1c)~Treatment+vitamin.B, data = tutorialanova)  
summary.aov(manova2)

## Response FBS :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1555.7 777.85 11.9891 2.276e-05 \*\*\*  
## vitamin.B 1 27.4 27.42 0.4226 0.5172   
## Residuals 95 6163.6 64.88   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response HbA1c :  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Treatment 2 0.01540 0.0076980 1.6857 0.1908  
## vitamin.B 1 0.00002 0.0000177 0.0039 0.9505  
## Residuals 95 0.43382 0.0045665

# still p value of the treatment on FBS is highly significant and there is no effect of vitamine b on FBS and HbA1c

# one way MANCOVA

mancova1 <- manova(cbind(FBS, HbA1c)~Treatment+Age, data = tutorialanova)  
summary.aov(mancova1)

## Response FBS :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1555.7 777.85 11.9706 2.31e-05 \*\*\*  
## Age 1 17.9 17.91 0.2756 0.6008   
## Residuals 95 6173.1 64.98   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response HbA1c :  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Treatment 2 0.01540 0.0076980 1.7300 0.1828  
## Age 1 0.01113 0.0111255 2.5004 0.1171  
## Residuals 95 0.42271 0.0044496

# p value of treatment on FBS only still highly significant

# two way MANCOVA

mancova2 <- manova(cbind(FBS, HbA1c)~Treatment+vitamin.B+Age, data = tutorialanova)  
summary.aov(mancova2)

## Response FBS :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Treatment 2 1555.7 777.85 11.9082 2.457e-05 \*\*\*  
## vitamin.B 1 27.4 27.42 0.4198 0.5186   
## Age 1 23.4 23.44 0.3588 0.5506   
## Residuals 94 6140.1 65.32   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response HbA1c :  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Treatment 2 0.01540 0.0076980 1.7129 0.1859  
## vitamin.B 1 0.00002 0.0000177 0.0039 0.9501  
## Age 1 0.01136 0.0113633 2.5284 0.1152  
## Residuals 94 0.42246 0.0044942

# p value is highly significant only treatment on FBS.