Multivariate-sec17-DA

Mehrab Atighi

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part1:

library(haven)  
library(klaR)

## Warning: package 'klaR' was built under R version 4.1.2

## Loading required package: MASS

library(MASS)  
data = read\_sav("F:/lessons/Multi Countios Variate2/data/Table 8.3 football.sav")  
#View(data)  
m1<-manova(cbind(data$WDIM,data$CIRCUM,data$FBEYE,data$EYEHD,  
 data$EARHD,data$JAW)~data$group)  
(s\_m1 = summary(m1))

## Df Pillai approx F num Df den Df Pr(>F)   
## data$group 1 0.45505 11.551 6 83 2.318e-09 \*\*\*  
## Residuals 88   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

E\_matrix = s\_m1$SS$Residuals  
(err = diag(E\_matrix / 87))

## [1] 0.4284368 3.3791052 0.5515260 2.0932050 0.7514221 0.3774489

m2 = lda(group~. ,data = data ,method = "moment")  
a1 = m2$scaling  
round((a\_star= sqrt(err) \* a1[,1]) ,digits = 3)

## WDIM CIRCUM FBEYE EYEHD EARHD JAW   
## 0.621 -0.007 -0.005 -0.937 -0.437 -0.509

#for froward method we have:  
m2

## Call:  
## lda(group ~ ., data = data, method = "moment")  
##   
## Prior probabilities of groups:  
## 1 2 3   
## 0.3333333 0.3333333 0.3333333   
##   
## Group means:  
## WDIM CIRCUM FBEYE EYEHD EARHD JAW  
## 1 15.20 58.93700 20.10833 13.08333 14.73333 12.26667  
## 2 15.42 57.37967 19.80333 10.08000 13.45333 11.94333  
## 3 15.58 57.77000 19.81000 10.94667 13.69667 11.80333  
##   
## Coefficients of linear discriminants:  
## LD1 LD2  
## WDIM 0.948423100 1.4067750094  
## CIRCUM -0.003639865 -0.0005126312  
## FBEYE -0.006439599 -0.0286176430  
## EYEHD -0.647483088 0.5402700415  
## EARHD -0.504360916 -0.3839132257  
## JAW -0.828535064 -1.5288556226  
##   
## Proportion of trace:  
## LD1 LD2   
## 0.943 0.057

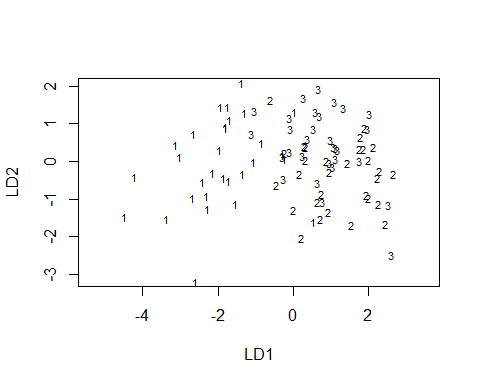
(M1 = greedy.wilks(group~ . , data = data))

## Formula containing included variables:   
##   
## group ~ EYEHD + WDIM + JAW + EARHD  
## <environment: 0x00000000126b09b0>  
##   
##   
## Values calculated in each step of the selection procedure:   
##   
## vars Wilks.lambda F.statistics.overall p.value.overall F.statistics.diff  
## 1 EYEHD 0.4278892 58.16183 9.181503e-17 58.161826  
## 2 WDIM 0.4003001 24.96348 2.604034e-16 2.963612  
## 3 JAW 0.3382838 20.38104 6.677444e-18 7.791368  
## 4 EARHD 0.3071512 16.89162 2.888334e-18 4.257081  
## p.value.diff  
## 1 9.181503e-17  
## 2 5.686808e-02  
## 3 7.765645e-04  
## 4 1.729878e-02

pp= predict(m2)  
head(pp$x)

## LD1 LD2  
## 1 -1.7152350 -0.5295425  
## 2 -1.3461862 -0.3263871  
## 3 0.5355641 -1.6034251  
## 4 -1.8066103 0.8965488  
## 5 -2.6834723 -0.9723178  
## 6 -2.5978793 -3.1988809

plot(m2)

 part2:

data=read.table("F:/lessons/Multi countios Variate2/data/apple-data.txt" , header = TRUE)  
tail(data , 4)

## group y1 y2 y3 y4  
## 45 6 1.05 1.949 3.34 0.610  
## 46 6 1.07 2.251 3.21 0.562  
## 47 6 1.13 3.064 3.63 0.707  
## 48 6 1.11 2.469 3.95 0.952

library(klaR)  
library(MASS)  
attach(data)  
(m1 = greedy.wilks(group~. , data = data))

## Formula containing included variables:   
##   
## group ~ y4 + y3 + y2  
## <environment: 0x0000000012d568e8>  
##   
##   
## Values calculated in each step of the selection procedure:   
##   
## vars Wilks.lambda F.statistics.overall p.value.overall F.statistics.diff  
## 1 y4 0.4086057 12.157716 2.586901e-07 12.157716  
## 2 y3 0.2655484 7.712631 1.428716e-08 4.417536  
## 3 y2 0.1599170 6.964237 1.899753e-10 5.284314  
## p.value.diff  
## 1 2.586901e-07  
## 2 2.536579e-03  
## 3 7.761966e-04

(M1 = lda(group~ . ,data= data ))

## Call:  
## lda(group ~ ., data = data)  
##   
## Prior probabilities of groups:  
## 1 2 3 4 5 6   
## 0.1666667 0.1666667 0.1666667 0.1666667 0.1666667 0.1666667   
##   
## Group means:  
## y1 y2 y3 y4  
## 1 1.13750 2.977125 3.73875 0.871125  
## 2 1.15750 3.109125 4.51500 1.280500  
## 3 1.10750 2.815250 4.45500 1.391375  
## 4 1.09750 2.879750 3.90625 1.039000  
## 5 1.08000 2.557250 4.31250 1.181000  
## 6 1.03625 2.214625 3.59625 0.735000  
##   
## Coefficients of linear discriminants:  
## LD1 LD2 LD3 LD4  
## y1 3.0479952 -1.140083 -1.002448 23.419063  
## y2 -1.7025953 -1.215888 1.672714 -3.076804  
## y3 4.2332645 7.166403 3.045553 -2.011416  
## y4 -0.4785144 -11.520302 -5.506192 3.101660  
##   
## Proportion of trace:  
## LD1 LD2 LD3 LD4   
## 0.6421 0.2707 0.0784 0.0089