act_NormMultivar

Carlos David Contreras Chacon

2022-09-22

La normal multivariada

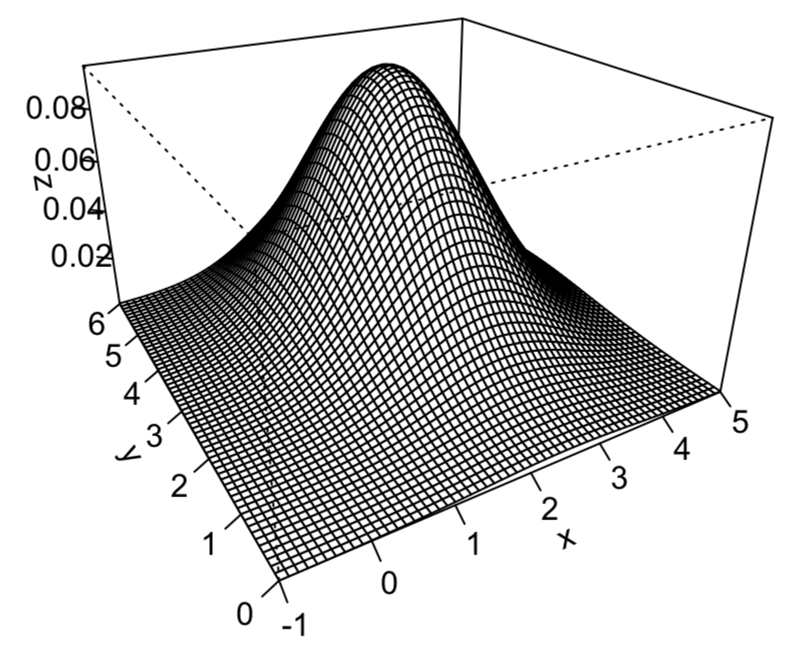
1

```
library(mnormt)
x = c(2,3)
miu = c(2.5, 4)
sigma = matrix(c(1.2, 0, 0, 2.3), nrow=2)
pmnorm(x, miu, sigma)
```

```
## [1] 0.08257333
```

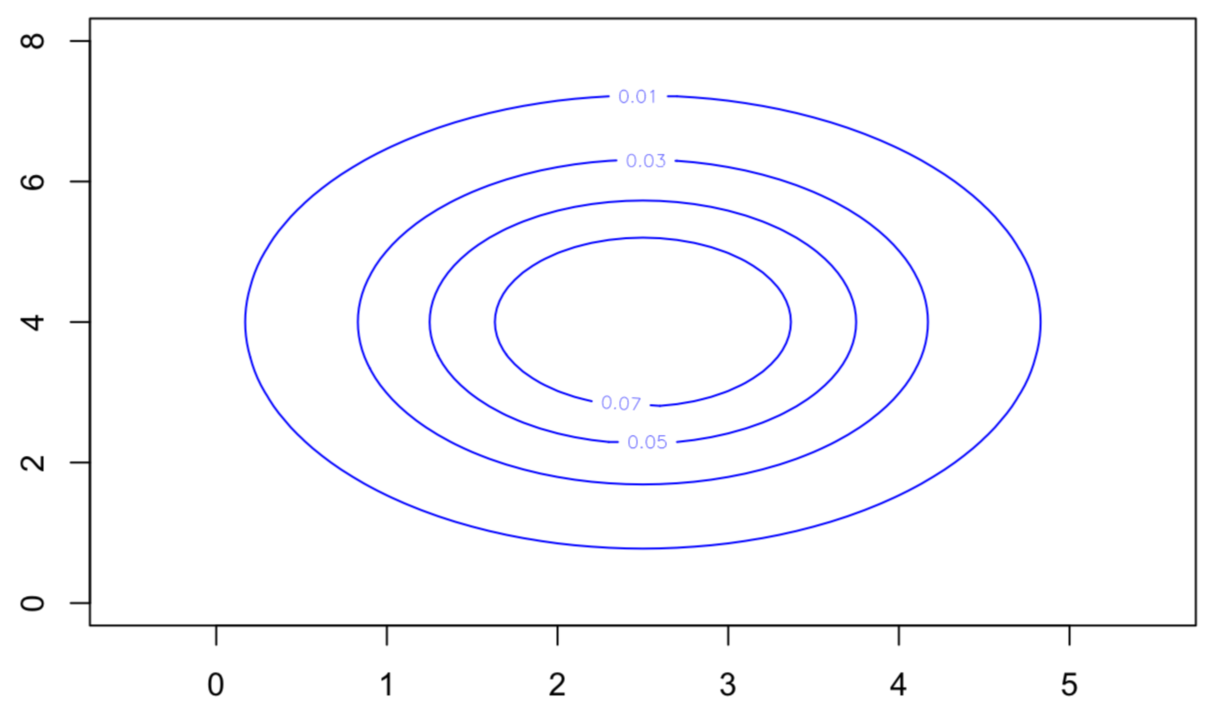
2

```
x <- seq(-3+2, 3+2, 0.1)
y <- seq(-3+3, 3+3, 0.1)
mu <- c(2.5, 4)
sigma = matrix(c(1.2, 0, 0, 2.3), nrow=2)
f <- function(x, y) dmnorm(cbind(x, y), mu, sigma)
z <- outer(x, y, f)
#create surface plot
persp(x, y, z, theta=-30, phi=25, expand=0.6, ticktype='detailed')
```



3

```
x <- seq(-3+2.5, 3+2.5, 0.1)
y <- seq(-4+4, 4+4, 0.1)
mu <- c(2.5, 4)
sigma = matrix(c(1.2, 0, 0, 2.3), nrow=2)
f <- function(x, y) dmnorm(cbind(x, y), mu, sigma)
z <- outer(x, y, f)
#create contour plot
contour(x, y, z, col = "blue", levels = c(0.01, 0.03, 0.05, 0.07, 1))
```

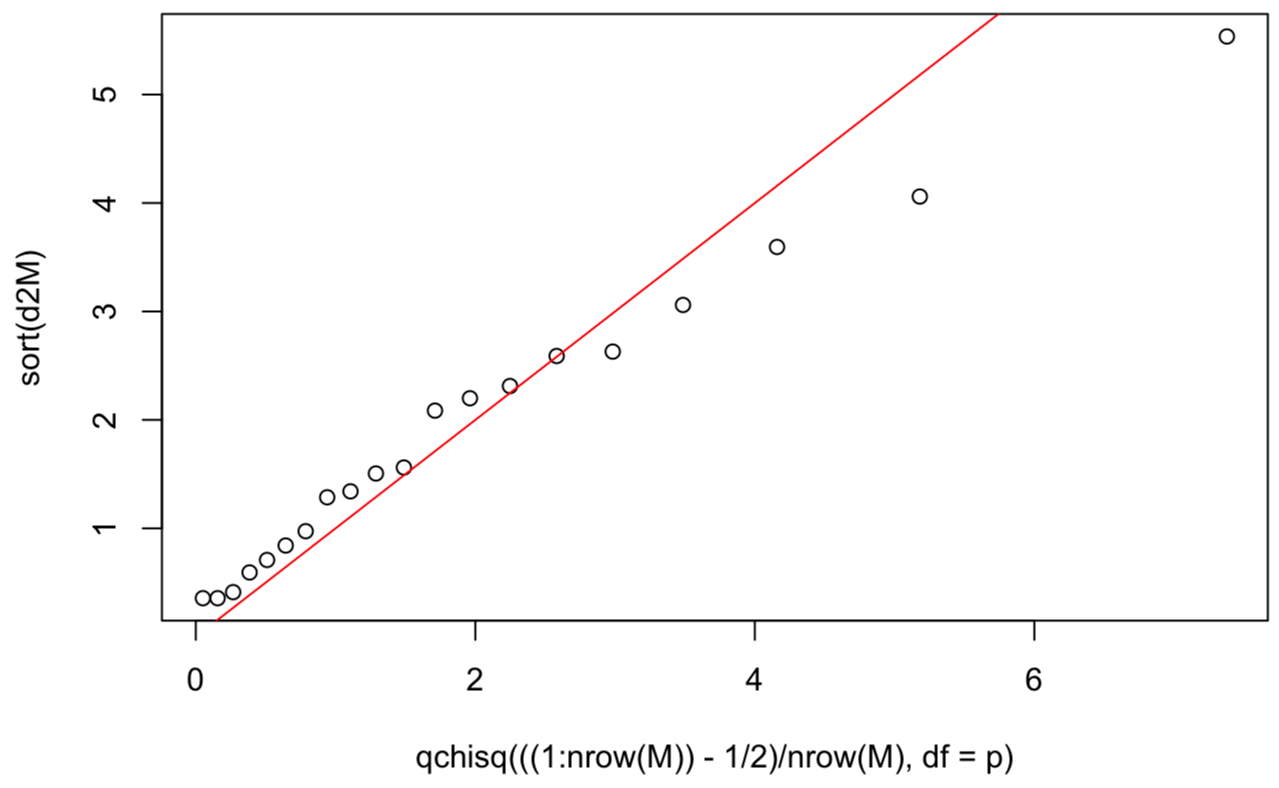


4

```
library(MVN)
M = read.csv("datos.csv")

p = 2        #indica que se trata de dos variables
# Vector de medias
X = colMeans(M)
#Matriz de covarianza
S = cov(M)
#Distancia de Mahalanobis
d2M =  mahalanobis(M,X,S)

#Multinormalidad Test gráfico Q-Q Plot
plot(qchisq(((1:nrow(M)) - 1/2)/nrow(M),df=p),sort( d2M ) )
abline(a=0, b=1,col="red")
```



```
## Test de Multinomalidad: Método Sesgo y kurtosis de Mardia
mvn(M,subset = NULL,mvn = "mardia", covariance = FALSE,showOutliers = FALSE)
```

```
## $multivariateNormality
##              Test         Statistic           p value Result
## 1 Mardia Skewness  3.59823747819632  0.46309914697164    YES
## 2 Mardia Kurtosis -1.43530997731026 0.151198785877334    YES
## 3             MVN              <NA>              <NA>    YES
##
## $univariateNormality
##               Test  Variable Statistic   p value Normality
## 1 Anderson-Darling     x        1.2355    0.0024    NO
## 2 Anderson-Darling     y        0.2451    0.7257    YES
##
## $Descriptives
##    n Mean   Std.Dev Median Min Max 25th  75th      Skew   Kurtosis
## x 20 0.18 0.1361114    0.1 0.0 0.5 0.10 0.225 0.8185140 -0.3698838
## y 20 5.04 1.0054588    5.0 3.3 6.7 4.35 5.850 0.1357527 -1.2067384
```