Metodos_estadisticos

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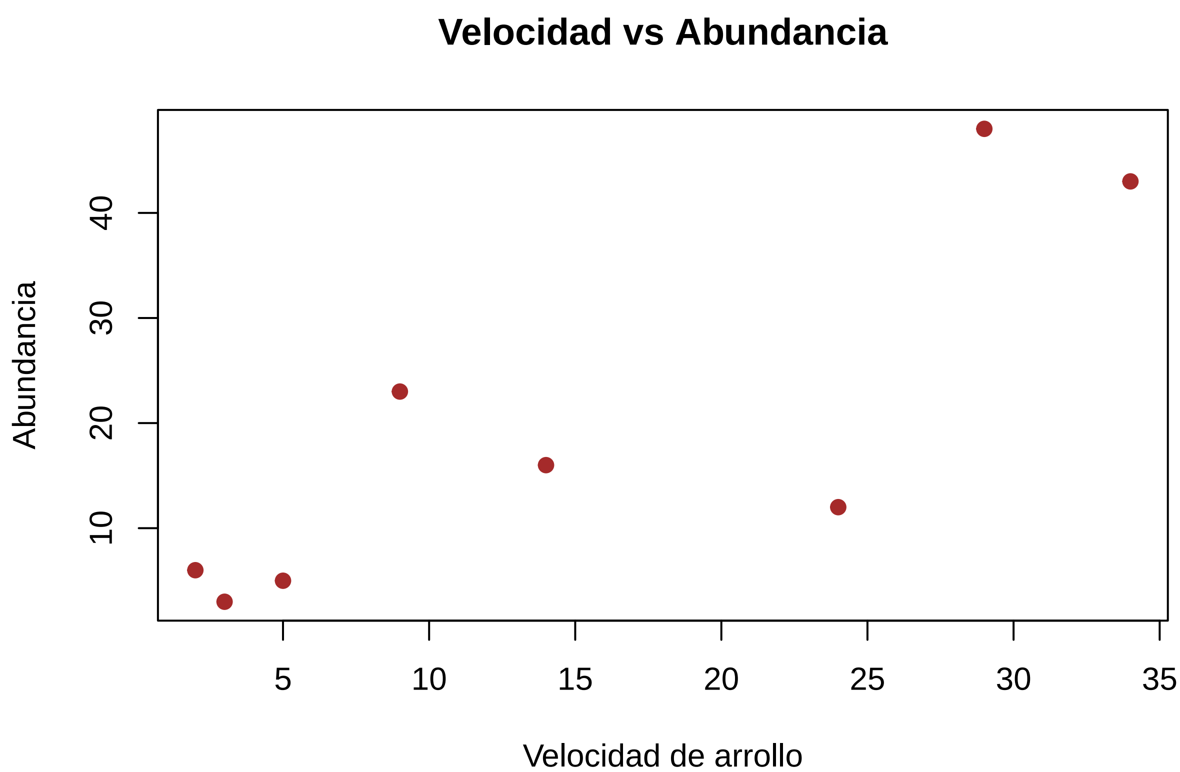
2025-10-02

```r
############################
# METODOS ESTADISTICOS
# 02/10/1025
# CORRELACIÓN
# Valeria
############################

####################################################
# Ejercicio 1: Correlación entre velocidad y abundancia de efímeras
######################################################

# Datos
speed <- c(2,3,5,9,14,24,29,34)
abundance <- c(6,3,5,23,16,12,48,43)

# Gráfico: Crear un diagrama de dispersión para visualisar los datos
plot(speed, abundance,
     main = "Velocidad vs Abundancia",
     xlab = "Velocidad de arrollo",
     ylab = "Abundancia",
     pch = 19, col = "brown")
```




```r
# Correlación de Pearson
# cor.test() realiza una prueba de correlación y nos da valores de p-value y r
cor.test(speed, abundance, method = "pearson")
```

```
##
##  Pearson's product-moment correlation
##
## data:  speed and abundance
## t = 3.8568, df = 6, p-value = 0.008393
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.3442317 0.9711386
## sample estimates:
##       cor
## 0.8441408
```

```r
#¿Es estadísticamente significativa la correlación?
# como p-value= 0.008 < 0.05 es estadisticamente significativa
```

```r
##########################################
# Ejercicio 2(suelo)
# Ingresar datos
###############################################

# Ingresar los datos en un data frame (que organiza la información en filas
```

```r
# y columnas)
soil <- data.frame(
  pH = c(5.40, 5.65, 5.14, 5.14, 5.14, 5.10, 4.70),
  N = c(0.188, 0.165, 0.260, 0.169, 0.164, 0.094, 0.100),
  Dens = c(0.92, 1.04, 0.95, 1.10, 1.12, 1.22, 1.52),
  P = c(215, 208, 300, 248, 174, 129, 117),
  Ca = c(16.35, 12.25, 13.02, 11.92,  14.17, 8.55, 8.74),
  Mg = c(7.65, 5.15, 5.68, 7.88, 8.12, 6.92, 8.16),
  K = c(0.72, 0.71, 0.68, 1.09, 0.70, 0.81, 0.39),
  Na = c(1.14, 0.94, 0.60, 1.01, 2.17, 2.67, 3.32)
)

# Matriz de correlaciones
cor.matrix <- cor(soil, method = "pearson")
cor.matrix
```

```
##              pH          N       Dens          P          Ca          Mg
## pH    1.0000000  0.3881145 -0.7736913  0.4206120  0.56848734 -0.61115331
## N     0.3881145  1.0000000 -0.7926628  0.9410159  0.69412870 -0.43103915
## Dens -0.7736913 -0.7926628  1.0000000 -0.7865731 -0.79809646  0.45828088
## P     0.4206120  0.9410159 -0.7865731  1.0000000  0.57439198 -0.45099416
## Ca    0.5684873  0.6941287 -0.7980965  0.5743920  1.00000000 -0.01009406
## Mg   -0.6111533 -0.4310391  0.4582809 -0.4509942 -0.01009406  1.00000000
## K     0.3709419  0.1859458 -0.4912862  0.4397625  0.18456449 -0.01344459
## Na   -0.7114380 -0.8524815  0.8950210 -0.9322460 -0.65215650  0.55987093
##                K         Na
## pH    0.37094191 -0.7114380
## N     0.18594583 -0.8524815
## Dens -0.49128624  0.8950210
## P     0.43976248 -0.9322460
## Ca    0.18456449 -0.6521565
## Mg   -0.01344459  0.5598709
## K     1.00000000 -0.5176140
## Na   -0.51761397  1.0000000
```

```r
# Obtener los p-values de las correlaciones

library(Hmisc)
```

```
##
## Adjuntando el paquete: 'Hmisc'

## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```r
res <- rcorr(as.matrix(soil))
res$r   # Coeficientes r
```

```
##              pH          N       Dens          P          Ca          Mg
## pH    1.0000000  0.3881145 -0.7736913  0.4206120  0.56848734 -0.61115331
```

```
## N     0.3881145  1.0000000 -0.7926628  0.9410159  0.69412870 -0.43103915
## Dens -0.7736913 -0.7926628  1.0000000 -0.7865731 -0.79809646  0.45828088
## P     0.4206120  0.9410159 -0.7865731  1.0000000  0.57439198 -0.45099416
## Ca    0.5684873  0.6941287 -0.7980965  0.5743920  1.00000000 -0.01009406
## Mg   -0.6111533 -0.4310391  0.4582809 -0.4509942 -0.01009406  1.00000000
## K     0.3709419  0.1859458 -0.4912862  0.4397625  0.18456449 -0.01344459
## Na   -0.7114380 -0.8524815  0.8950210 -0.9322460 -0.65215650  0.55987093
##                K         Na
## pH    0.37094191 -0.7114380
## N     0.18594583 -0.8524815
## Dens -0.49128624  0.8950210
## P     0.43976248 -0.9322460
## Ca    0.18456449 -0.6521565
## Mg   -0.01344459  0.5598709
## K     1.00000000 -0.5176140
## Na   -0.51761397  1.0000000
```

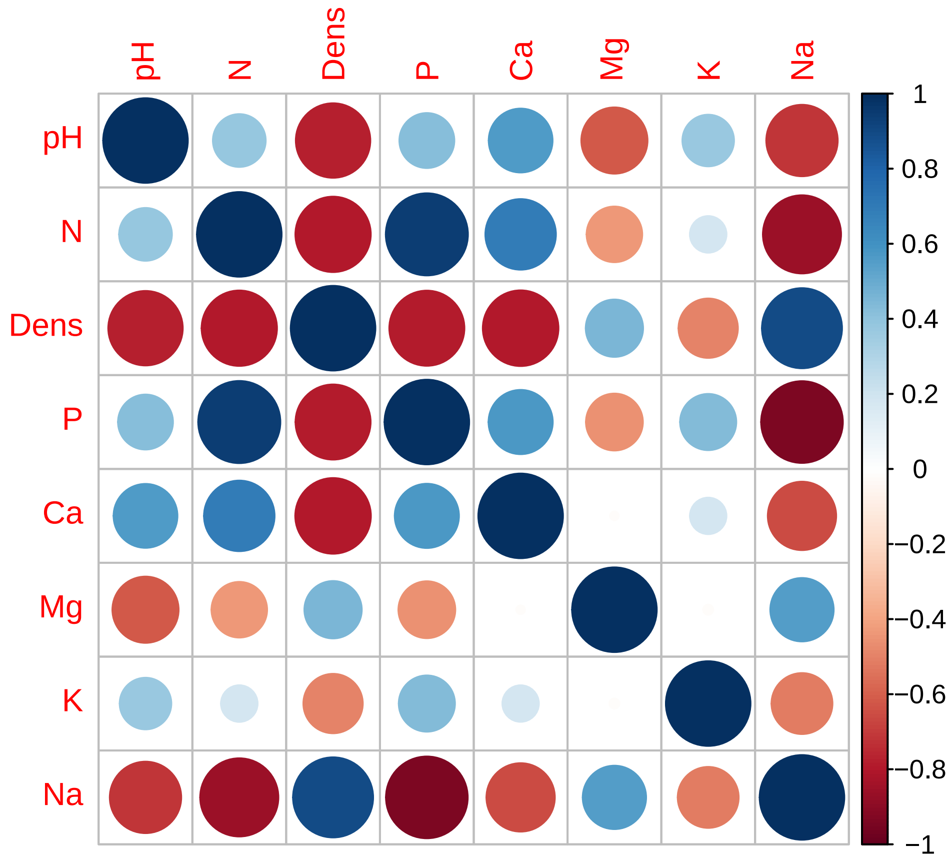
```r
res$P   # Valores p
```

```
##              pH           N        Dens           P         Ca         Mg
## pH           NA 0.389598749 0.041249280 0.347396647 0.18297197 0.1448353
## N    0.38959875          NA 0.033505890 0.001571912 0.08359083 0.3342845
## Dens 0.04124928 0.033505890          NA 0.035894252 0.03145189 0.3010543
## P    0.34739665 0.001571912 0.035894252          NA 0.17743202 0.3097948
## Ca   0.18297197 0.083590834 0.031451887 0.177432022         NA 0.9828647
## Mg   0.14483526 0.334284451 0.301054275 0.309794820 0.98286466        NA
## K    0.41268477 0.689757431 0.262861691 0.323480126 0.69198279 0.9771778
## Na   0.07301106 0.014803213 0.006476458 0.002212297 0.11240576 0.1912051
##              K          Na
## pH   0.4126848 0.073011065
## N    0.6897574 0.014803213
## Dens 0.2628617 0.006476458
## P    0.3234801 0.002212297
## Ca   0.6919828 0.112405762
## Mg   0.9771778 0.191205072
## K           NA 0.234092556
## Na   0.2340926          NA
```

```r
# Gráfico de correlaciones

library(corrplot)
```

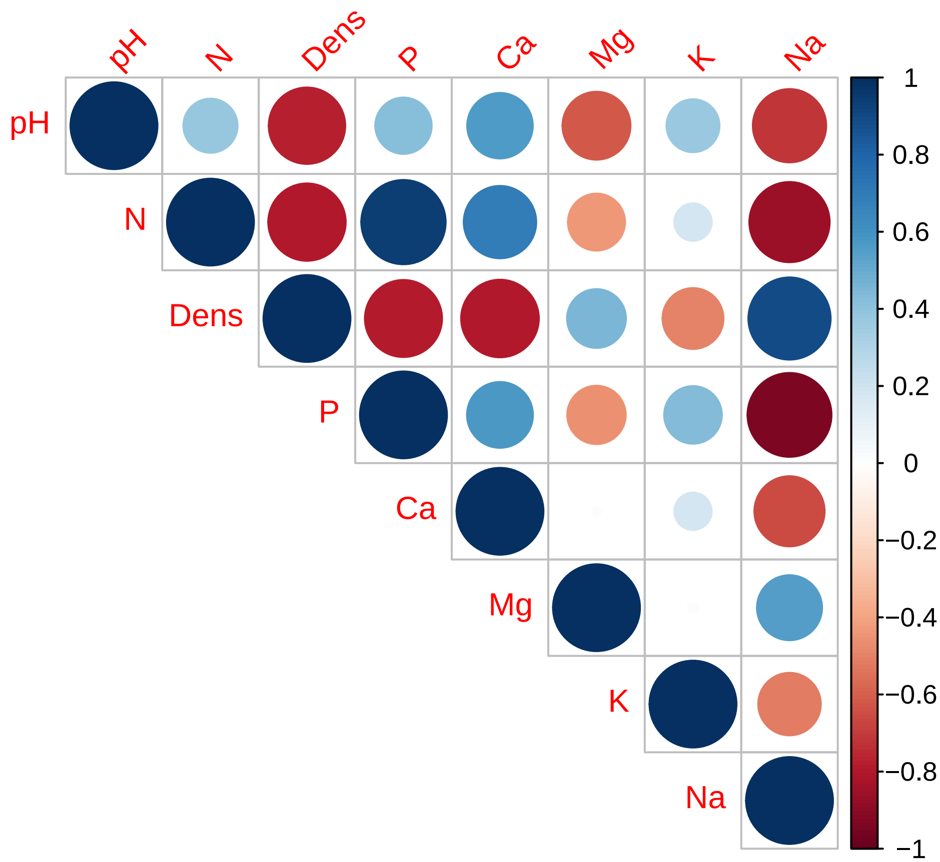
```
## corrplot 0.95 loaded
```

```r
corrplot(cor.matrix, method = "circle")
```




```r
corrplot(cor.matrix, method = "circle", type = "upper",
         tl.color = "gold", tl.srt = 45)
```

```
## Warning in text.default(pos.xlabel[, 1], pos.xlabel[, 2], newcolnames, srt =
## tl.srt, : "tl.color" es un parámetro gráfico inválido

## Warning in text.default(pos.ylabel[, 1], pos.ylabel[, 2], newrownames, col =
## tl.col, : "tl.color" es un parámetro gráfico inválido

## Warning in title(title, ...): "tl.color" es un parámetro gráfico inválido
```

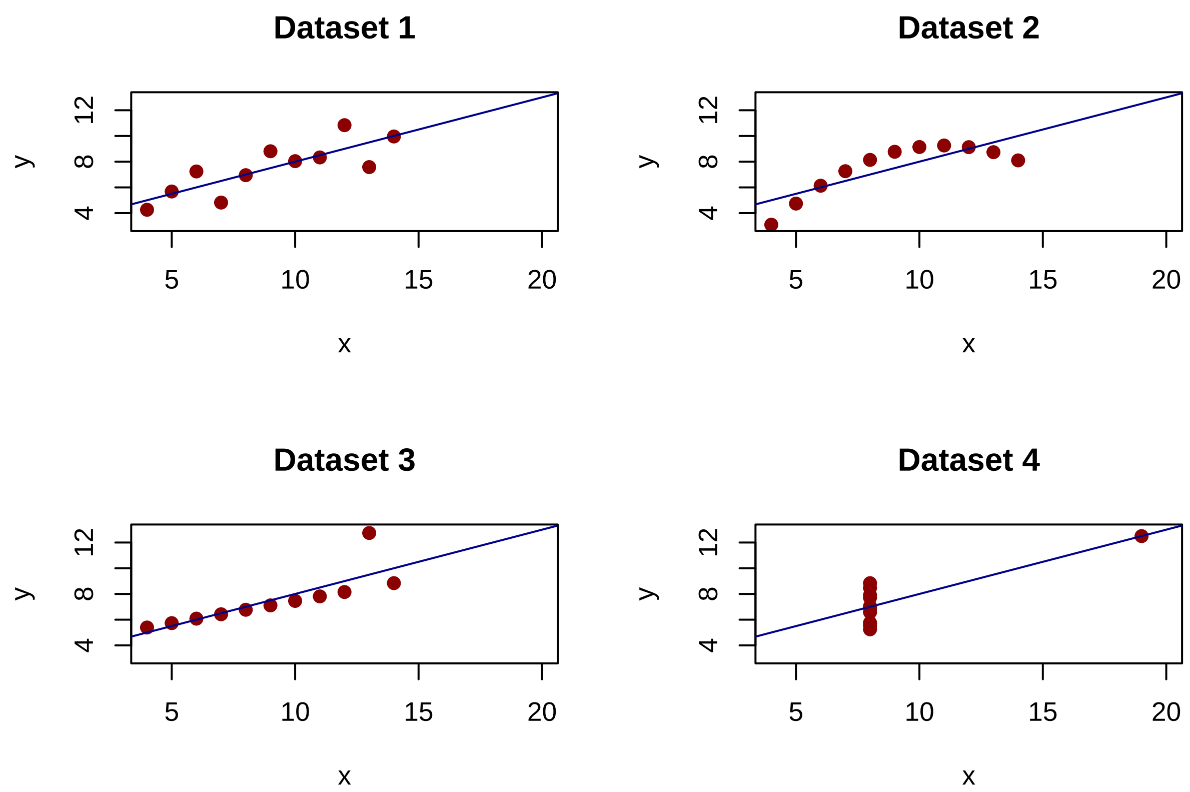



```r
###############################################
# Ejercicio 3: El cuarteto de Anscombe
###############################################

# Usar conjunto de datos de anscombe
data(anscombe)

# Ver los datos
anscombe
```

```
##    x1 x2 x3 x4    y1   y2    y3    y4
## 1  10 10 10  8  8.04 9.14  7.46  6.58
## 2   8  8  8  8  6.95 8.14  6.77  5.76
## 3  13 13 13  8  7.58 8.74 12.74  7.71
## 4   9  9  9  8  8.81 8.77  7.11  8.84
## 5  11 11 11  8  8.33 9.26  7.81  8.47
## 6  14 14 14  8  9.96 8.10  8.84  7.04
## 7   6  6  6  8  7.24 6.13  6.08  5.25
## 8   4  4  4 19  4.26 3.10  5.39 12.50
## 9  12 12 12  8 10.84 9.13  8.15  5.56
## 10  7  7  7  8  4.82 7.26  6.42  7.91
## 11  5  5  5  8  5.68 4.74  5.73  6.89
```

```r
# Gráficar los 4 conjuntos de datos
par(mfrow=c(2,2)) #
```

```r
for(i in 1:4){
  x <- anscombe[,i]
  y <- anscombe[,i+4]
  # Configurar el gráfico de dispersión con una línea de regresión
  plot(x, y, main=paste("Dataset", i),
       xlim = c(4,20), ylim = c(3, 13),
       pch = 19, col = "darkred")
  abline(lm(y ~ x), col = "darkblue")
}
```




```r
#Notar en el ejercicio las estadisticas resumen son casi iguales,
# los gráficos muestran la relación entre las variables es muy diferente
# en cada uno

# Calcular la correlación para cada conjunto de datos
for(i in 1:4){
  print(cor.test(anscombe[,i],
                 anscombe[,i+4]))}
```

```
##
##  Pearson's product-moment correlation
##
## data:  anscombe[, i] and anscombe[, i + 4]
## t = 4.2415, df = 9, p-value = 0.00217
## alternative hypothesis: true correlation is not equal to 0
```

```
## 95 percent confidence interval:
##  0.4243912 0.9506933
## sample estimates:
##       cor
## 0.8164205
##
##
##  Pearson's product-moment correlation
##
## data:  anscombe[, i] and anscombe[, i + 4]
## t = 4.2386, df = 9, p-value = 0.002179
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.4239389 0.9506402
## sample estimates:
##       cor
## 0.8162365
##
##
##  Pearson's product-moment correlation
##
## data:  anscombe[, i] and anscombe[, i + 4]
## t = 4.2394, df = 9, p-value = 0.002176
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.4240623 0.9506547
## sample estimates:
##       cor
## 0.8162867
##
##
##  Pearson's product-moment correlation
##
## data:  anscombe[, i] and anscombe[, i + 4]
## t = 4.243, df = 9, p-value = 0.002165
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.4246394 0.9507224
## sample estimates:
##       cor
## 0.8165214
```