Parcial3 SantiagoDiazJ

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16/11/2021

```
load("abulon.RData")
abulon= abulon[, -9]
```

###**PUNTO 1**

```
p=prcomp(abulon, scale. = TRUE)
p
```

A).

```
## Standard deviations (1, .., p=8):
## [1] 2.46890747 1.00037869 0.71674125 0.42665815 0.31716275 0.27980636 0.15158634
## [8] 0.07823651
##
## Rotation (n x k) = (8 x 8):
##                         PC1          PC2         PC3         PC4         PC5
## Sexo              0.0178714 -0.997961388 -0.04741331 -0.02861559 -0.02556395
## Longitud         -0.3889308 -0.001016694  0.15563520 -0.51892507  0.17055975
## Diametro         -0.3880291 -0.001177418  0.14253495 -0.57130156  0.08525128
## Altura           -0.2953557  0.039936010 -0.95262617 -0.03598076  0.04550821
## Peso_total       -0.3990672 -0.022464877  0.11338901  0.29273559  0.04027288
## Peso_sin_concha -0.3875954 -0.041273115  0.12559823  0.37328012  0.60743242
## Peso_visceras    -0.3867797 -0.015405273  0.10614857  0.42021259 -0.19539218
## Peso_cascaron    -0.3892667  0.005504494  0.07627142  0.02463813 -0.74306320
##                         PC6          PC7           PC8
## Sexo              0.005008179  0.002835119 -0.0004135585
## Longitud          0.163193891  0.706633168 -0.0131505580
## Diametro          0.067774723 -0.700538706  0.0107076254
## Altura            0.016191742  0.006107935 -0.0029041789
## Peso_total       -0.160306755 -0.018102828 -0.8450098403
## Peso_sin_concha -0.372100915 -0.019604812  0.4302741221
## Peso_visceras     0.765057802 -0.053693132  0.1895877236
## Peso_cascaron    -0.467991772  0.079213190  0.2541315583
```

```
summary(p)
```

B).

```
## Importance of components:
##                           PC1    PC2     PC3     PC4     PC5     PC6     PC7
## Standard deviation     2.4689 1.0004 0.71674 0.42666 0.31716 0.27981 0.15159
## Proportion of Variance 0.7619 0.1251 0.06421 0.02275 0.01257 0.00979 0.00287
## Cumulative Proportion  0.7619 0.8870 0.95125 0.97400 0.98658 0.99636 0.99923
##                            PC8
## Standard deviation     0.07824
## Proportion of Variance 0.00077
## Cumulative Proportion  1.00000
```

Observemos que para la componente 5 ya tenemos un acumulado de 0.9866, es decir un 98.66% por lo cual seleccionamos las 5 primeras componentes.

C). Para la interpretacion de estas componentes podemos decir que estas resumen casi en su totalidad las observaciones, vemos que a medida que añadimos una componente extra, su aporte a la varianza es cada vez menor. Como vemos en la 4 aporta un 0.064 mientras que para la 5 solo obtenemos un 0.012, es decir que esta ultima componente es la que menos aporta. Con las primeras 3 seria mas que suficiente con un resumen de 95%.

```
library(psych)
```

D).

```
## Warning: package 'psych' was built under R version 4.1.1
```

```
fit = fa(abulon,3,rotate="none", fm = "mle", covar = FALSE)
fit
```

```
## Factor Analysis using method =  ml
## Call: fa(r = abulon, nfactors = 3, rotate = "none", covar = FALSE,
##     fm = "mle")
## Standardized loadings (pattern matrix) based upon correlation matrix
##                   ML1   ML2   ML3   h2     u2 com
## Sexo            -0.03 -0.07 -0.07 0.01 0.9897 2.3
## Longitud         0.96  0.20 -0.02 0.96 0.0388 1.1
## Diametro         0.96  0.27 -0.03 1.00 0.0050 1.2
## Altura           0.66  0.01  0.11 0.45 0.5526 1.1
## Peso_total       0.99 -0.10  0.09 1.00 0.0044 1.0
## Peso_sin_concha  0.98 -0.19 -0.09 1.00 0.0049 1.1
## Peso_visceras    0.94 -0.07  0.17 0.93 0.0749 1.1
## Peso_cascaron    0.95  0.04  0.23 0.95 0.0501 1.1
##
##                        ML1  ML2  ML3
## SS loadings           6.00 0.17 0.12
## Proportion Var        0.75 0.02 0.01
## Cumulative Var        0.75 0.77 0.78
## Proportion Explained  0.95 0.03 0.02
```

```
## Cumulative Proportion 0.95 0.98 1.00
##
## Mean item complexity =  1.2
## Test of the hypothesis that 3 factors are sufficient.
##
## The degrees of freedom for the null model are  28  and the objective function was  14.27 with Chi Sq
## The degrees of freedom for the model are 7  and the objective function was  0.21
##
## The root mean square of the residuals (RMSR) is  0.01
## The df corrected root mean square of the residuals is  0.01
##
## The harmonic number of observations is  1891 with the empirical chi square  4.16  with prob <  0.76
## The total number of observations was  1891  with Likelihood Chi Square =  396.57  with prob <  1.3e-8
##
## Tucker Lewis Index of factoring reliability =  0.942
## RMSEA index =  0.172  and the 90 % confidence intervals are  0.157 0.186
## BIC =  343.76
## Fit based upon off diagonal values = 1
## Measures of factor score adequacy
##                                                 ML1  ML2  ML3
## Correlation of (regression) scores with factors   1 0.98 0.91
## Multiple R square of scores with factors          1 0.96 0.83
## Minimum correlation of possible factor scores     1 0.92 0.66
```

E). Miremos que para estos factores la primera componente tiene mucha relacion con todas las variables, casi que todas tienden a 1 menos la variable del sexo, que tiende casi a 0. Luego en la segunda se va disminuyendo en algunas esta relacion y en la tercera los valores se disminuyen aun mas. Podriamos decir que la segunda componente representa las medidas del abulon mientras que la tercera representa mas el peso.

###**PUNTO 2**

```
Parcial3Ej4 <- read.csv("Parcial3Ej4.csv")
```

```
a = Parcial3Ej4[,5:6]
a
```

```
##    Value Price
## 1    2.2   4.2
## 2    1.9   5.0
## 3    3.8   2.7
## 4    2.2   5.9
## 5    4.0   2.6
## 6    3.4   2.6
## 7    3.2   2.2
## 8    1.6   5.5
## 9    4.3   2.0
## 10   3.7   2.8
## 11   1.8   4.6
## 12   3.2   3.5
## 13   3.9   2.1
## 14   3.0   2.6
## 15   2.3   3.6
## 16   3.6   2.8
```

```
## 17   3.4   3.0
## 18   2.6   4.0
## 19   3.4   3.0
## 20   5.5   1.5
## 21   1.9   4.2
## 22   2.1   3.2
## 23   5.5   1.7
```

```
b = Parcial3Ej4[,c(3,4,7,8,9,10)]
b
```

```
##    Economy Service Design Sport Safety Easy
## 1      3.9     2.8    3.0   3.1    2.4  2.8
## 2      4.8     1.6    2.0   2.5    1.6  2.8
## 3      3.0     3.8    4.0   4.4    4.0  2.6
## 4      5.3     2.9    1.7   1.1    3.3  4.3
## 5      2.1     3.9    4.5   4.4    4.4  2.2
## 6      2.3     3.1    3.2   3.3    3.6  2.8
## 7      2.5     3.4    3.3   3.3    3.3  2.4
## 8      4.6     2.4    1.3   1.6    2.8  3.6
## 9      3.2     3.9    4.3   4.5    4.7  2.9
## 10     2.6     3.3    3.7   3.0    3.7  3.1
## 11     4.1     1.7    2.4   3.2    1.4  2.4
## 12     3.2     2.9    3.1   3.1    2.9  2.6
## 13     2.6     3.3    3.5   3.9    3.8  2.4
## 14     2.2     2.4    3.2   4.0    2.9  2.4
## 15     3.1     2.6    2.8   2.9    2.4  2.4
## 16     2.9     3.5    3.2   3.8    3.2  2.6
## 17     2.7     3.3    3.1   3.4    3.0  2.7
## 18     3.9     2.8    2.6   3.0    3.2  3.0
## 19     2.5     2.9    3.2   3.1    3.2  2.8
## 20     3.6     4.7    4.1   5.8    5.9  3.1
## 21     3.8     2.3    3.1   3.6    1.6  2.4
## 22     3.1     2.2    3.5   3.5    2.8  1.8
## 23     3.7     4.7    4.8   5.2    5.5  4.0
```

```
can= cancor(a,b,xcenter = TRUE,ycenter = TRUE)
can
```

```
## $cor
## [1] 0.9791972 0.8851224
##
## $xcoef
##              [,1]       [,2]
## Value -0.12521238 -0.3595609
## Price  0.07105407 -0.3415287
##
## $ycoef
##                 [,1]         [,2]          [,3]         [,4]         [,5]
## Economy  0.092212427 -0.121092546 -0.2580998399 -0.004306834 -0.034429118
## Service -0.040760051 -0.116024901  0.2863692813  0.013212581 -0.731048280
## Design  -0.001012802  0.002515381 -0.4780189938 -0.516140195 -0.009013529
## Sport   -0.097743919  0.020397998  0.0165512811  0.436491623 -0.026011179
```

```
## Safety  -0.047471563  0.003025469  0.0076249683 -0.006780833  0.549570262
## Easy    -0.080197194 -0.195025111  0.0008539958 -0.003303736 -0.018228222
##                [,6]
## Economy  0.33810554
## Service  0.33358283
## Design  -0.05080275
## Sport   -0.25983439
## Safety   0.20644491
## Easy    -0.81137611
##
## $xcenter
##    Value    Price
## 3.152174 3.273913
##
## $ycenter
##  Economy  Service   Design    Sport   Safety     Easy
## 3.291304 3.060870 3.200000 3.465217 3.286957 2.786957
```

Podemos ver que en el primer grupo, 1 el aumentar el valor influye en 0.12 decremento al primer set. Con el precio pasaria en 0.07 en aumento. Esto no es mucho. Siguiendo asi podemos ver que variables influyen mas en los grupos.