Biplot punto extras

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#primero que nada activamos las librerias y cargamos datos

```
library(MultBiplotR)
```

```
## Warning in rgl.init(initValue, onlyNULL): RGL: unable to open X11 display
## Warning: 'rgl.init' failed, running with 'rgl.useNULL = TRUE'.
```

```
library(readxl)
```

```
tension<- read_excel("tenso.xlsx")
```

Exploracion de matriz

```
dim(tension)
```

```
## [1] 50 13
```

```
colnames(tension)
```

```
##  [1] "edad"                   "anemia"
##  [3] "diabetes"               "Alta_presión_sanguínea"
##  [5] "sexo"                   "fuma"
##  [7] "MUERTE_EVENTO"          "creatinina_fosfoquinasa"
##  [9] "fracción_de_eyección"   "plaquetas"
## [11] "suero_creatinina"       "suero_sodio"
## [13] "tiempo"
```

```
str(tension)
```

```
## tibble [50 x 13] (S3: tbl_df/tbl/data.frame)
##  $ edad                   : num [1:50] 75 55 65 50 65 90 75 60 65 80 ...
##  $ anemia                 : num [1:50] 0 0 0 1 1 1 1 1 0 1 ...
##  $ diabetes               : num [1:50] 0 0 0 0 1 0 0 1 0 0 ...
##  $ Alta_presión_sanguínea : num [1:50] 1 0 0 0 0 1 0 0 0 1 ...
##  $ sexo                   : num [1:50] 1 1 1 1 0 1 1 1 0 1 ...
##  $ fuma                   : num [1:50] 0 0 1 0 0 1 0 1 0 1 ...
##  $ MUERTE_EVENTO          : num [1:50] 1 1 1 1 1 1 1 1 1 1 ...
##  $ creatinina_fosfoquinasa: num [1:50] 582 7861 146 111 160 ...
##  $ fracción_de_eyección   : num [1:50] 20 38 20 20 20 40 15 60 65 35 ...
##  $ plaquetas              : num [1:50] 265000 263358 162000 210000 327000 ...
##  $ suero_creatinina       : num [1:50] 1.9 1.1 1.3 1.9 2.7 2.1 1.2 1.1 1.5 9.4 ...
##  $ suero_sodio            : num [1:50] 130 136 129 137 116 132 137 131 138 133 ...
##  $ tiempo                 : num [1:50] 4 6 7 7 8 8 10 10 10 10 ...
```

#transformar las variables para que funcionen con el codigo

```
fuma<-factor(tension$fuma,
                     levels= c("1","0"))
anemia<-factor(tension$anemia,
             levels= c("1","0"))
sexo<-factor(tension$sexo,
             levels= c("1","0"))
diabetes<-factor(tension$diabetes,
             levels= c("1","0"))
Alta_presión_sanguínea<-factor(tension$Alta_presión_sanguínea,
             levels= c("1","0"))
MUERTE_EVENTO<-factor(tension$MUERTE_EVENTO,
             levels= c("1","0"))
edad<-as.numeric(tension$edad,strict = TRUE)
creatinina_fosfoquinasa<-as.numeric(tension$creatinina_fosfoquinasa,strict = TRUE)
fracción_de_eyección<-as.numeric(tension$fracción_de_eyección,strict = TRUE)
plaquetas<-as.numeric(tension$plaquetas,strict = FALSE)
suero_creatinina<-as.numeric(tension$suero_creatinina,strict = TRUE)
suero_sodio<-as.numeric(tension$suero_sodio,strict = TRUE)
tiempo<-as.numeric(tension$tiempo,strict = TRUE)
```

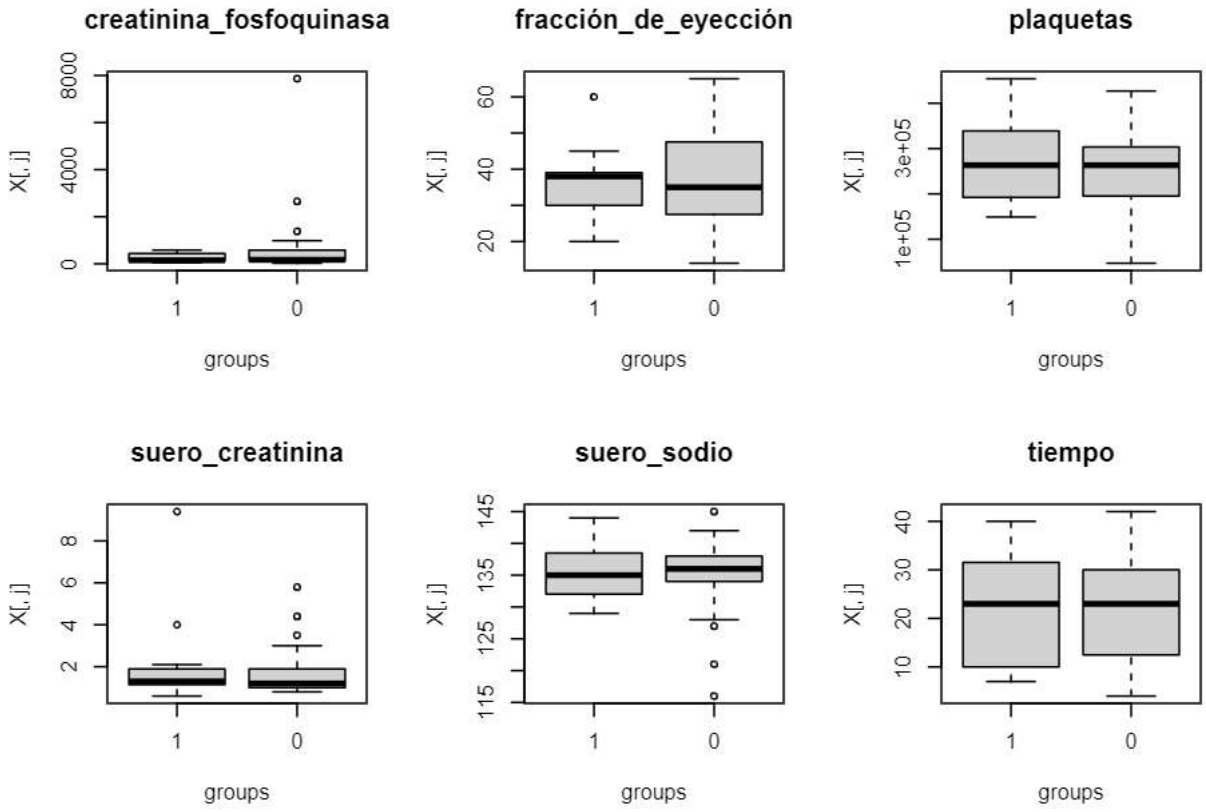
ya con los datos convertidos como requerimos los tranformaresmos de nuevo a una matrix

```
tension<-data.frame(edad, anemia, diabetes,Alta_presión_sanguínea,sexo,fuma,
                    MUERTE_EVENTO,creatinina_fosfoquinasa,fracción_de_eyección,
                    plaquetas,suero_creatinina,suero_sodio,tiempo)
```

Graficos de exploracion

```
BX1<-BoxPlotPanel(tension[,8:13], nrows=2, groups=tension$fuma);BX1
```

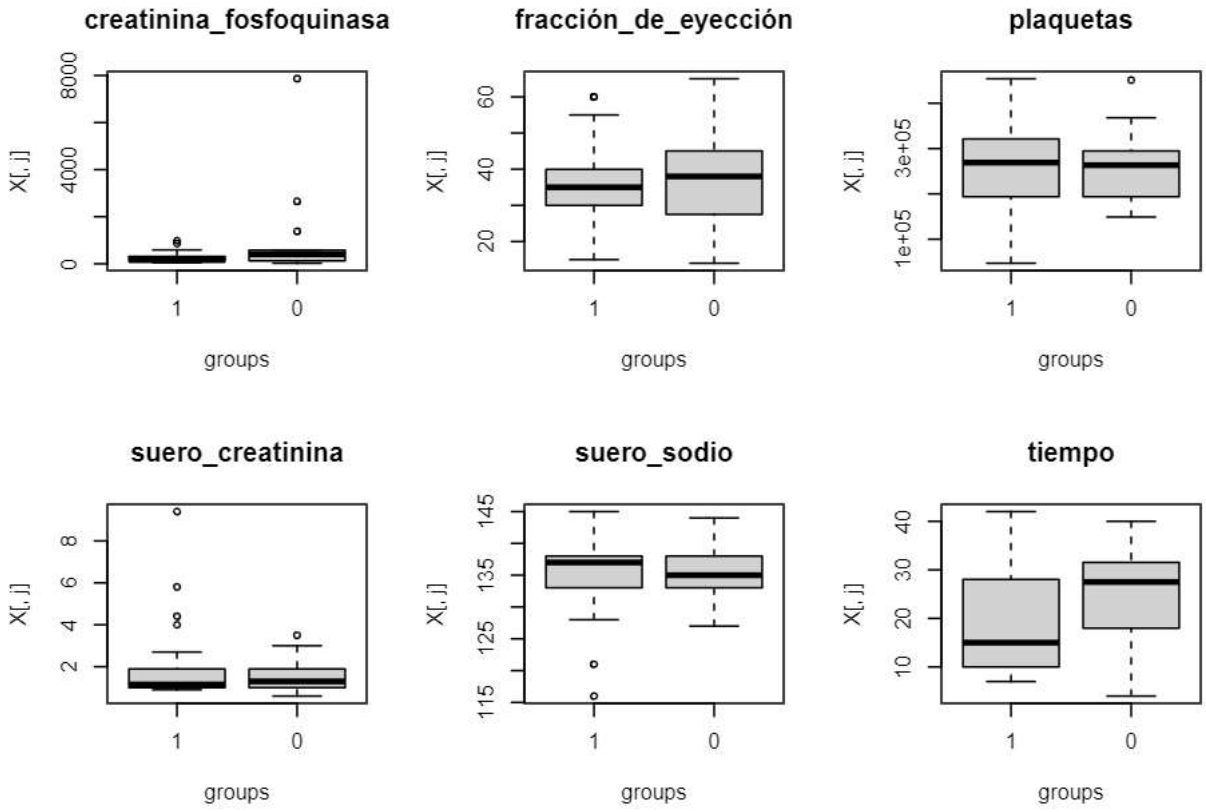
```
## [1] 2
```




```
## $mfrow
## [1] 2 3
```

```
BX2<-BoxPlotPanel(tension[,8:13], nrows=2, groups=tension$anemia);BX2
```

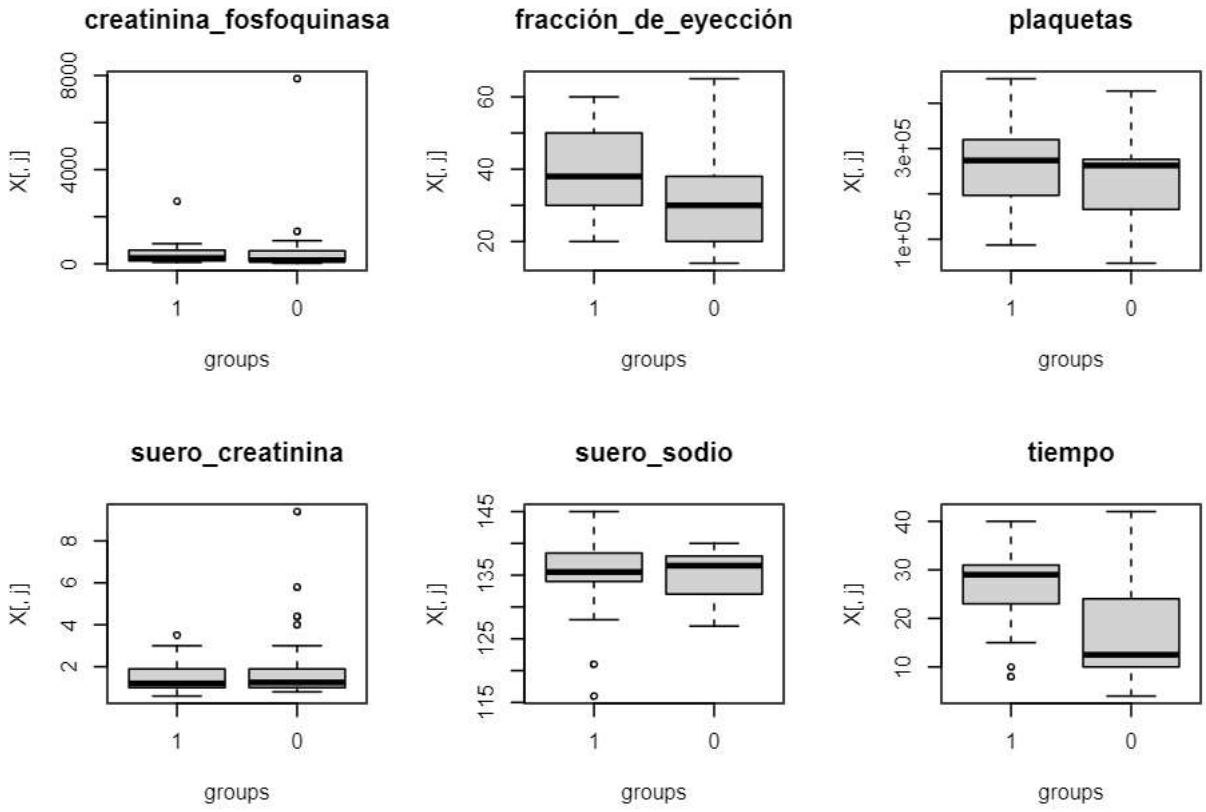
```
## [1] 2
```




```
## $mfrow
## [1] 2 3
```

```
BX3<-BoxPlotPanel(tension[,8:13], nrows=2, groups=tension$diabetes);BX3
```

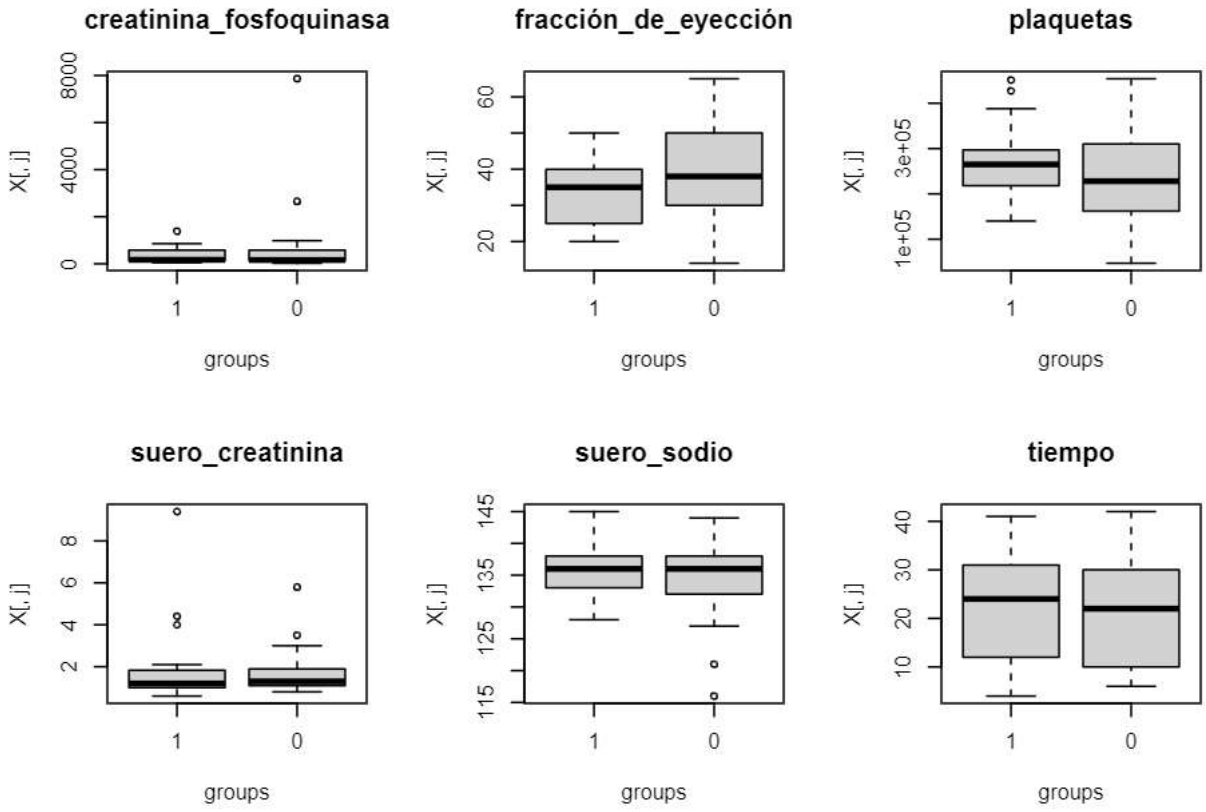
```
## [1] 2
```




```
## $mfrow
## [1] 2 3
```

```
BX4<-BoxPlotPanel(tension[,8:13], nrows=2, groups=tension$Alta_presión_sanguínea);BX4
```

```
## [1] 2
```




```
## $mfrow
## [1] 2 3
```

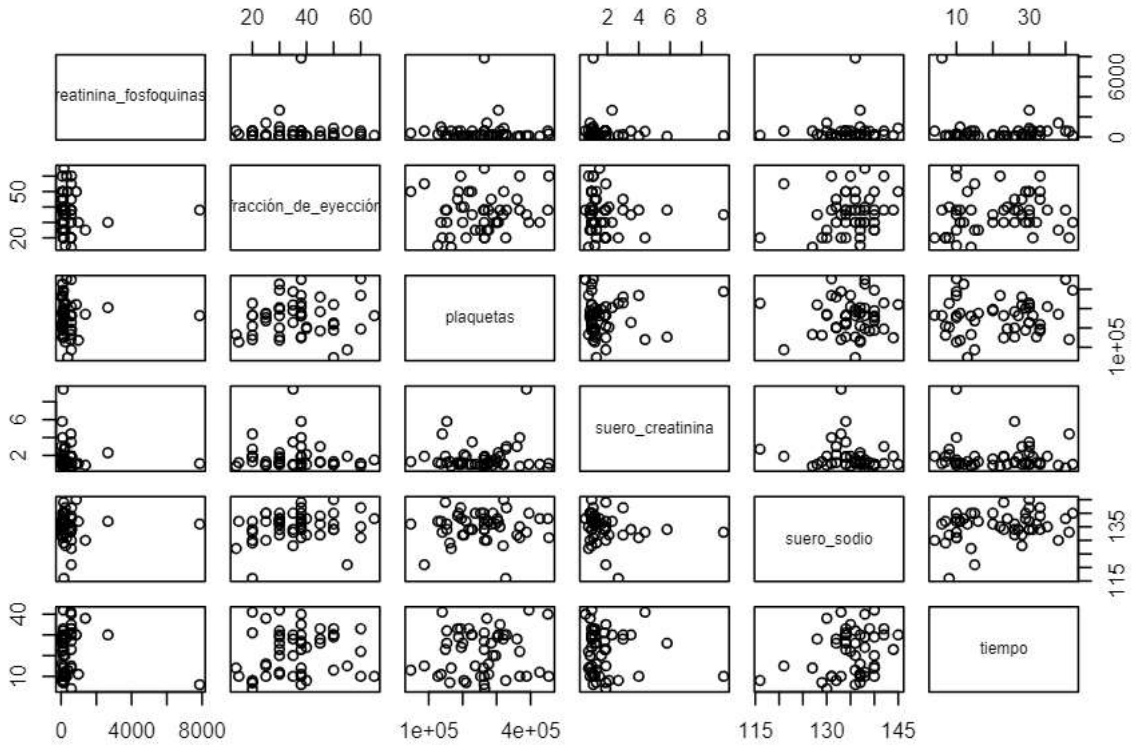
Filtrado de variables

##1.- Seleccion de variables numericas

```
X<-tension[,8:13]
```

2.- Generacion Plot

```
PL1<-plot(X[,1:6])
```



##Reduccion de la dimensionalidad

```
acpvino<-PCA.Analysis(X,Scaling = 5)
summary(acpvino)
```

```
##  ###### Principal Components Analysis #######
##
## Transformation of the raw data:
## [1] "Standardize columns"
##
##  Eigenvalues & Explained Variance (Inertia)
##      Eigenvalue Exp. Var Cummulative
## [1,]   73.83945   25.115      25.115
## [2,]   56.27621   19.142      44.257
## [3,]   49.55939   16.857      61.114
##
##
##  STRUCTURE OF THE PRINCIPAL COMPONENTS
##                           Dim 1  Dim 2  Dim 3
## creatinina_fosfoquinasa -0.053  0.560 -0.707
## fracción_de_eyección     0.578 -0.138 -0.191
## plaquetas                0.217 -0.554 -0.643
## suero_creatinina        -0.432 -0.642 -0.104
## suero_sodio              0.735  0.163  0.037
## tiempo                   0.629 -0.266  0.222
```

Presentacion de tablas (markdown)

```
summary(acpvino, latex=TRUE)
```

```
##  ###### Principal Components Analysis #######
```

```
##
## Transformation of the raw data:
## [1] "Standardize columns"
##
##  Eigenvalues & Explained Variance (Inertia)
##      Eigenvalue Exp. Var Cummulative
## [1,]   73.83945   25.115      25.115
## [2,]   56.27621   19.142      44.257
## [3,]   49.55939   16.857      61.114
##
##
##  STRUCTURE OF THE PRINCIPAL COMPONENTS
##                           Dim 1  Dim 2  Dim 3
## creatinina_fosfoquinasa -0.053  0.560 -0.707
## fracción_de_eyección     0.578 -0.138 -0.191
## plaquetas                0.217 -0.554 -0.643
## suero_creatinina        -0.432 -0.642 -0.104
## suero_sodio              0.735  0.163  0.037
## tiempo                   0.629 -0.266  0.222
## % latex table generated in R 4.2.0 by xtable 1.8-4 package
## % Sat May 14 20:03:41 2022
## \begin{table}[ht]
## \centering
## \begin{tabular}{rrrr}
##   \hline
##  & Eigenvalue & Exp. Var & Cummulative \\
##   \hline
## 1 & 73.84 & 25.11 & 25.11 \\
##   2 & 56.28 & 19.14 & 44.26 \\
##   3 & 49.56 & 16.86 & 61.11 \\
##    \hline
## \end{tabular}
## \caption{Explained Variance}
## \end{table}
## % latex table generated in R 4.2.0 by xtable 1.8-4 package
## % Sat May 14 20:03:41 2022
## \begin{table}[ht]
## \centering
## \begin{tabular}{rrrr}
##   \hline
##  & Dim 1 & Dim 2 & Dim 3 \\
##   \hline
## creatinina\_fosfoquinasa & -0.05 & 0.56 & -0.71 \\
##   fracción\_de\_eyección & 0.58 & -0.14 & -0.19 \\
##   plaquetas & 0.22 & -0.55 & -0.64 \\
##   suero\_creatinina & -0.43 & -0.64 & -0.10 \\
##   suero\_sodio & 0.73 & 0.16 & 0.04 \\
##   tiempo & 0.63 & -0.27 & 0.22 \\
##    \hline
## \end{tabular}
## \caption{Correlations with the Principal Components}
## \end{table}
```

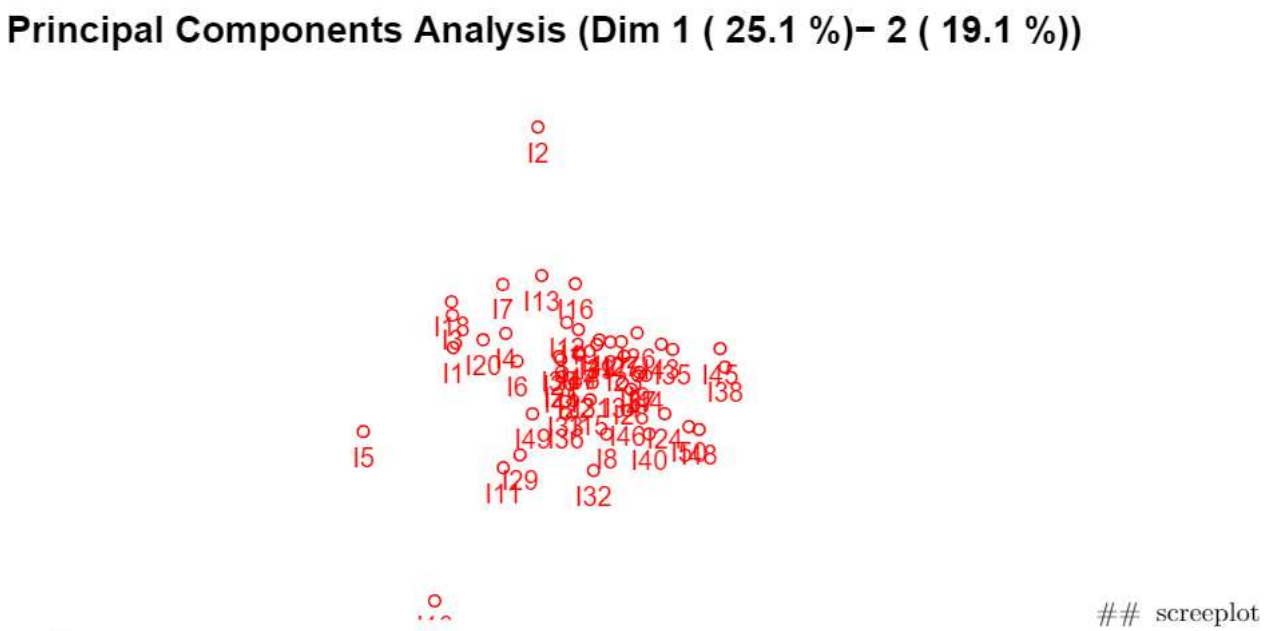
##2.- Contenido del objeto acpvino

```
names(acpvino)
```

```
##  [1] "Title"                "Type"                 "call"
##  [4] "Non_Scaled_Data"      "alpha"                "Dimension"
##  [7] "Means"                "Medians"              "Deviations"
## [10] "Minima"               "Maxima"               "P25"
## [13] "P75"                  "GMean"                "Initial_Transformation"
## [16] "Scaled_Data"          "nrows"                "ncols"
## [19] "nrowsSup"             "ncolsSup"             "dim"
## [22] "EigenValues"          "Inertia"              "CumInertia"
## [25] "EV"                   "Structure"            "RowCoordinates"
## [28] "ColCoordinates"       "RowContributions"     "ColContributions"
## [31] "Scale_Factor"         "ClusterType"          "Clusters"
## [34] "ClusterColors"        "ClusterNames"
```

##3.- Generacion del grafico Sin caja

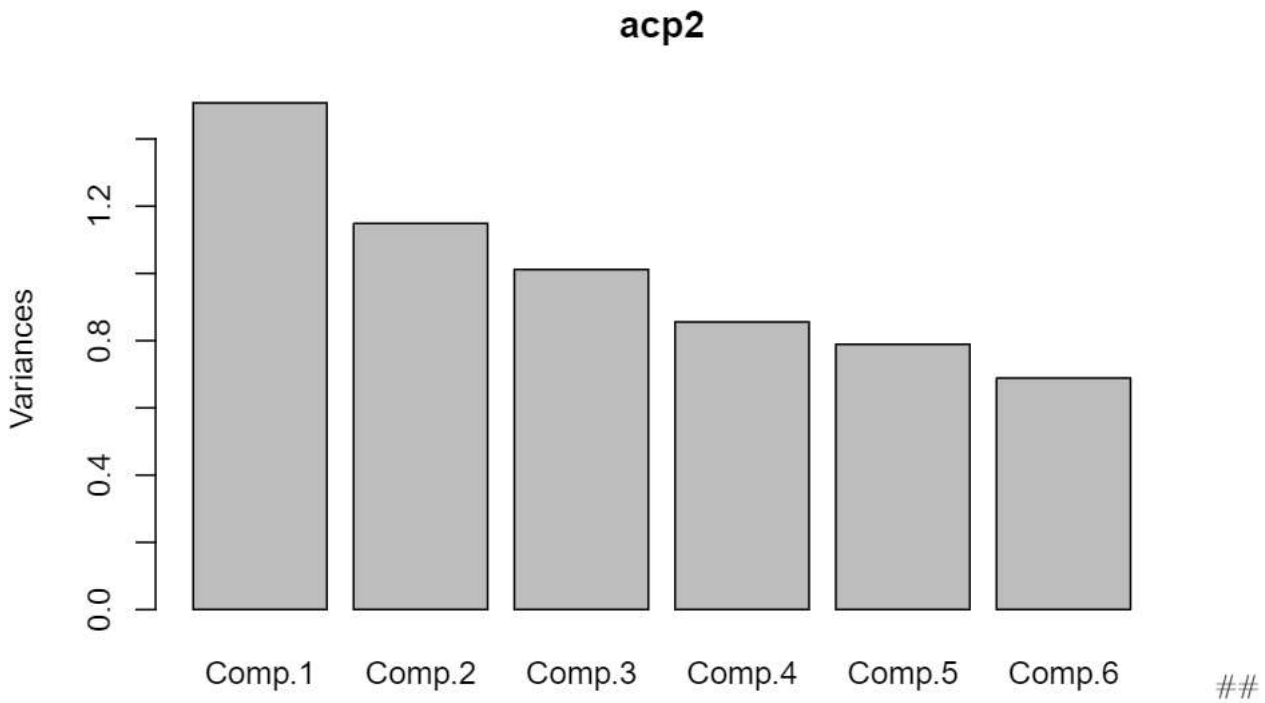
```
acp1<-plot(acpvino, ShowBox=FALSE)
```



screeplot

con barras

```
acp2<-princomp(X, cor=TRUE, score=TRUE)
plot(acp2)
```

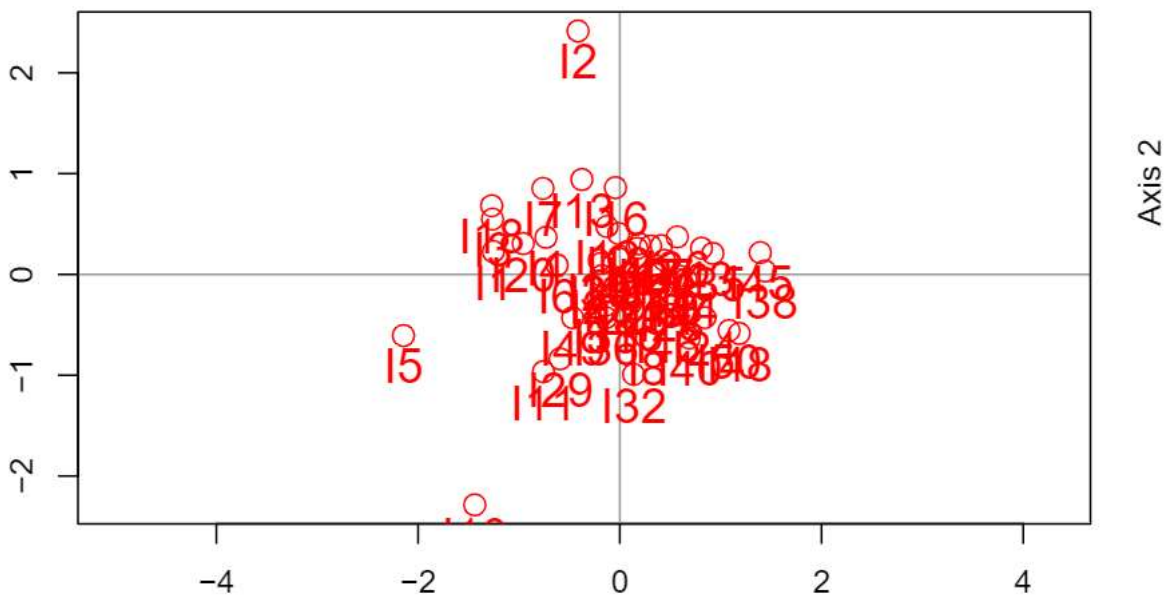


##

Grafico circular de correlacion

```
acp3<-plot(acpvino, CorrelationCircle=TRUE,
           ShowAxis=TRUE,  CexInd=1.5)
```

Princip



agregar grupos al biplot definido por usuario

```
acpvino1<-AddCluster2Biplot(acpvino, ClusterType="es",
                            Groups = tension$suero_creatinina)
acpvino1
```

```
## $Title
## [1] "Principal Components Analysis"
##
## $Type
## [1] "PCA"
##
## $call
## PCA.Biplot(X = X, alpha = 1, dimension = dimension, Scaling = Scaling)
##
## $Non_Scaled_Data
##     creatinina_fosfoquinasa fracción_de_eyección plaquetas suero_creatinina
## I1                      582                   20    265000             1.90
## I2                     7861                   38    263358             1.10
## I3                      146                   20    162000             1.30
## I4                      111                   20    210000             1.90
## I5                      160                   20    327000             2.70
## I6                       47                   40    204000             2.10
## I7                      246                   15    127000             1.20
## I8                      315                   60    454000             1.10
## I9                      157                   65    263358             1.50
## I10                     123                   35    388000             9.40
## I11                      81                   38    368000             4.00
## I12                     231                   25    253000             0.90
## I13                     981                   30    136000             1.10
## I14                     168                   38    276000             1.10
## I15                      80                   30    427000             1.00
## I16                     379                   50     47000             1.30
## I17                     149                   38    262000             0.90
## I18                     582                   14    166000             0.80
## I19                     125                   25    237000             1.00
## I20                     582                   55     87000             1.90
## I21                      52                   25    276000             1.30
## I22                     128                   30    297000             1.60
## I23                     220                   35    289000             0.90
## I24                      63                   60    368000             0.80
## I25                     582                   30    263358             1.83
## I26                     148                   38    149000             1.90
## I27                     112                   40    196000             1.00
## I28                     122                   45    284000             1.30
## I29                      60                   38    153000             5.80
## I30                      70                   30    200000             1.20
## I31                     582                   38    263358             1.83
## I32                      23                   45    360000             3.00
## I33                     249                   35    319000             1.00
## I34                     159                   30    302000             1.20
## I35                      94                   50    188000             1.00
## I36                     582                   35    228000             3.50
## I37                      60                   50    226000             1.00
## I38                     855                   50    321000             1.00
## I39                    2656                   30    305000             2.30
## I40                     235                   38    329000             3.00
## I41                     582                   20    263358             1.83
```

```
## I42                   124                30    153000            1.20
## I43                   571                45    185000            1.20
## I44                   127                50    218000            1.00
## I45                   588                60    194000            1.10
## I46                   582                38    310000            1.90
## I47                  1380                25    271000            0.90
## I48                   582                38    451000            0.60
## I49                   553                20    140000            4.40
## I50                   129                30    395000            1.00
##     suero_sodio tiempo
## I1          130      4
## I2          136      6
## I3          129      7
## I4          137      7
## I5          116      8
## I6          132      8
## I7          137     10
## I8          131     10
## I9          138     10
## I10         133     10
## I11         131     10
## I12         140     10
## I13         137     11
## I14         137     11
## I15         138     12
## I16         136     13
## I17         140     14
## I18         127     14
## I19         140     15
## I20         121     15
## I21         137     16
## I22         136     20
## I23         140     20
## I24         135     22
## I25         134     23
## I26         144     23
## I27         138     24
## I28         136     26
## I29         134     26
## I30         132     26
## I31         134     27
## I32         132     28
## I33         128     28
## I34         138     29
## I35         140     29
## I36         134     30
## I37         134     30
## I38         145     30
## I39         137     30
## I40         142     30
## I41         134     31
## I42         136     32
## I43         139     33
## I44         134     33
```

```
## I45         142     33
## I46         135     35
## I47         130     38
## I48         138     40
## I49         133     41
## I50         140     42
##
## $alpha
## [1] 1
##
## $Dimension
## [1] 3
##
## $Means
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##                507.5200                 36.0800          256395.8030
##        suero_creatinina             suero_sodio                tiempo
##                  1.7958                135.1400                21.6000
##
## $Medians
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##                   164.0                    36.5               263358.0
##        suero_creatinina             suero_sodio                tiempo
##                     1.2                   136.0                  23.0
##
## $Deviations
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##             1146.997949               12.369878          90911.469610
##        suero_creatinina             suero_sodio                tiempo
##                1.499332                5.245056               10.684721
##
## $Minima
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##                    23.0                    14.0                47000.0
##        suero_creatinina             suero_sodio                tiempo
##                     0.6                   116.0                   4.0
##
## $Maxima
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##                  7861.0                    65.0               454000.0
##        suero_creatinina             suero_sodio                tiempo
##                     9.4                   145.0                  42.0
##
## $P25
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##                  122.25                   30.00              194500.00
##        suero_creatinina             suero_sodio                tiempo
##                    1.00                  133.00                 11.00
##
## $P75
## creatinina_fosfoquinasa    fracción_de_eyección              plaquetas
##                  582.00                   43.75              308750.00
##        suero_creatinina             suero_sodio                tiempo
##                    1.90                  138.00                 30.00
```

```
##
## $GMean
## [1] 42849.66
##
## $Initial_Transformation
## [1] "Standardize columns"
##
## $Scaled_Data
##     creatinina_fosfoquinasa fracción_de_eyección   plaquetas suero_creatinina
## I1               0.06493473          -1.29993200  0.09464369       0.06949762
## I2               6.41106639           0.15521576  0.07658249      -0.46407335
## I3              -0.31518801          -1.29993200 -1.03832666      -0.33068061
## I4              -0.34570245          -1.29993200 -0.51034048       0.06949762
## I5              -0.30298223          -1.29993200  0.77662585       0.60306859
## I6              -0.40150028           0.31689885 -0.57633875       0.20289036
## I7              -0.22800390          -1.70413971 -1.42331659      -0.39737698
## I8              -0.16784686           1.93372969  2.17358929      -0.46407335
## I9              -0.30559776           2.33793740  0.07658249      -0.19728787
## I10             -0.33524036          -0.08730887  1.44760829       5.07172546
## I11             -0.37185768           0.15521576  1.22761405       1.47012141
## I12             -0.24108151          -0.89572429 -0.03735286      -0.59746609
## I13              0.41279934          -0.49151658 -1.32431918      -0.46407335
## I14             -0.29600750           0.15521576  0.21564052      -0.46407335
## I15             -0.37272952          -0.49151658  1.87659706      -0.53076972
## I16             -0.11204902           1.12531427 -2.30329357      -0.33068061
## I17             -0.31257249           0.15521576  0.06164455      -0.59746609
## I18              0.06493473          -1.78498125 -0.99432782      -0.66416246
## I19             -0.33349667          -0.89572429 -0.21334825      -0.53076972
## I20              0.06493473           1.52952198 -1.86330508       0.06949762
## I21             -0.39714108          -0.89572429  0.21564052      -0.33068061
## I22             -0.33088115          -0.49151658  0.44663448      -0.13059149
## I23             -0.25067176          -0.08730887  0.35863678      -0.59746609
## I24             -0.38755082           1.93372969  1.22761405      -0.66416246
## I25              0.06493473          -0.49151658  0.07658249       0.02281016
## I26             -0.31344433           0.15521576 -1.18132292       0.06949762
## I27             -0.34483061           0.31689885 -0.66433645      -0.53076972
## I28             -0.33611220           0.72110656  0.30363822      -0.33068061
## I29             -0.39016635           0.15521576 -1.13732407       2.67065609
## I30             -0.38144794          -0.49151658 -0.62033760      -0.39737698
## I31              0.06493473           0.15521576  0.07658249       0.02281016
## I32             -0.42242447           0.72110656  1.13961635       0.80315770
## I33             -0.22538837          -0.08730887  0.68862815      -0.53076972
## I34             -0.30385407          -0.49151658  0.50163304      -0.39737698
## I35             -0.36052375           1.12531427 -0.75233415      -0.53076972
## I36              0.06493473          -0.08730887 -0.31234566       1.13663956
## I37             -0.39016635           1.12531427 -0.33434508      -0.53076972
## I38              0.30294736           1.12531427  0.71062757      -0.53076972
## I39              1.87313325          -0.49151658  0.53463218       0.33628310
## I40             -0.23759415           0.15521576  0.79862527       0.80315770
## I41              0.06493473          -1.29993200  0.07658249       0.02281016
## I42             -0.33436851          -0.49151658 -1.13732407      -0.39737698
## I43              0.05534448           0.72110656 -0.78533328      -0.39737698
## I44             -0.33175299           1.12531427 -0.42234278      -0.53076972
## I45              0.07016577           1.93372969 -0.68633587      -0.46407335
```

```
## I46              0.06493473          0.15521576  0.58963074       0.06949762
## I47              0.76066396         -0.89572429  0.16064196      -0.59746609
## I48              0.06493473          0.15521576  2.14059016      -0.79755521
## I49              0.03965134         -1.29993200 -1.28032033       1.73690690
## I50             -0.33000931         -0.49151658  1.52460627      -0.53076972
##      suero_sodio      tiempo
## I1    -0.9799705 -1.64721192
## I2     0.1639639 -1.46002875
## I3    -1.1706262 -1.36643716
## I4     0.3546197 -1.36643716
## I5    -3.6491508 -1.27284558
## I6    -0.5986590 -1.27284558
## I7     0.3546197 -1.08566240
## I8    -0.7893147 -1.08566240
## I9     0.5452754 -1.08566240
## I10   -0.4080033 -1.08566240
## I11   -0.7893147 -1.08566240
## I12    0.9265869 -1.08566240
## I13    0.3546197 -0.99207082
## I14    0.3546197 -0.99207082
## I15    0.5452754 -0.89847923
## I16    0.1639639 -0.80488764
## I17    0.9265869 -0.71129606
## I18   -1.5519377 -0.71129606
## I19    0.9265869 -0.61770447
## I20   -2.6958721 -0.61770447
## I21    0.3546197 -0.52411288
## I22    0.1639639 -0.14974654
## I23    0.9265869 -0.14974654
## I24   -0.0266918  0.03743663
## I25   -0.2173475  0.13102822
## I26    1.6892098  0.13102822
## I27    0.5452754  0.22461981
## I28    0.1639639  0.41180298
## I29   -0.2173475  0.41180298
## I30   -0.5986590  0.41180298
## I31   -0.2173475  0.50539457
## I32   -0.5986590  0.59898615
## I33   -1.3612819  0.59898615
## I34    0.5452754  0.69257774
## I35    0.9265869  0.69257774
## I36   -0.2173475  0.78616933
## I37   -0.2173475  0.78616933
## I38    1.8798655  0.78616933
## I39    0.3546197  0.78616933
## I40    1.3078983  0.78616933
## I41   -0.2173475  0.87976091
## I42    0.1639639  0.97335250
## I43    0.7359311  1.06694409
## I44   -0.2173475  1.06694409
## I45    1.3078983  1.06694409
## I46   -0.0266918  1.25412726
## I47   -0.9799705  1.53490202
## I48    0.5452754  1.72208519
```

```
## I49  -0.4080033  1.81567678
## I50   0.9265869  1.90926836
##
## $nrows
## [1] 50
##
## $ncols
## [1] 6
##
## $nrowsSup
## [1] 0
##
## $ncolsSup
## [1] 0
##
## $dim
## [1] 3
##
## $EigenValues
## [1] 73.83945 56.27621 49.55939 41.91491 38.68184 33.72821
##
## $Inertia
## [1] 25.115 19.142 16.857 14.257 13.157 11.472
##
## $CumInertia
## [1]  25.115  44.257  61.114  75.371  88.528 100.000
##
## $EV
##             [,1]       [,2]        [,3]
## [1,] -0.04353695  0.5221311 -0.70342453
## [2,]  0.47083148 -0.1287753 -0.18984449
## [3,]  0.17692679 -0.5167392 -0.63893607
## [4,] -0.35176962 -0.5990220 -0.10337547
## [5,]  0.59914283  0.1524296  0.03708531
## [6,]  0.51225499 -0.2484240  0.22102462
##
## $Structure
##                               Dim 1      Dim 2       Dim 3
## creatinina_fosfoquinasa -0.05344464  0.5595565 -0.70742832
## fracción_de_eyección     0.57797848 -0.1380056 -0.19092505
## plaquetas                0.21718997 -0.5537781 -0.64257280
## suero_creatinina        -0.43182175 -0.6419588 -0.10396386
## suero_sodio              0.73548962  0.1633555  0.03729639
## tiempo                   0.62882873 -0.2662306  0.22228266
##
## $RowCoordinates
##            Dim 1       Dim 2       Dim 3
## I1  -1.254181811  0.22634207 -0.16304827
## I2  -0.414644246  2.41462548 -2.96625565
## I3  -1.262448074  0.54874389  0.50122692
## I4  -0.732431796  0.36797027  0.31758116
## I5  -2.144938070 -0.60671545 -0.31472332
## I6  -0.621350879  0.09209400  0.16246039
## I7  -0.762301906  0.85363425  0.73753211
```

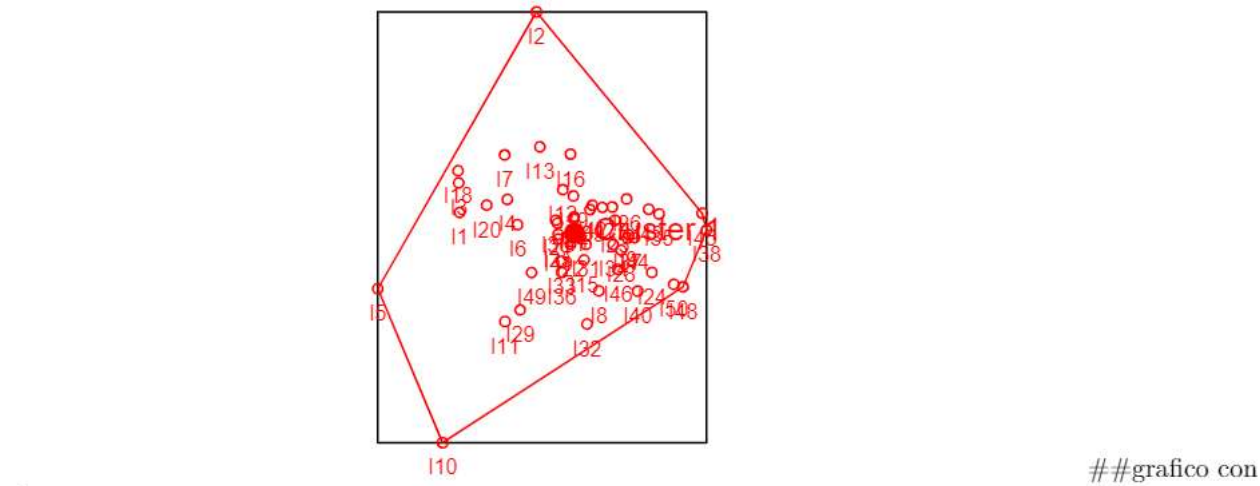
```
## I8   0.266612381 -0.63057037 -1.13543278
## I9   0.590955365 -0.01783586 -0.29142066
## I10 -1.438350842 -2.28566531 -0.88675855
## I11 -0.757160999 -0.96483025 -0.59454289
## I12 -0.127436307  0.47492605  0.13416029
## I13 -0.376331282  0.94156615  0.29984542
## I14 -0.005104748  0.17866031 -0.07156488
## I15  0.103816629 -0.29118514 -0.59060843
## I16 -0.043087869  0.86104455  0.73241411
## I17  0.304494520  0.28142831  0.05492440
## I18 -1.270200447  0.68132986  0.47784677
## I19 -0.011920872  0.40559762  0.30150096
## I20 -0.957917903  0.30578619  0.37304290
## I21 -0.186877417  0.10926263  0.14848550
## I22 -0.043074198 -0.12205271  0.01659631
## I23  0.440886606  0.14131113  0.01635967
## I24  0.843657772 -0.42828556 -0.49038256
## I25 -0.178232144 -0.01326432  0.01053284
## I26  0.569505422  0.37261414  0.62921138
## I27  0.412346880  0.28564206  0.44682801
## I28  0.508988812 -0.18596153  0.02248142
## I29 -0.592357152 -0.83747174  0.47549345
## I30 -0.203084995  0.13996210  0.53005952
## I31  0.124866281 -0.12093011 -0.01391814
## I32  0.137518969 -0.99153404 -0.33025293
## I33 -0.141399657 -0.30576540 -0.07823385
## I34  0.422528124 -0.12549017  0.12270942
## I35  0.921660177  0.20932601  0.46598227
## I36 -0.138356402 -0.42920831  0.13355201
## I37  0.578300929 -0.05273957  0.30232948
## I38  1.440213576  0.03373972 -0.35572133
## I39  0.170100784  0.25795681 -0.86344175
## I40  0.689251103 -0.63137700 -0.14252938
## I41 -0.176452038 -0.06328426  0.20533844
## I42  0.194548393  0.30393166  0.80465421
## I43  0.809501983  0.26079586  0.38485835
## I44  0.655081891 -0.04894065  0.34947546
## I45  1.392134307  0.21655580  0.21642457
## I46  0.474288736 -0.39577989 -0.11168231
## I47 -0.010468833  0.15678898 -0.06290068
## I48  1.183865311 -0.58579927 -0.58604535
## I49 -0.467621510 -0.42996826  0.75950405
## I50  1.082607446 -0.55698072 -0.08394808
##
## $ColCoordinates
##                                Dim 1      Dim 2       Dim 3
## creatinina_fosfoquinasa -0.07128447  0.8549023 -1.15174000
## fracción_de_eyección     0.77090778 -0.2108480 -0.31083859
## plaquetas                0.28968801 -0.8460739 -1.04615093
## suero_creatinina        -0.57596391 -0.9807984 -0.16926003
## suero_sodio              0.98099616  0.2495780  0.06072098
## tiempo                   0.83873185 -0.4067528  0.36189085
##
## $RowContributions
```

```
##      Dim 1 Dim 2 Dim 3
## I1  78.36  2.55  1.32
## I2   1.06 35.93 54.22
## I3  68.76 12.99 10.84
## I4  35.36  8.92  6.65
## I5  69.74  5.58  1.50
## I6  39.60  0.87  2.71
## I7  24.17 30.31 22.63
## I8   1.81 10.14 32.89
## I9  13.22  0.01  3.22
## I10 18.94 47.83  7.20
## I11 27.29 44.31 16.82
## I12  1.34 18.57  1.48
## I13 10.88 68.08  6.90
## I14  0.00  5.77  0.93
## I15  0.55  4.30 17.68
## I16  0.07 26.98 19.52
## I17 13.46 11.50  0.44
## I18 57.41 16.52  8.12
## I19  0.02 17.78  9.82
## I20 18.26  1.86  2.77
## I21  6.17  2.11  3.90
## I22  0.81  6.47  0.12
## I23 36.26  3.73  0.05
## I24 32.67  8.42 11.04
## I25 26.90  0.15  0.09
## I26 19.79  8.47 24.16
## I27 35.33 16.95 41.49
## I28 67.37  8.99  0.13
## I29 10.67 21.32  6.87
## I30  7.58  3.60 51.67
## I31 12.39 11.62  0.15
## I32  1.51 78.46  8.70
## I33  1.77  8.28  0.54
## I34 31.48  2.78  2.65
## I35 63.57  3.28 16.25
## I36  2.48 23.90  2.31
## I37 36.19  0.30  9.89
## I38 88.31  0.05  5.39
## I39  1.59  3.65 40.85
## I40 34.50 28.95  1.48
## I41  3.31  0.43  4.48
## I42  3.65  8.91 62.46
## I43 59.00  6.12 13.34
## I44 38.07  0.21 10.83
## I45 71.37  1.73  1.72
## I46 30.86 21.49  1.71
## I47  0.01  1.30  0.21
## I48 44.15 10.81 10.82
## I49  5.98  5.05 15.76
## I50 42.12 11.15  0.25
##
## $ColContributions
##                         Dim 1 Dim 2 Dim 3
```

```
## creatinina_fosfoquinasa  0.29 31.31 50.05
## fracción_de_eyección    33.41  1.90  3.65
## plaquetas                4.72 30.67 41.29
## suero_creatinina        18.65 41.21  1.08
## suero_sodio             54.09  2.67  0.14
## tiempo                  39.54  7.09  4.94
##
## $Scale_Factor
## [1] 0.6107494
##
## $ClusterType
## [1] "es"
##
## $Clusters
##  [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [39] 1 1 1 1 1 1 1 1 1 1 1 1
## Levels: 1
##
## $ClusterColors
## [1] "red"   "green" "blue"
##
## $ClusterNames
## [1] "Cluster 1"
##
## attr(,"class")
## [1] "PCA.Analysis"
```

Grafico con poligonos CexInd= tamaño de los argumentos

```
acp4<-plot(acpvino1, PlotClus=TRUE,
           ClustCenters=TRUE, margin=0.05,
           CexInd=0.7, ShowBox=TRUE)
```



##grafico con elipses

```
acp5<-plot(acpvino1, PlotClus=TRUE, ClustCenters=TRUE,
           margin=0.05, CexInd=0.7, TypeClus="el",
           ShowBox=F)
```

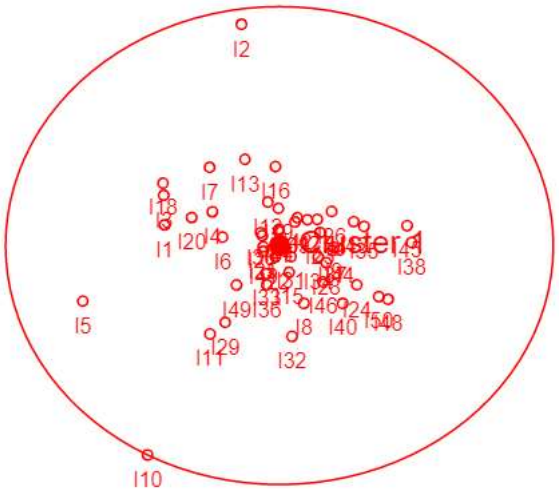
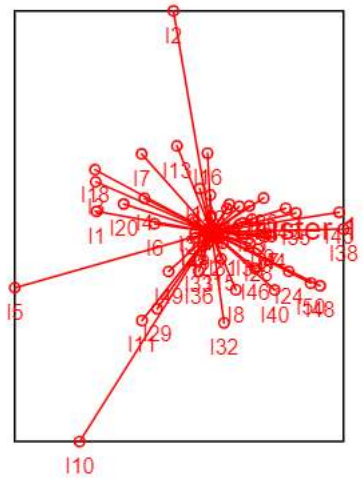


grafico con estrellas

```
acp6<-plot(acpvino1, PlotClus=TRUE, ClustCenters=TRUE,
           margin=0.05, CexInd=0.7, TypeClus="st",
           ShowBox=TRUE)
```



Biplot

alpha= 0:GH 1:JK 2:HJ Predeterminado JK

```
bipvino<-PCA.Biplot(X, Scaling = 5)
summary(bipvino)
```

```
##  ###### Biplot for Principal Components Analysis #######
##
## Call
## PCA.Biplot(X = X, Scaling = 5)
## Type of coordinates:
## Transformation of the raw data:
## [1] "Standardize columns"
## Type of Biplot
## [1] "PCA"
##
##  Eigenvalues & Explained Variance (Inertia)
##      Eigenvalue Exp. Var Cummulative
## [1,]   73.83945   25.115      25.115
## [2,]   56.27621   19.142      44.257
## [3,]   49.55939   16.857      61.114
##
##
##  RELATIVE CONTRIBUTIONS OF THE FACTOR TO THE ELEMENT
##
##  Row Contributions
##     Dim 1 Dim 2 Dim 3
## I1  78.36  2.55  1.32
## I2   1.06 35.93 54.22
## I3  68.76 12.99 10.84
## I4  35.36  8.92  6.65
## I5  69.74  5.58  1.50
## I6  39.60  0.87  2.71
## I7  24.17 30.31 22.63
## I8   1.81 10.14 32.89
## I9  13.22  0.01  3.22
## I10 18.94 47.83  7.20
## I11 27.29 44.31 16.82
## I12  1.34 18.57  1.48
## I13 10.88 68.08  6.90
## I14  0.00  5.77  0.93
## I15  0.55  4.30 17.68
## I16  0.07 26.98 19.52
## I17 13.46 11.50  0.44
## I18 57.41 16.52  8.12
## I19  0.02 17.78  9.82
## I20 18.26  1.86  2.77
## I21  6.17  2.11  3.90
## I22  0.81  6.47  0.12
## I23 36.26  3.73  0.05
## I24 32.67  8.42 11.04
## I25 26.90  0.15  0.09
## I26 19.79  8.47 24.16
## I27 35.33 16.95 41.49
## I28 67.37  8.99  0.13
## I29 10.67 21.32  6.87
## I30  7.58  3.60 51.67
## I31 12.39 11.62  0.15
## I32  1.51 78.46  8.70
## I33  1.77  8.28  0.54
```

```
## I34 31.48  2.78  2.65
## I35 63.57  3.28 16.25
## I36  2.48 23.90  2.31
## I37 36.19  0.30  9.89
## I38 88.31  0.05  5.39
## I39  1.59  3.65 40.85
## I40 34.50 28.95  1.48
## I41  3.31  0.43  4.48
## I42  3.65  8.91 62.46
## I43 59.00  6.12 13.34
## I44 38.07  0.21 10.83
## I45 71.37  1.73  1.72
## I46 30.86 21.49  1.71
## I47  0.01  1.30  0.21
## I48 44.15 10.81 10.82
## I49  5.98  5.05 15.76
## I50 42.12 11.15  0.25
##
##  Column Contributions
##                           Dim 1 Dim 2 Dim 3
## creatinina_fosfoquinasa  0.29 31.31 50.05
## fracción_de_eyección    33.41  1.90  3.65
## plaquetas                4.72 30.67 41.29
## suero_creatinina        18.65 41.21  1.08
## suero_sodio             54.09  2.67  0.14
## tiempo                  39.54  7.09  4.94
##
##
##
##  Qualities of representation of the rows (Cummulative contributions)
##     Dim 1 Dim 2 Dim 3
## I1  78.36 80.91 82.23
## I2   1.06 36.99 91.21
## I3  68.76 81.75 92.59
## I4  35.36 44.28 50.93
## I5  69.74 75.32 76.82
## I6  39.60 40.47 43.18
## I7  24.17 54.48 77.11
## I8   1.81 11.95 44.84
## I9  13.22 13.23 16.45
## I10 18.94 66.77 73.97
## I11 27.29 71.60 88.42
## I12  1.34 19.91 21.39
## I13 10.88 78.96 85.86
## I14  0.00  5.77  6.70
## I15  0.55  4.85 22.53
## I16  0.07 27.05 46.57
## I17 13.46 24.96 25.40
## I18 57.41 73.93 82.05
## I19  0.02 17.80 27.62
## I20 18.26 20.12 22.89
## I21  6.17  8.28 12.18
## I22  0.81  7.28  7.40
## I23 36.26 39.99 40.04
```

```
## I24 32.67 41.09 52.13
## I25 26.90 27.05 27.14
## I26 19.79 28.26 52.42
## I27 35.33 52.28 93.77
## I28 67.37 76.36 76.49
## I29 10.67 31.99 38.86
## I30  7.58 11.18 62.85
## I31 12.39 24.01 24.16
## I32  1.51 79.97 88.67
## I33  1.77 10.05 10.59
## I34 31.48 34.26 36.91
## I35 63.57 66.85 83.10
## I36  2.48 26.38 28.69
## I37 36.19 36.49 46.38
## I38 88.31 88.36 93.75
## I39  1.59  5.24 46.09
## I40 34.50 63.45 64.93
## I41  3.31  3.74  8.22
## I42  3.65 12.56 75.02
## I43 59.00 65.12 78.46
## I44 38.07 38.28 49.11
## I45 71.37 73.10 74.82
## I46 30.86 52.35 54.06
## I47  0.01  1.31  1.52
## I48 44.15 54.96 65.78
## I49  5.98 11.03 26.79
## I50 42.12 53.27 53.52
##
##
##
##  Qualities of representation of the columns (Cummulative contributions)
##                          Dim 1 Dim 2 Dim 3
## creatinina_fosfoquinasa  0.29 31.60 81.65
## fracción_de_eyección    33.41 35.31 38.96
## plaquetas                4.72 35.39 76.68
## suero_creatinina        18.65 59.86 60.94
## suero_sodio             54.09 56.76 56.90
## tiempo                  39.54 46.63 51.57
```

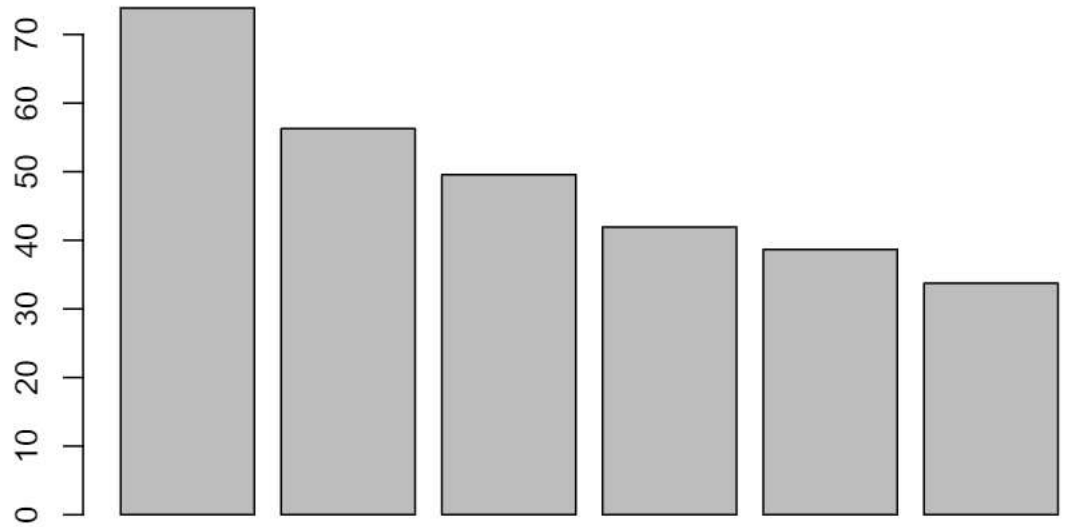
Valores propios

```
bipvino$EigenValues
```

```
## [1] 73.83945 56.27621 49.55939 41.91491 38.68184 33.72821
```

##screeplot

```
SC<-barplot(bipvino$EigenValues)
```



##Vectores propios

```
bipvino$EV
```

```
##              [,1]       [,2]        [,3]
## [1,] -0.04353695  0.5221311 -0.70342453
## [2,]  0.47083148 -0.1287753 -0.18984449
## [3,]  0.17692679 -0.5167392 -0.63893607
## [4,] -0.35176962 -0.5990220 -0.10337547
## [5,]  0.59914283  0.1524296  0.03708531
## [6,]  0.51225499 -0.2484240  0.22102462
```

##Tabla de inercias

```
Inercias<-data.frame(paste("Eje",1:length(bipvino$EigenValues)),
                     bipvino$EigenValues, bipvino$Inertia,
                     bipvino$CumInertia)

colnames(Inercias)<-c("Eje", "Valor Propio",
                      "Inercia", "Inercia acumulada")
```

Markdown

```
library(knitr)
kable(Inercias)
```

Eje	Valor Propio	Inercia	Inercia acumulada
Eje 1	73.83945	25.115	25.115
Eje 2	56.27621	19.142	44.257
Eje 3	49.55939	16.857	61.114
Eje 4	41.91491	14.257	75.371
Eje 5	38.68184	13.157	88.528
Eje 6	33.72821	11.472	100.000

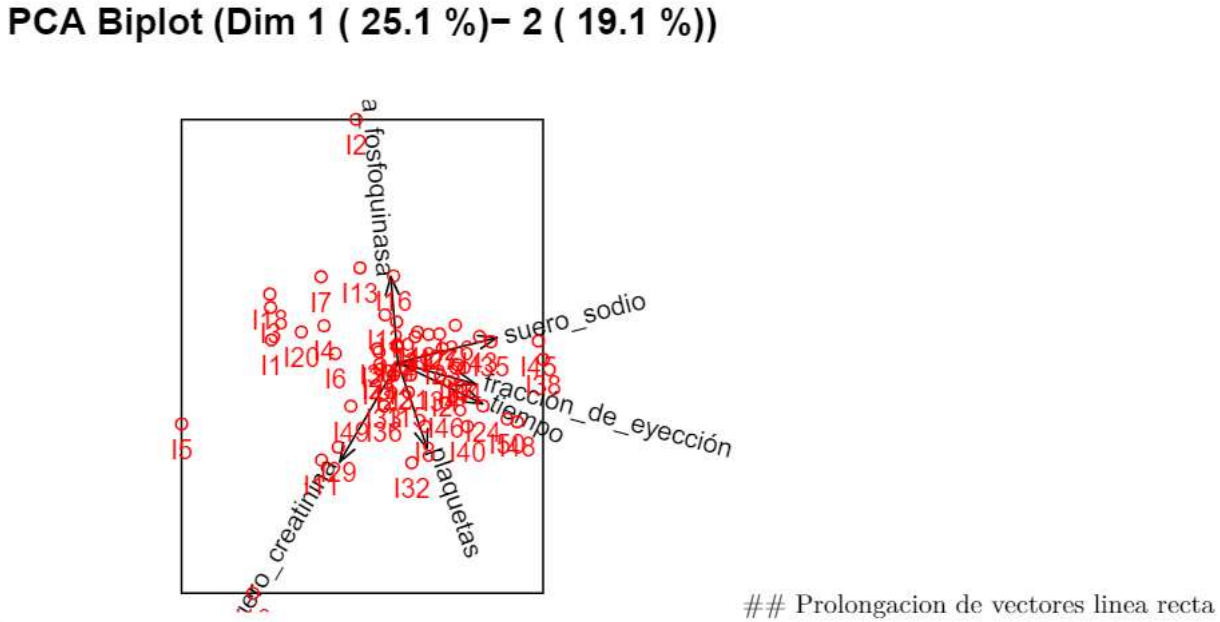
tabla contribucion de columnas

```
kable(bipvino$ColContributions)
```

	Dim 1	Dim 2	Dim 3
creatinina_fosfoquinasa	0.29	31.31	50.05
fracción_de_eyección	33.41	1.90	3.65
plaquetas	4.72	30.67	41.29
suero_creatinina	18.65	41.21	1.08
suero_sodio	54.09	2.67	0.14
tiempo	39.54	7.09	4.94

Grafico

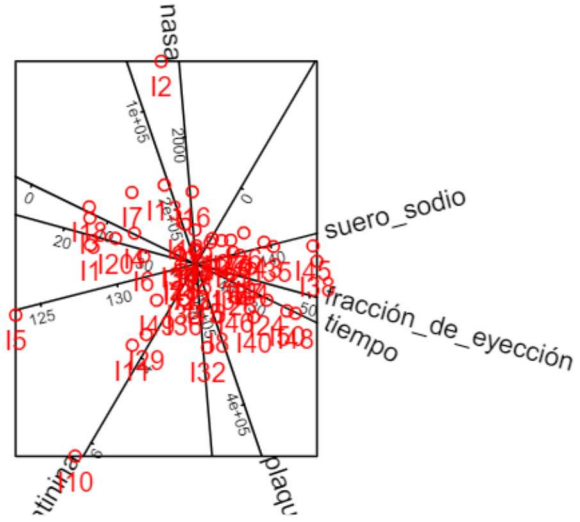
```
plot(bipvino, ShowBox=TRUE)
```



Prolongacion de vectores linea recta

```
BP1<-plot(bipvino, mode="s",
          margin=0.1, ShowBox=TRUE)
```

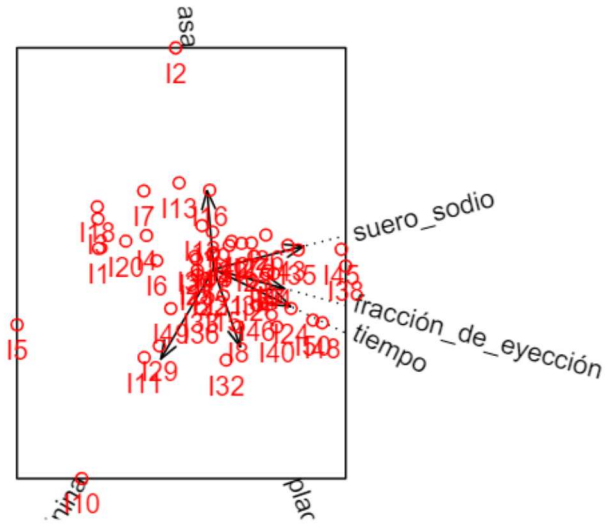
PCA Biplot (Dim 1 (25.1 %)− 2 (19.1 %))



Prolongacion de vectores con flechas y linea punteada

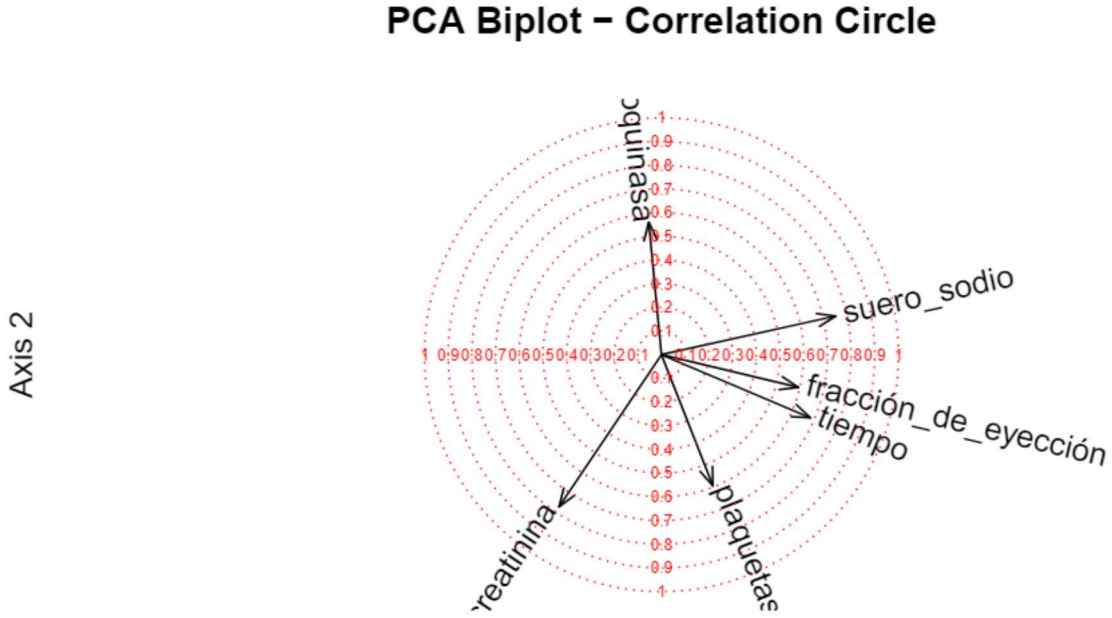
```
BP2<-plot(bipvino, mode="ah", margin=0.05,
          ShowBox=TRUE)
```

PCA Biplot (Dim 1 (25.1 %)− 2 (19.1 %))



##Grafico circular correlaciones

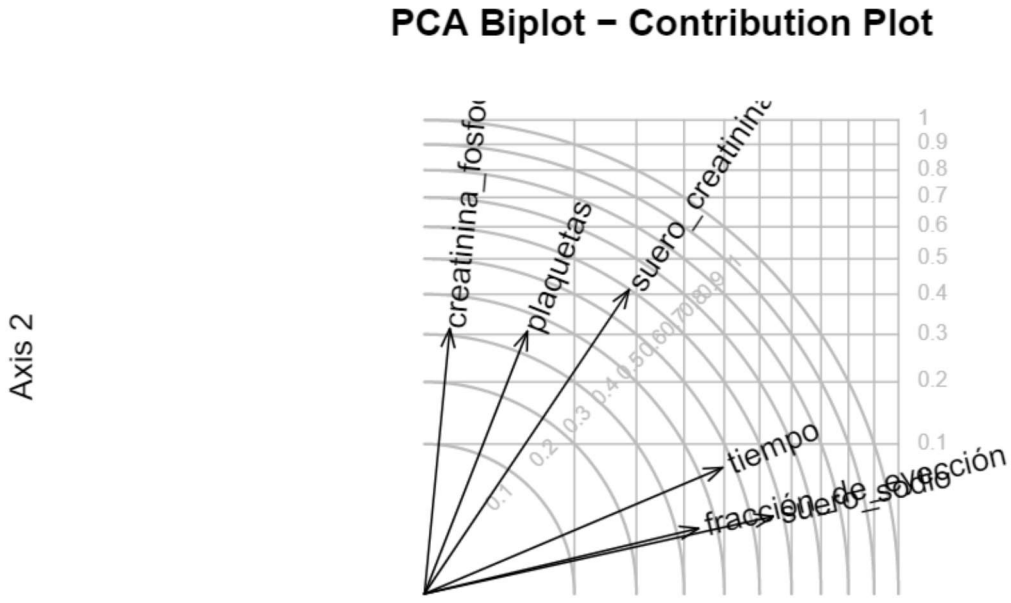
```
GC<-CorrelationCircle(bipvino)
```



Grafico

contribuciones de los vectores Calidad de representacion eje 1, 2 y 1+2

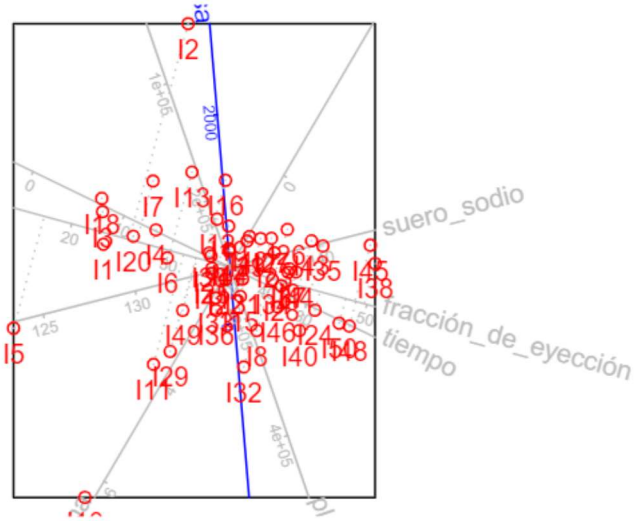
```
ColContributionPlot(bipvino, AddSigns2Labs = FALSE)
```



Proyeccion individuos sobre una variable dp= selecciona la variable

```
BP3<-plot(bipvino, dp=2, mode="s",
          ColorVar=c("blue", rep("grey",17)),
          ShowBox=TRUE)
```

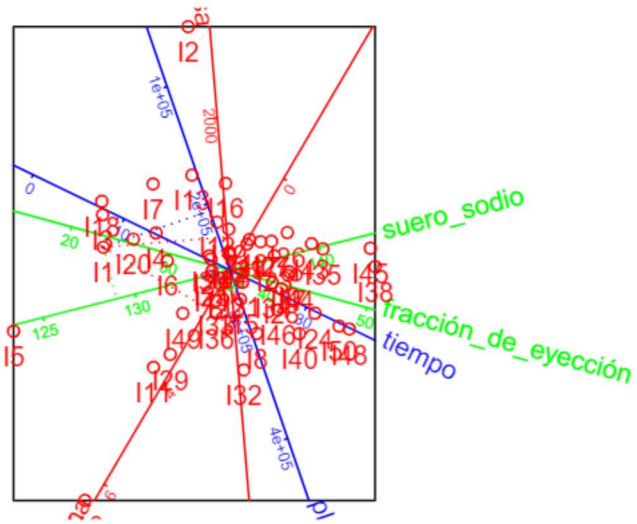
PCA Biplot (Dim 1 (25.1 %)− 2 (19.1 %))



##Proyeccion de ind sobre todas las variables PredPoints= individuo

```
BP4<-plot(bipvino, PredPoints=1, mode="s",
          ColorVar=1:6, ShowBox=TRUE)
```

PCA Biplot (Dim 1 (25.1 %)− 2 (19.1 %))

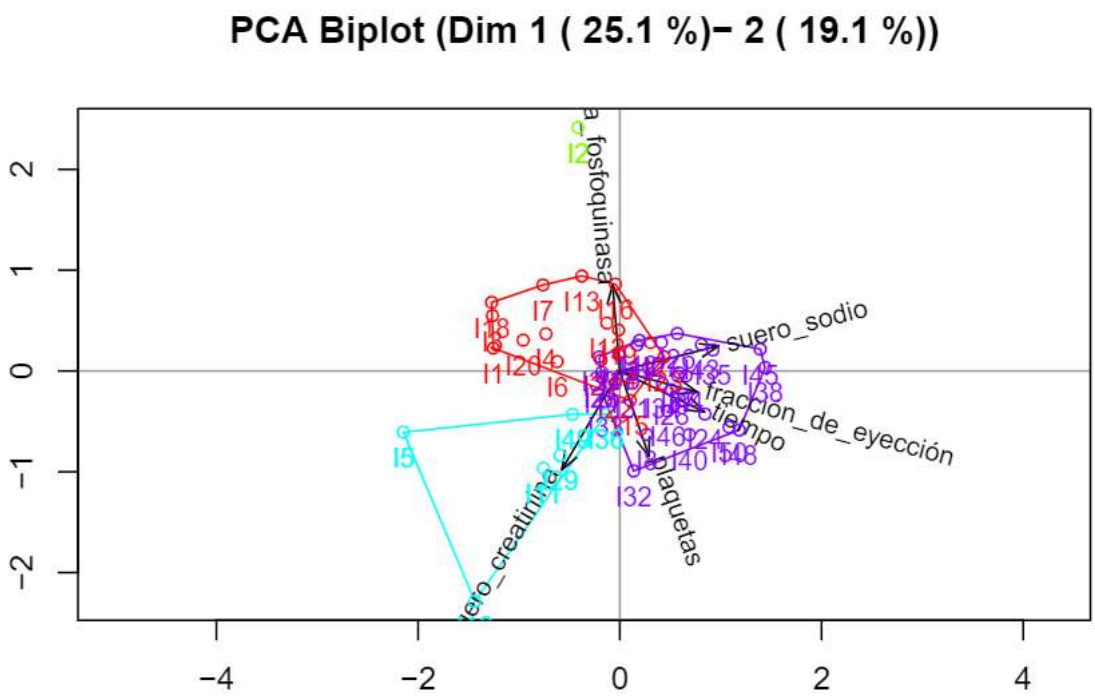


##Agregar cluster Jerarquico con datos originales metodo ward.D

```
bipvino=AddCluster2Biplot(bipvino, NGroups=4,
                          ClusterType="hi",
                          method="ward.D",
                          Original=TRUE)
```

##Cluster aplicado al biplot

```
clusBP<-plot(bipvino, PlotClus=TRUE,ShowAxis=TRUE)
```




```
clusBP
```

```
## NULL
```