

Correspondance analysis (CA) with FactoMineR (Nobel prize dataset)

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Import data

Upload the Nobel prize dataset on your computer.

```
Nobel <- read.table("data_CA_NobelPrize_withMaths.csv", header=TRUE, sep=";", row.names=1,
                    check.names=FALSE)
```

```
summary(Nobel)
```

```
##      Chemistry      Economic science      Literature      Medicine
## Min.   : 1.00      Min.   : 0.00      Min.   : 0.00      Min.   : 2.00
## 1st Qu.: 4.00      1st Qu.: 1.00      1st Qu.: 5.00      1st Qu.: 4.00
## Median : 8.00      Median : 3.00      Median : 7.00      Median : 9.00
## Mean   :22.46      Mean   :10.38      Mean   :12.38      Mean   : 26.69
## 3rd Qu.:24.00      3rd Qu.: 6.00      3rd Qu.:10.00      3rd Qu.: 26.00
## Max.   :94.00      Max.   :47.00      Max.   :79.00      Max.   :110.00
##      Peace          Physics          Mathematics
## Min.   : 0.00      Min.   : 2.00      Min.   : 1.000
## 1st Qu.: 1.00      1st Qu.: 5.00      1st Qu.: 1.000
## Median : 8.00      Median : 11.00     Median : 4.000
## Mean   :11.62      Mean   : 26.54     Mean   : 7.846
## 3rd Qu.:16.00      3rd Qu.: 24.00     3rd Qu.:11.000
## Max.   :51.00      Max.   :103.00     Max.   :34.000
```

Loading FactoMineR

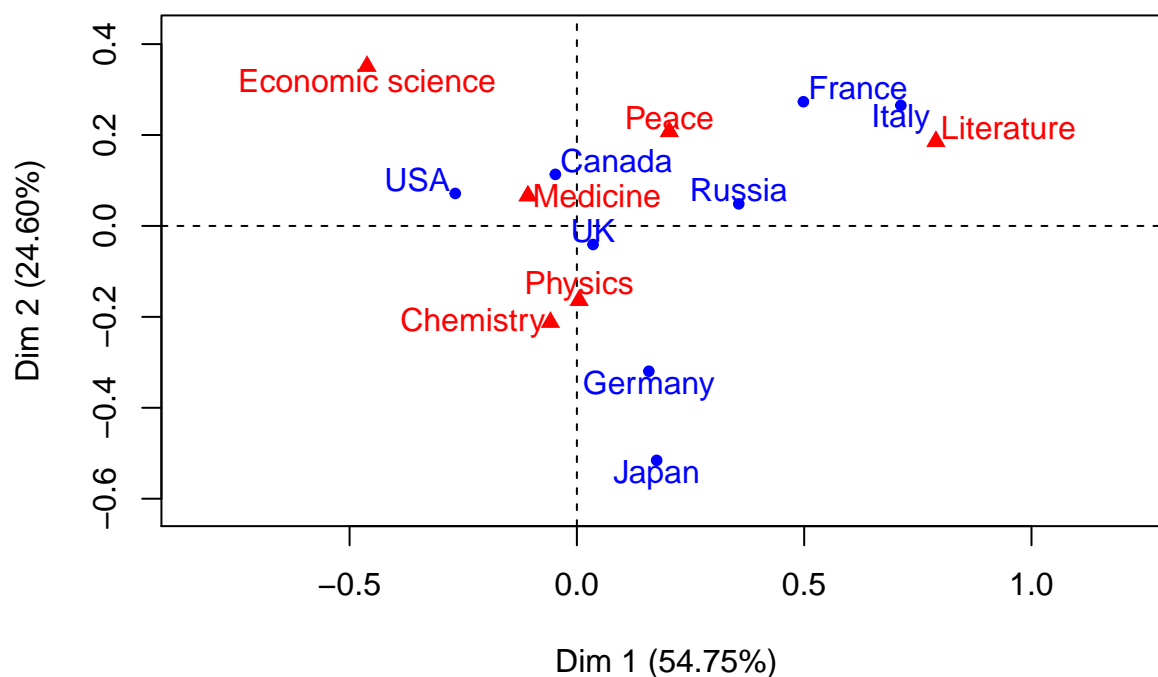
```
library(FactoMineR)
```

Correspondence Analysis

Active variables are the G8 countries and the Nobel prizes.

```
res.ca=CA(Nobel[1:8,1:6])
```

CA factor map



Outputs can be summarized with the function `summary`.

```
summary(res.ca)
```

```
##
## Call:
## CA(X = Nobel[1:8, 1:6])
##
## The chi square of independence between the two variables is equal to 86.75919 (p-value = 2.76733e-000)
##
## Eigenvalues
##           Dim.1  Dim.2  Dim.3  Dim.4  Dim.5
## Variance      0.083  0.037  0.022  0.008  0.002
## % of var.     54.748 24.600 14.227  5.180  1.245
## Cumulative % of var. 54.748 79.348 93.575 98.755 100.000
##
## Rows
##           Iner*1000  Dim.1  ctr  cos2  Dim.2  ctr  cos2
## Canada           | 2.040 | -0.047 0.085 0.035 | 0.113 1.086 0.199
## France           | 33.080 | 0.498 27.709 0.698 | 0.273 18.536 0.210
## Germany          | 19.066 | 0.158 4.226 0.185 | -0.320 38.296 0.752
## Italy             | 25.908 | 0.713 20.316 0.653 | 0.265 6.261 0.090
## Japan            | 15.089 | 0.176 1.492 0.082 | -0.516 28.653 0.711
## Russia           | 14.432 | 0.356 7.210 0.416 | 0.049 0.298 0.008
## UK               | 7.354 | 0.036 0.249 0.028 | -0.041 0.727 0.037
## USA              | 35.239 | -0.267 38.713 0.915 | 0.071 6.143 0.065
```

```

##           Dim.3   ctr   cos2
## Canada      | 0.112  1.834  0.195 |
## France      | -0.155 10.375  0.068 |
## Germany     | -0.061  2.431  0.028 |
## Italy       |  0.282 12.251  0.102 |
## Japan       |  0.244 11.089  0.159 |
## Russia      |  0.355 27.589  0.414 |
## UK          | -0.205 31.534  0.929 |
## USA         |  0.037  2.897  0.018 |
##
## Columns
##           Iner*1000   Dim.1   ctr   cos2   Dim.2   ctr   cos2
## Chemistry      |  13.469 | -0.058  0.862  0.053 | -0.212 25.471  0.708
## Economic science |  38.902 | -0.462 26.916  0.577 |  0.351 34.675  0.334
## Literature     |  58.438 |  0.790 64.353  0.918 |  0.186  7.942  0.051
## Medicine      |  10.429 | -0.108  3.418  0.273 |  0.066  2.874  0.103
## Peace         |  16.213 |  0.203  4.443  0.228 |  0.208 10.316  0.238
## Physics       |  14.758 |  0.005  0.008  0.000 | -0.164 18.723  0.475
##
##           Dim.3   ctr   cos2
## Chemistry      | -0.107 11.181  0.180 |
## Economic science |  0.174 14.649  0.082 |
## Literature     |  0.117  5.478  0.020 |
## Medicine      | -0.115 15.069  0.313 |
## Peace         | -0.226 21.169  0.283 |
## Physics       |  0.164 32.455  0.476 |

```

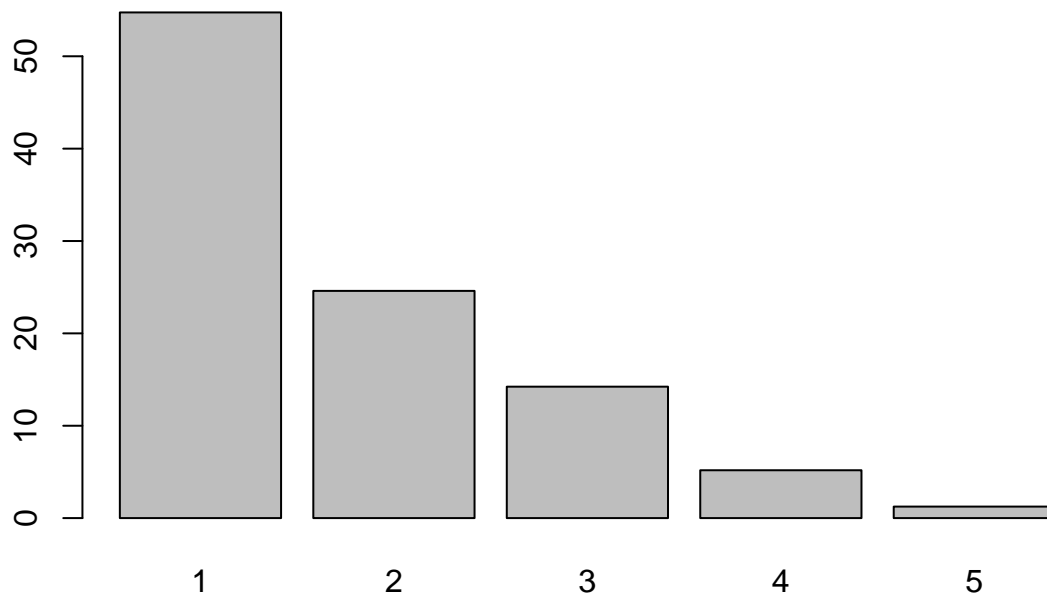
Bar chart of eigenvalues

```

barplot(res.ca$eig[,2],main="Eigenvalues", names.arg=1:nrow(res.ca$eig))

```

Eigenvalues



CA with supplementary elements

```
# Adding the Fields medal as supplementary element  
res.ca=CA(Nobel[1:8,], col.sup=7)
```

CA factor map

