Analyse en Composantes Principales avec FactoMineR sur les données du cours (données températures)

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Script et sorties R permettant de retrouver les graphes et sorties du cours. Le jeu de données doit être téléchargé et sauvegardé dans un répertoire connu (dans mon cas, le fichier a été sauvegardé dans le répertoire "C:/husson"").

```
library(FactoMineR)
```

Importation des données

```
setwd("C:/users/husson/")    # permet de placer la session R où se trouve le jeu de données
temperature <- read.table("AnaDo_JeuDonnees_TemperatFrance.csv",
        header=TRUE, sep=";", dec=".", row.names=1, fileEncoding="latin1")
```
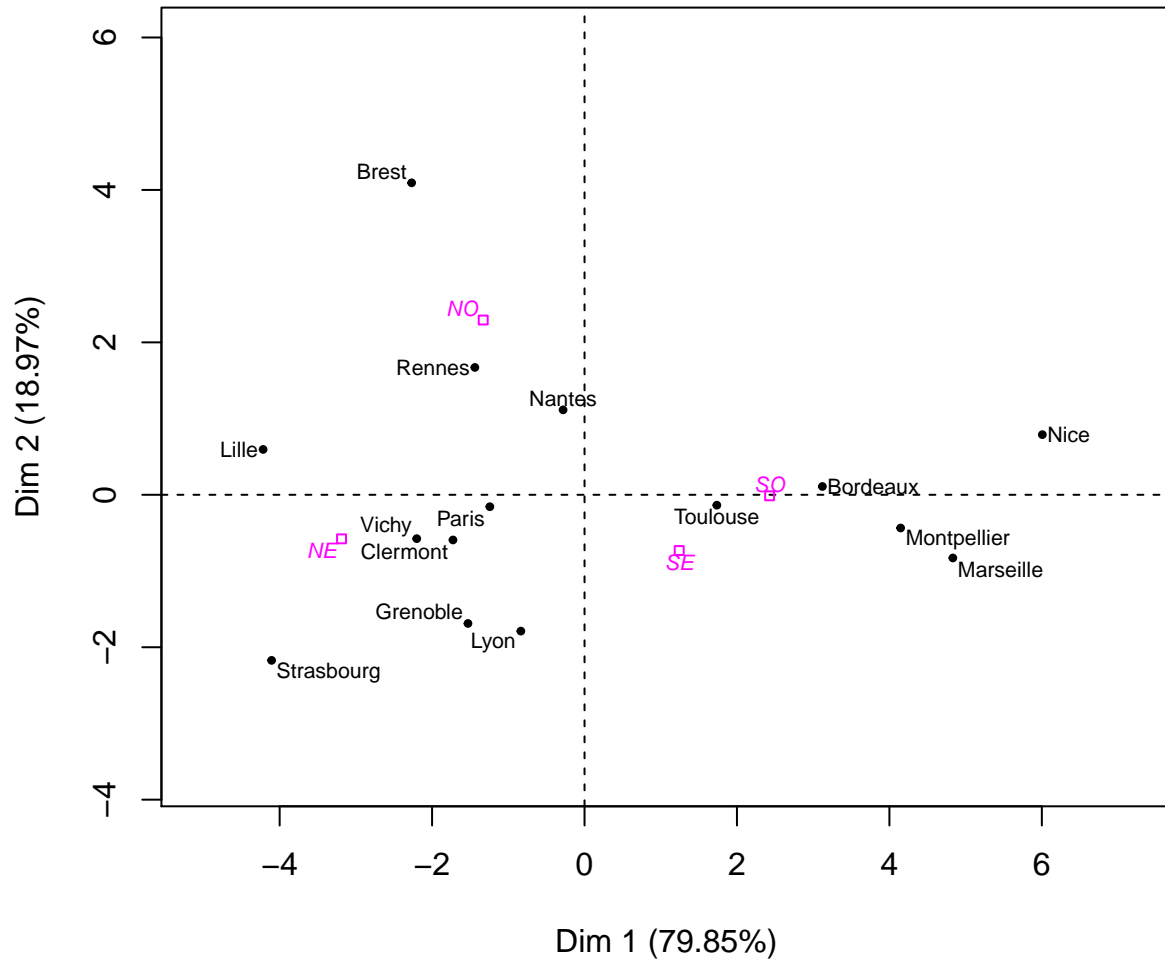
```
summary(temperature)
```

```
##      Janv            Févr            Mars             Avri
##  Min.   :0.400   Min.   :1.500   Min.   : 5.600   Min.   : 8.90
##  1st Qu.:2.400   1st Qu.:3.350   1st Qu.: 7.550   1st Qu.:10.00
##  Median :4.700   Median :5.300   Median : 7.800   Median :10.70
##  Mean   :3.973   Mean   :4.833   Mean   : 8.233   Mean   :10.98
##  3rd Qu.:5.550   3rd Qu.:6.200   3rd Qu.: 9.550   3rd Qu.:12.20
##  Max.   :7.500   Max.   :8.500   Max.   :10.800   Max.   :13.30
##      Mai             Juin            juil             Août
##  Min.   :11.60   Min.   :14.40   Min.   :15.60   Min.   :16.00
##  1st Qu.:13.70   1st Qu.:17.15   1st Qu.:18.90   1st Qu.:18.45
##  Median :14.30   Median :17.50   Median :19.40   Median :19.10
##  Mean   :14.43   Mean   :17.83   Mean   :19.83   Mean   :19.57
##  3rd Qu.:15.35   3rd Qu.:19.00   3rd Qu.:20.90   3rd Qu.:20.95
##  Max.   :16.80   Max.   :20.80   Max.   :23.30   Max.   :22.80
##      Sept            Octo            Nove             Déce
##  Min.   :14.70   Min.   : 9.50   Min.   : 4.900   Min.   :1.300
##  1st Qu.:15.85   1st Qu.:11.30   1st Qu.: 6.600   1st Qu.:3.450
##  Median :16.40   Median :11.60   Median : 7.800   Median :5.400
##  Mean   :16.99   Mean   :12.32   Mean   : 7.927   Mean   :4.847
##  3rd Qu.:18.45   3rd Qu.:13.55   3rd Qu.: 9.050   3rd Qu.:6.350
##  Max.   :20.30   Max.   :16.00   Max.   :11.500   Max.   :8.200
##      Lati            Long             Moye             Ampl        Région
##  Min.   :43.18   Min.   :-4.290   Min.   : 9.72   Min.   :10.20   NE:3
##  1st Qu.:43.96   1st Qu.: 0.460   1st Qu.:10.86   1st Qu.:14.95   NO:3
##  Median :45.47   Median : 3.050   Median :11.18   Median :16.20   SE:7
##  Mean   :46.04   Mean   : 2.583   Mean   :11.81   Mean   :15.91   SO:2
##  3rd Qu.:48.15   3rd Qu.: 4.875   3rd Qu.:13.01   3rd Qu.:17.45
##  Max.   :50.38   Max.   : 7.450   Max.   :14.84   Max.   :18.60
```
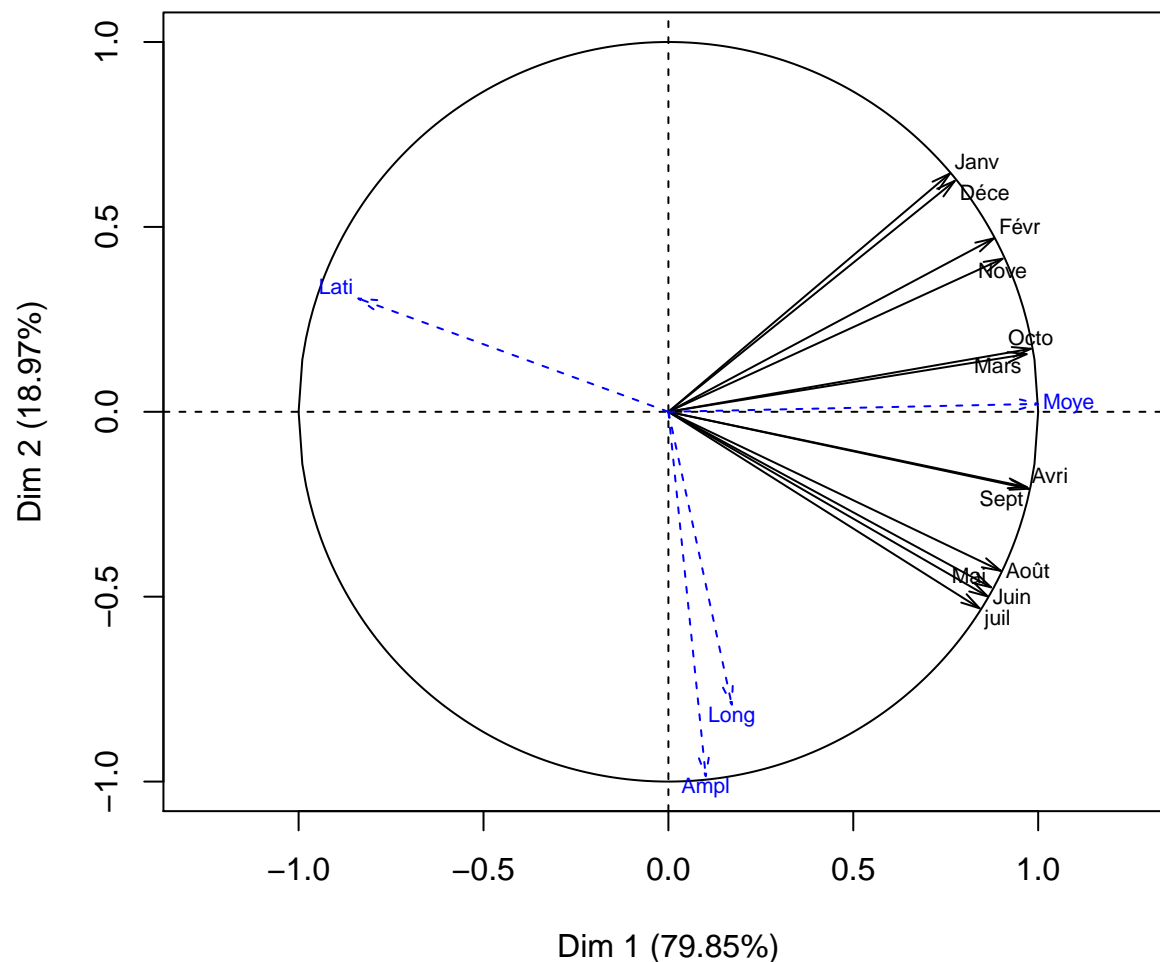
L'ACP

```
res <- PCA(temperature, quanti.sup=13:16,quali.sup=17)
```

Individuals factor map (PCA)

Variables factor map (PCA)

Résumé des principales sorties R

On résume ici les résultats des 2 premières dimensions sur tous les individus

```
summary(res, ncp=2, nbelements=Inf)
```

```
##
## Call:
## PCA(X = temperature, quanti.sup = 13:16, quali.sup = 17, graph = FALSE)
##
##
## Eigenvalues
##                        Dim.1   Dim.2   Dim.3   Dim.4   Dim.5   Dim.6
## Variance               9.582   2.276   0.070   0.040   0.014   0.008
## % of var.             79.848  18.970   0.583   0.331   0.117   0.067
```

3

```
## Cumulative % of var.   79.848   98.818   99.402   99.732   99.849   99.916
##                          Dim.7    Dim.8    Dim.9   Dim.10   Dim.11   Dim.12
## Variance                0.006    0.002    0.001    0.000    0.000    0.000
## % of var.               0.050    0.015    0.012    0.004    0.002    0.000
## Cumulative % of var.    99.966   99.981   99.993   99.997  100.000  100.000
##
## Individuals
##                 Dist    Dim.1     ctr    cos2    Dim.2     ctr    cos2
## Bordeaux     |  3.207 |  3.121   6.776   0.947 |  0.109   0.035   0.001 |
## Brest        |  4.685 | -2.268   3.579   0.234 |  4.093  49.069   0.763 |
## Clermont     |  1.840 | -1.726   2.073   0.880 | -0.593   1.028   0.104 |
## Grenoble     |  2.335 | -1.529   1.627   0.429 | -1.688   8.344   0.523 |
## Lille        |  4.278 | -4.217  12.372   0.972 |  0.595   1.037   0.019 |
## Lyon         |  1.978 | -0.835   0.485   0.178 | -1.788   9.365   0.817 |
## Marseille    |  4.922 |  4.833  16.250   0.964 | -0.829   2.012   0.028 |
## Montpellier  |  4.177 |  4.147  11.967   0.986 | -0.435   0.555   0.011 |
## Nantes       |  1.184 | -0.281   0.055   0.056 |  1.115   3.638   0.886 |
## Nice         |  6.068 |  6.007  25.106   0.980 |  0.789   1.825   0.017 |
## Paris        |  1.317 | -1.242   1.073   0.889 | -0.156   0.072   0.014 |
## Rennes       |  2.220 | -1.439   1.440   0.420 |  1.671   8.178   0.567 |
## Strasbourg   |  4.662 | -4.106  11.728   0.776 | -2.172  13.819   0.217 |
## Toulouse     |  1.779 |  1.736   2.097   0.953 | -0.136   0.054   0.006 |
## Vichy        |  2.293 | -2.201   3.372   0.922 | -0.575   0.969   0.063 |
##
## Variables
##                 Dim.1     ctr    cos2    Dim.2     ctr    cos2
## Janv         |  0.761   6.048   0.579 |  0.644  18.238   0.415 |
## Févr         |  0.880   8.090   0.775 |  0.469   9.666   0.220 |
## Mars         |  0.969   9.795   0.939 |  0.156   1.069   0.024 |
## Avri         |  0.969   9.806   0.940 | -0.204   1.822   0.041 |
## Mai          |  0.873   7.950   0.762 | -0.475   9.899   0.225 |
## Juin         |  0.864   7.783   0.746 | -0.499  10.953   0.249 |
## juil         |  0.842   7.391   0.708 | -0.531  12.406   0.282 |
## Août         |  0.899   8.427   0.807 | -0.430   8.120   0.185 |
## Sept         |  0.974   9.901   0.949 | -0.208   1.902   0.043 |
## Octo         |  0.980  10.026   0.961 |  0.170   1.276   0.029 |
## Nove         |  0.904   8.524   0.817 |  0.414   7.527   0.171 |
## Déce         |  0.774   6.258   0.600 |  0.624  17.121   0.390 |
##
## Supplementary continuous variables
##                 Dim.1    cos2    Dim.2    cos2
## Lati         | -0.839   0.704 |  0.306   0.094 |
## Long         |  0.171   0.029 | -0.792   0.628 |
## Moye         |  1.000   0.999 |  0.021   0.000 |
## Ampl         |  0.101   0.010 | -0.986   0.972 |
##
## Supplementary categories
##                 Dist    Dim.1    cos2   v.test    Dim.2    cos2  v.test
## NE           |  3.250 | -3.188   0.962  -1.927 | -0.578   0.032  -0.716 |
## NO           |  2.653 | -1.329   0.251  -0.803 |  2.293   0.747   2.843 |
## SE           |  1.448 |  1.242   0.736   1.405 | -0.731   0.255  -1.696 |
## SO           |  2.461 |  2.428   0.974   1.151 | -0.013   0.000  -0.013 |
```

Graphe en coloriant les villes en fonction de la région

```
plot(res,habillage="Région")
```

Individuals factor map (PCA)