Introduction to R: Part V

Annex

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Contents I

R and Calc

R and Calc is an extension to *Calc* application, part of the OO.o suite (OpenOffice.org):

- Allows to see R objects from the OO.o menu
- R should be started with `Rserve` running:

```
library(Rserve)
Rserve()
```

- in OO.o, Use the menu bar *R Add-on* > *Rdump()*
- It will open a dialog, input

```
rnorm(10)
cor.test(c(1,2,3,4), c(1,2,2,3))
```

- A new sheet will open with the result of the link to R
- `http://wiki.services.openoffice.org/wiki/R_and_Calc`

What is latex?

LaTeX (written as LaTeX in plain text, pronounced as `/l\'atej/`) is:

- Is a document markup language
- Is document preparation system for the TeX typesetting program
- Originally written in 1984 by Leslie Lamport at SRI International
- Only to the language in which documents are written, not to the text editor itself.

Widely used in :

- Academia
- Thesis
- Technical books

What is latex? II

Why we should all use LaTeX?

1. The typographic quality is comparable to scientific publishing editorials
2. Is *content* oriented as opposite to *WYSIWYG*. Splits presentation from content
3. LaTeX is open source distributed under LPPL.

Latex example

```
\documentclass[12pt]{article}
\title{\LaTeX}
\date{}
\begin{document}
  \maketitle
  \LaTeX{} is a document preparation system for the \TeX{}
  typesetting program. It offers programmable desktop publishing
  features and extensive facilities for automating most aspects of
  typesetting and desktop publishing, including numbering and
  cross-referencing, tables and figures, page layout, bibliographies,
  and much more. \LaTeX{} was originally written in 1984 by Leslie
  Lamport and has become the dominant method for using \TeX; few
  people write in plain \TeX{} anymore. The current version is
  \LaTeXe.
  \newline
   % This is a comment, it is not shown in the final output.
   % The following shows a little of the typesetting power of LaTeX
  \begin{eqnarray}
    E &=& mc^2                                  \\
    m &=& \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}
  \end{eqnarray}
\end{document}
```

Latex example II

LaTeX

LaTeX is a document preparation system for the TeX typesetting program. It offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout, bibliographies, and much more. LaTeX was originally written in 1984 by Leslie Lamport and has become the dominant method for using TeX; few people write in plain TeX anymore. The current version is LaTeX 2_ε.

$$E = mc^2 \tag{1}$$

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{2}$$

Sweave

In LaTeX code...

```
<<ejemploSweave>>= x <- 10
 y <- 20
 x * y
@
```

Output...

```
> x <- 10
> y <- 20
> x * y

[1] 200
```

Sweave

In LaTeX code

```
<<ejemploSweave>>=

library(iris)
head(iris[,c(1,2,5)])
summary(iris[,c(1,2,5)])

@
```

In LaTeX code

```
<<ejplot,echo=FALSE,fig=TRUE>>=

plot(iris,col=iris$Species)

@
```

Sweave II

Output...

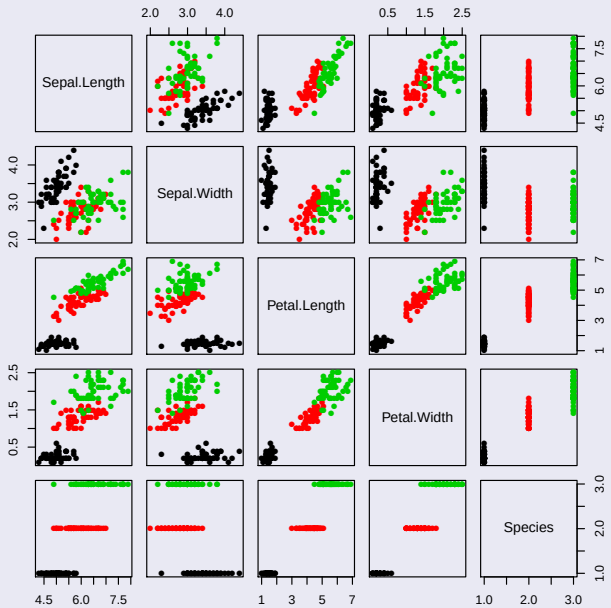
```
> data(iris)
> head(iris[, c(1, 2, 5)])

  Sepal.Length Sepal.Width Species
1          5.1         3.5  setosa
2          4.9         3.0  setosa
3          4.7         3.2  setosa
4          4.6         3.1  setosa
5          5.0         3.6  setosa
6          5.4         3.9  setosa

> summary(iris[, c(1, 2, 5)])

  Sepal.Length    Sepal.Width          Species
 Min.   :4.300   Min.   :2.000   setosa    :50
 1st Qu.:5.100   1st Qu.:2.800   versicolor:50
 Median :5.800   Median :3.000   virginica :50
 Mean   :5.843   Mean   :3.057
 3rd Qu.:6.400   3rd Qu.:3.300
 Max.   :7.900   Max.   :4.400
```

Output...



Parallel Computing?

Massive and distributed computing

1. Large number of parameters
2. Large number of variables
3. Large number of cases

MPI

- *MPI is a library specification for message-passing, proposed as a standard by a broadly based committee of vendors, implementors, and users.*
- Standard MPI available from `http://www-unix.mcs.anl.gov/mpi/standard.html`
- *MPI was designed for high performance on both massively parallel machines and on workstation clusters.*
- Extensive use: `http://www-unix.mcs.anl.gov/mpi/libraries.html`

R, Snow, Rmpi

It is possibel to go for "easy" parallel computing with R:

1. SNOW (simple network of worksations) is a easy parallel computing framework, under the frame of *lam-mpi*, via `Rmpi`
2. Snow exists thanks to Sigal Blay (`http://www.sfu.ca/~sblay/`).

Start up an R cluster is easy:

```
# carregar les llibreries de paralelitzacip
library(snow,rmpi)

# Arrancar 8 procesos de R
cl <- makeCluster(8, "MPI")
```

To stop the cluster

```
stopcluster(cl)
```

Rsnow, example

```
> cl <- makeCluster(8, type = "MPI")
> x <- list(alpha = 1:10, beta = exp(-3:3))
> x

$alpha
 [1]  1  2  3  4  5  6  7  8  9 10

$beta
[1]  0.04978707  0.13533528  0.36787944  1.00000000
[5]  2.71828183  7.38905610  20.08553692

> parLapply(cl, x, quantile)

$alpha
   0%   25%   50%   75%  100%
 1.00  3.25  5.50  7.75 10.00

$beta
         0%          25%          50%          75%         100%
 0.04978707  0.25160736  1.00000000  5.05366896 20.08553692

stopcluster(cl)
```

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End Part V