CURSO
INTRODUÇÃO AO R

Aula 1

Conceitos iniciais sobre o R

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IESC - UFRJ

2011

Tópicos

1. Sobre o R.

2. A interface gráfica do R.

3. Preparando uma sessão de trabalho no R.

4. Definições básicas no R.

5. Operações básicas no R.

6. Procurando ajuda no R.

7. Pacotes.

8. Operações básicas com números e vetores numéricos.

Sobre o R

- R é um programa estatístico com as seguintes facilidades:
  a. Gratuito de código aberto (Open Source).
  b. Ambiente de programação baseado na linguagem R.
  c. Ferramentas para gerar gráficos a nível de publicação.
  d. Coleção de pacotes, constantemente atualizada, contendo implementações computacionais de métodos estatísticos aplicados em diversas áreas.
- Última versão: R- 2.13.1 (08/07/2011).
- Geralmente, duas atualizações por ano.

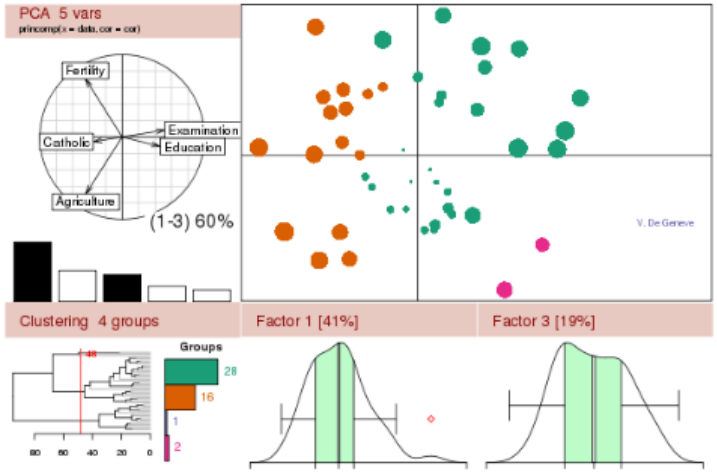
Sobre o R

- A curva de aprendizagem do R é “lenta” e a curva de esquecimento “rápida”.
- As primeiras interações da pessoa com o R podem ser desalentadoras.
- O processo “preparação dos dados - análises dos dados - resultados” no R é diferente em comparação com outros programas (SPSS, SAS, outros).
- Vale a pena usar o R?

Sobre o R

http://www.r-project.org/

The R Project for Statistical Computing



About R
- What is R?
- Contributors
- Screenshots
- What's new?

Download, Packages
- CRAN

R Project
- Foundation
- Members & Donors
- Mailing Lists
- Bug Tracking
- Developer Page
- Conferences
- Search

Documentation
- Manuals
- FAQs
- The R Journal
- Wiki
- Books
- Certification
- Other

Misc
- Bioconductor
- Related Projects

Getting Started:

- R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To **download R**, please choose your preferred CRAN mirror.
- If you have questions about R like how to download and install the software, or what the license terms are, please read our answers to frequently asked questions before you send an email.

News:

R version 2.13.1 has been released on 2011-07-08. The source code is first available in this directory, and eventually via all of CRAN. Binaries will arrive in due course (see download instructions above).

- **The R Journal Vol.3/1** is available
- The R Foundation as been awarded fifteen slots for R projects in the Google Summer of Code 2011.
- **useR! 2011**, will take place at the University of Warwick, Coventry, UK, August 16-18, 2011.

Sobre o R

Bits

Business ▪ Innovation ▪ Technology ▪ Society

January 8, 2009, 1:52 PM

R You Ready for R?

By ASHLEE VANCE

Statistics professor Robert Gentleman who helped developed the R programming language. (Credit: Stuart Isett for The New York Times)

http://bits.blogs.nytimes.com/2009/01/08/r-you-ready-for-r/

Sobre o R

The New York Times

Business Computing

WORLD | U.S. | N.Y. / REGION | BUSINESS | TECHNOLOGY | SCIENCE | HEALTH | SPORTS | OPINION

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Personal Tech »

Cellphones, Cameras, Computers and more

Data Analysts Captivated by R's Power

Stuart Isett for The New York Times

R first appeared in 1996, when the statistics professors Robert Gentleman, left, and Ross Ihaka released the code as a free software package.

http://www.nytimes.com/2009/01/07/technology/business-computing/07program.html

Sobre o R

Quem usa R?

Sobre o R

Baixando o R do CRAN

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CRAN Mirrors

The Comprehensive R Archive Network is available at the following URLs, please choose a location close to you. Some statistics on the status of the mirrors can be found here: main page, windows release, windows old release.

Argentina	
http://mirror.fcaglp.unlp.edu.ar/CRAN/	Universidad Nacional de La Plata
http://r.mirror.mendoza-conicet.gob.ar/	CONICET Mendoza
Australia	
http://cran.csiro.au/	CSIRO
http://cran.ms.unimelb.edu.au/	University of Melbourne
Austria	
http://cran.at.r-project.org/	Wirtschaftsuniversitaet Wien
Belgium	
http://www.freestatistics.org/cran/	K.U.Leuven Association
Brazil	
http://cran-r.c3sl.ufpr.br/	Universidade Federal do Parana
http://cran.fiocruz.br/	Oswaldo Cruz Foundation, Rio de Janeiro
http://www.vps.fmvz.usp.br/CRAN/	University of Sao Paulo, Sao Paulo
http://brieger.esalq.usp.br/CRAN/	University of Sao Paulo, Piracicaba

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The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- Download R for Linux
- Download R for MacOS X
- Download R for Windows

Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2011-07-08): R-2.13.1.tar.gz (read what's new in the latest version).
- Sources of R alpha and beta releases (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are available here. Please read about new features and bug fixes before filing corresponding feature requests or bug reports.
- Source code of older versions of R is available here.
- Contributed extension packages

Sobre o R

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R for Windows

Subdirectories:

base — Binaries for base distribution (managed by Duncan Murdoch). This is what you want if you **install R for the first time**.

contrib — Binaries of contributed packages (managed by Uwe Ligges)

Please do not submit binaries to CRAN. Package developers might want to contact Duncan Murdoch or Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the R FAQ and R for Windows FAQ.

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

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R-2.13.1 for Windows (32/64 bit)

Download R 2.13.1 for Windows (39 megabytes, 32/64 bit)

Installation and other instructions
New features in this version: Windows specific, all platforms.

If you want to double-check that the package you have downloaded exactly matches the package distributed by R, you can compare the md5sum of the .exe to the true fingerprint. You will need a version of md5sum for windows: both graphical and command line versions are available.

Frequently asked questions

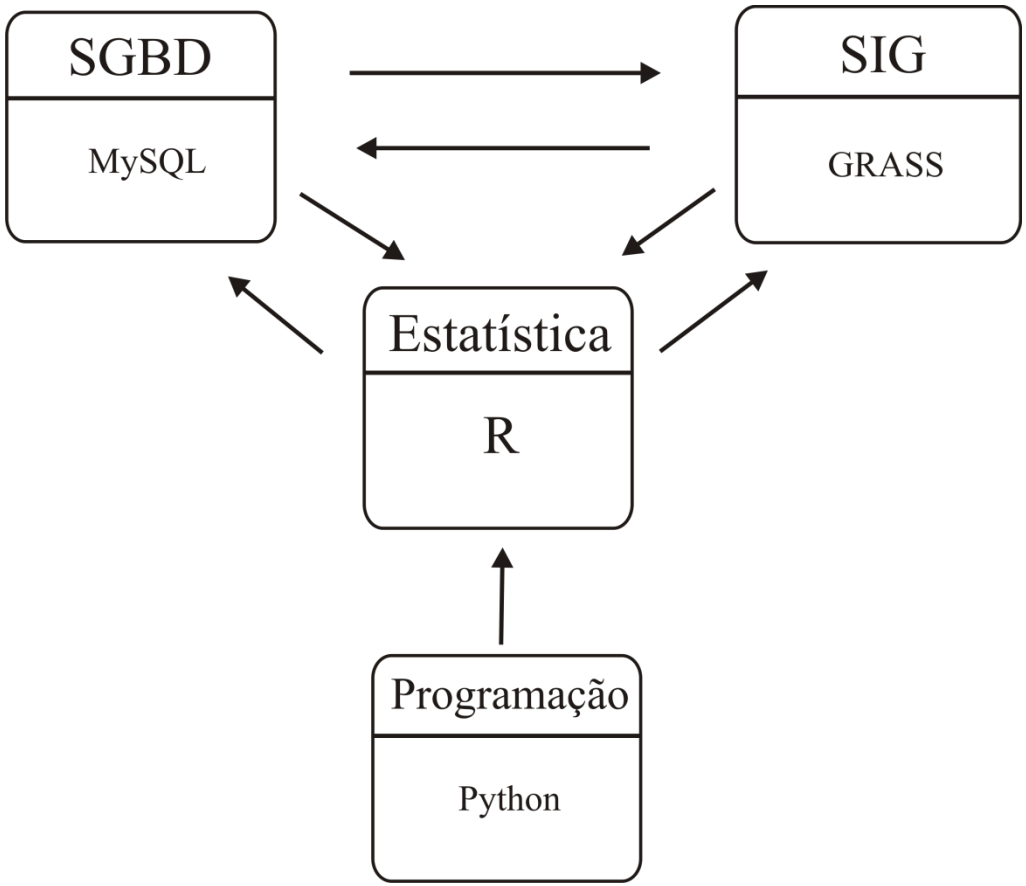
- How do I install R when using Windows Vista?
- How do I update packages in my previous version of R?
- Should I run 32-bit or 64-bit R?

Please see the R FAQ for general information about R and the R Windows FAQ for Windows-specific information.

Other builds

- Patches to this release are incorporated in the r-patched snapshot build.
- A build of the development version (which will eventually become the next major release of R) is available in the r-devel snapshot build.
- Previous releases

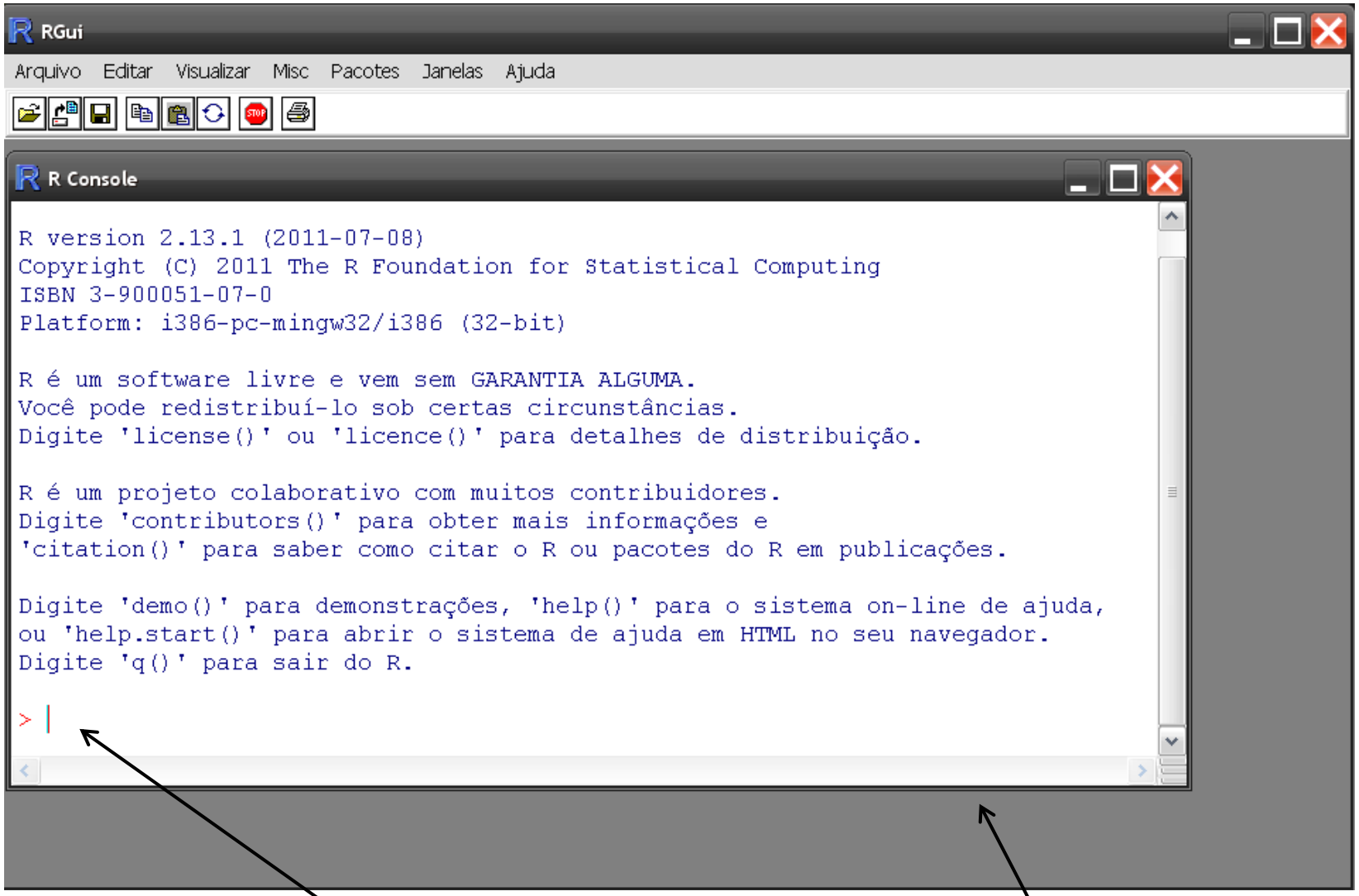
Sobre o R



Interoperabilidade do R: tendência Open Source

open source™

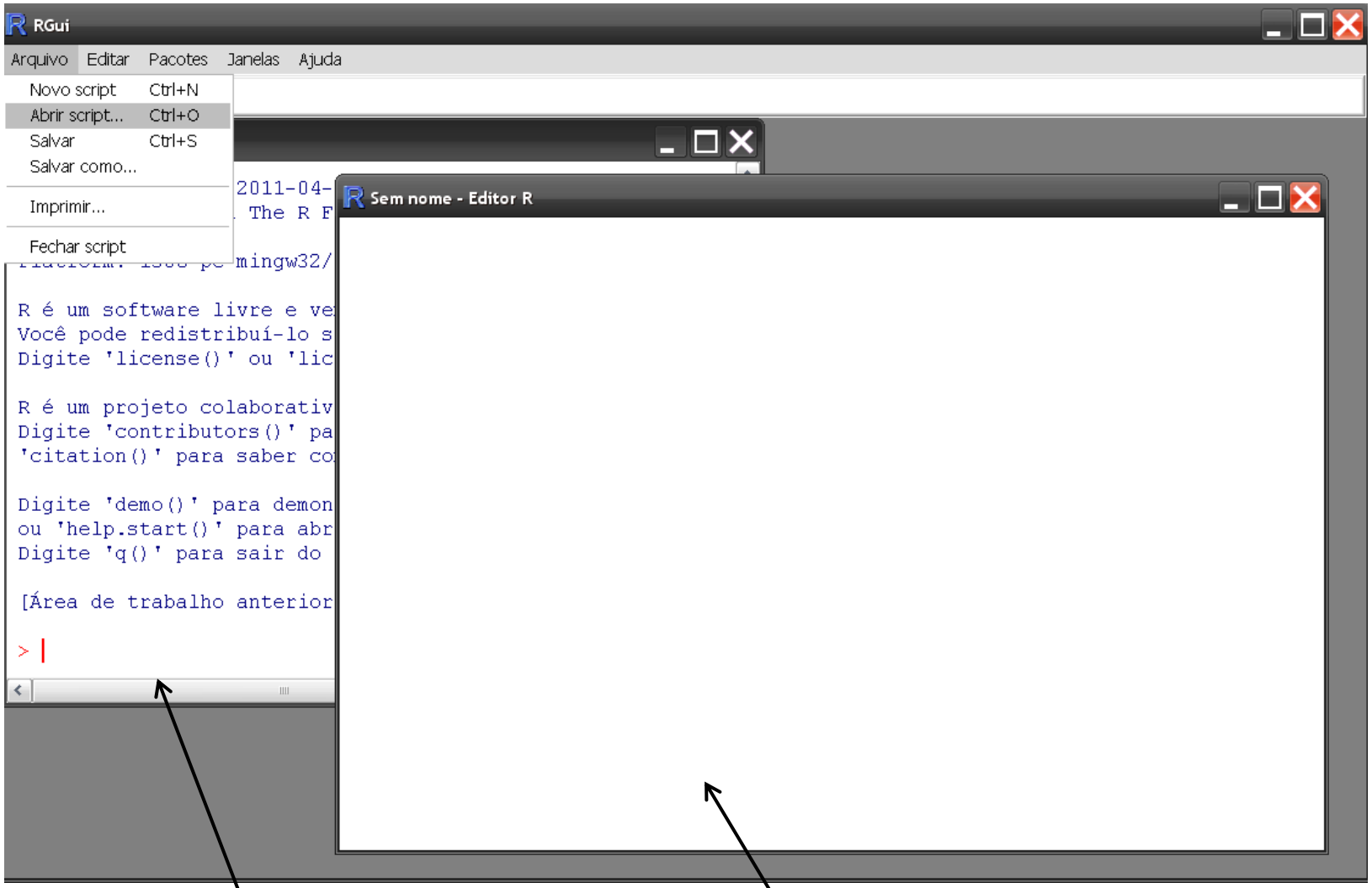
A interface gráfica do R



Linha de comandos

Janela de comandos

A interface gráfica do R



Janela de comandos

Janela do editor do R

A interface gráfica do R

Janela de Comandos

- **Na linha de comandos, especificada pelo símbolo (*prompt*) >, são digitadas comandos e funções.**
- **Se ao digitar aparecer o símbolo + no lugar do *prompt*, significa que ainda esta faltando completar o texto do comando.**
- **Os resultados das operações e funções são mostradas na Janela de Comandos.**

Janela do editor

- **Serve para digitar uma lista de comandos que podem ser organizados para formar uma função ou *script*.**

Preparando uma sessão de trabalho no R

Visualizando o diretório de trabalho: getwd()

```
> getwd()
[1] "C:/Documents and Settings/Administrador/Meus documentos"
```

Criando o diretório de trabalho: dir.create()

```
> dir.create('C:/cursoR')
```

Definindo o diretório de trabalho: setwd()

```
> setwd('C:/cursoR')

> getwd()
[1] "C:/cursoR"
```

Definições básicas no R

- Todas as entidades que são criadas e manipuladas no R são denominadas genericamente de Objetos.
- Objetos podem ser variáveis, vetores de números, cadeias de caracteres, funções, matrizes, entre outros.
- Objetos são criados a partir de um comando de atribuição ou assinalação.
- Comando para atribuição: <- ou =
- Exemplo de criação de um objeto denominado a com valor igual a 4.

```
> a <- 4
> a
[1] 4
```

Definições básicas no R

- R usa uma sintaxe *case-sensitive.*
- Por exemplo, A e a correspondem a objetos diferentes.

```
> A <- 2

> a <- 3
```

- Nomes de objetos não podem começar com número nem podem ser palavras reservadas.

O R não avisa quando um objeto muda de valor.

=> Criar os objetos: A = 2, a = 3, BB = 312, A1 = 12, e A2 = 100

Operações básicas no R

Lista objetos: ls() e objects()

```
> ls()

[1] "a"  "A"  "A1" "A2" "BB"
```

- Se desejamos listar unicamente os objetos que começam com a letra A.

```
> ls(pattern = 'A')

[1] "A"  "A1" "A2"
```

Apaga objetos: rm() e remove()

```
> rm(a)

> rm(A, A1)
```

- Apagando um objeto não tem como recuperá-lo.

Operações básicas no R

Apaga todos os objetos da área de trabalho

```
> rm(list = ls())

> ls()

character(0)
```

=> Criar os objetos: A = 2, a = 3, BB = 312, A1 = 12, e A2 = 100

```
> A <- 2; a <- 3; BB <- 312; A1 <- 12;  A2 <- 100
```

Definições básicas no R

Área de Trabalho (Workplace)

- Todos os objetos criados em uma sessão de trabalho são armazenados temporariamente na Área de Trabalho até o final da sessão de trabalho.
- No final de uma sessão de trabalho (sair do R), o R perguntará se deseja salvar a Área de Trabalho. Caso afirmativo, salva a Área de Trabalho no arquivo .Rdata.
- Quando o R é iniciado de novo, carrega a Área de Trabalho salvo no arquivo .Rdata anteriormente.

Salva os objetos da Área de Trabalho: save.image()

```
> save.image("Aula1.RData")
```

Definições básicas no R

Mostra os arquivos no diretório de trabalho: dir()

```
> dir()
[1] "Aula1.RData"
```

=> Apague todos os objetos da Área de Trabalho.

Carrega uma Área de trabalho: load()

```
> load("Aula1.Rdata")
> ls()
[1] "a"  "A"  "A1" "A2" "BB"
```

Salva o histórico de comandos: save.history()

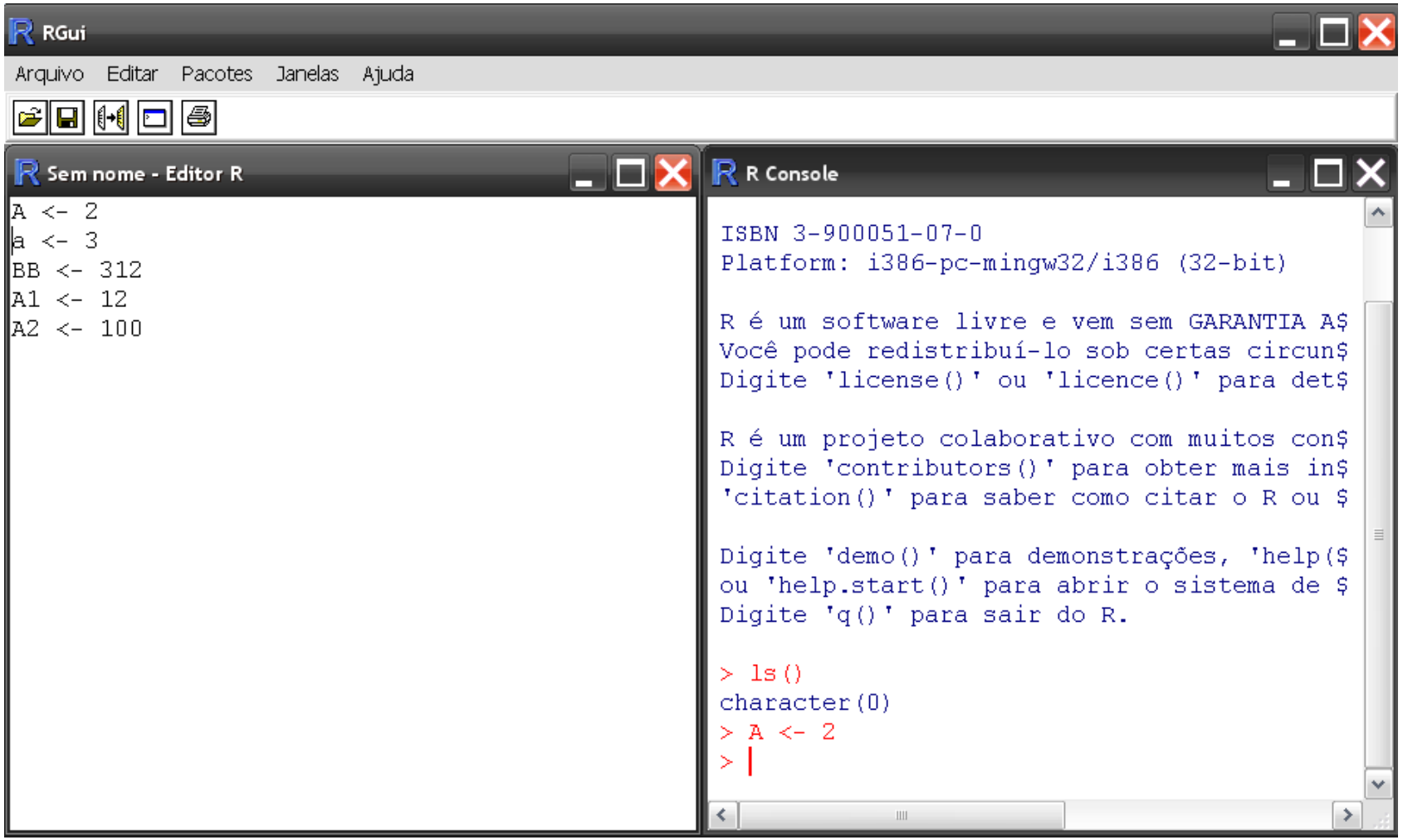
- O arquivo do histórico de comandos pode ser aberto pelo bloco de notas.

```
> savehistory("comandos.Rhistory")
```

Definições básicas no R

=> Abra o Editor do R e coloque os comandos:

A <- 2; a <- 3; BB <- 312; A1 <- 12; A2 <- 100



Definições básicas no R

Salva o conteúdo do Editor do R

- O conteúdo do Editor do R pode ser salvo utilizando o menu na opção Arquivo.
- A extensão do arquivo é *.R e pode ser aberto pelo Bloco de Notas.

=> Salve o conteúdo do Editor do R com o nome aula1.R

Procurando ajuda no R

Ajuda para funções: ? ou help()

```
> ? hist

> help(mean)
```

Ajuda para caracteres especiais ou comandos da linguagem R : ? ou help()

```
> ? "$"

> help("if")

> help("for")
```

Procurando ajuda no R

Acessa ajuda em html do R: help.start()

> help.start()

Statistical Data Analysis 

Manuals

An Introduction to R
Writing R Extensions
R Data Import/Export
The R Language Definition
R Installation and Administration
R Internals

Reference

Packages
Search Engine & Keywords

Miscellaneous Material

About R
License
Authors
Frequently Asked Questions
NEWS
Resources
Thanks

Material specific to the Windows port

CHANGES
Windows FAQ

Procurando ajuda no R

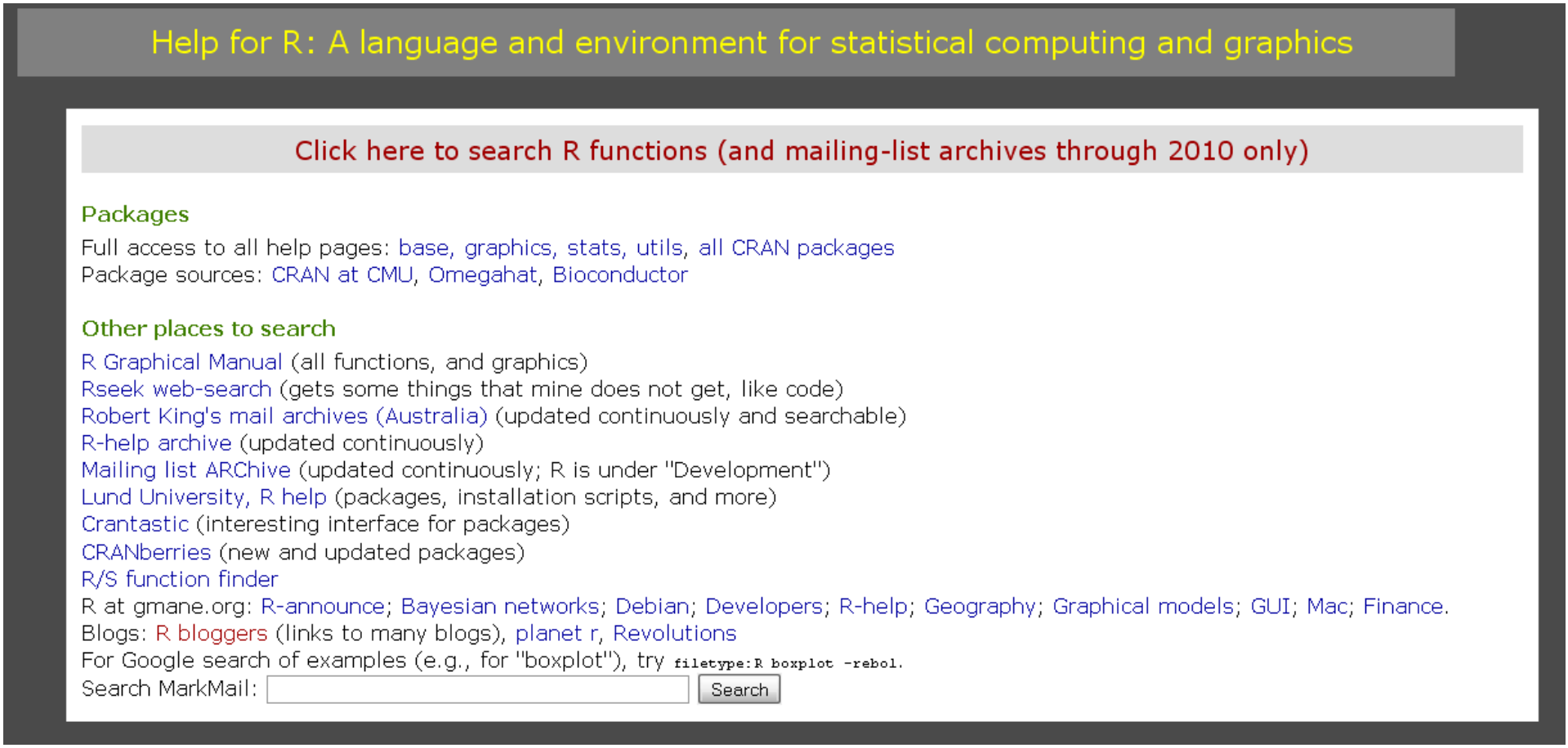
Procura por um termo: apropos()

```
> apropos("sum")
 [1] ".__C__summary.table"      ".__C__summaryDefault"
 [3] ".__T__Summary:base"       "colSums"
 [5] "contr.sum"                "cumsum"
 [7] "print.summary.table"      "print.summaryDefault"
 [9] "rowsum"                   "rowsum.data.frame"
[11] "rowsum.default"           "rowSums"
[13] "sum"                      "summary"
[15] "Summary"                  "summary.aov"
[17] "summary.aovlist"          "summary.connection"
[19] "summary.data.frame"       "Summary.data.frame"
[21] "summary.Date"             "Summary.Date"
[23] "summary.default"          "Summary.difftime"
[25] "summary.factor"           "Summary.factor"
[27] "summary.glm"              "summary.infl"
[29] "summary.lm"               "summary.manova"
[31] "summary.matrix"           "summary.mlm"
[33] "Summary.numeric_version"  "Summary.ordered"
[35] "summary.POSIXct"          "Summary.POSIXct"
[37] "summary.POSIXlt"          "Summary.POSIXlt"
[39] "summary.srcfile"          "summary.srcref"
[41] "summary.stepfun"          "summary.table"
[43] "summaryRprof"
```

> help(summary.lm)

Procurando ajuda no R

Ajuda na Internet: http://search.r-project.org/



Procurando ajuda no R

Ajuda na Internet: http://search.r-project.org/

R Site Search

Powered by Namazu.
Comments and criticisms welcome.

This search will allow you to search the contents of the R functions, package vignettes, task views, and R-help mail archives.

The mail archives include R-help (including R-sig-geo through 2007), R-sig-mixed-models and R-devel through December 2010. To see a thread, you may have to click on "[thread]" at the bottom of a message. Notice that the mail archives are no longer included in the default search.

So far I have not had time to work on the mail archives for 2011. I think they are not needed anymore. There are other search engines for mail that are better. The functions, however, are necessary and I will try to continue maintaining them.

The functions, vignettes, and task views are complete up to August 29, 2011, for R version 2.13.1, including all the CRAN packages, the minimal default packages (and a few more) from Bioconductor, and all of Jim Lindsey's packages.

Query: Search! [How to search]

Display: 100 **Description:** normal **Sort:** by score

Target:

- [x] Functions
- [x] Vignettes
- [ ] R-help 2008-2009
- [ ] R-help 2010-
- [x] Task views
- [ ] R-sig-mixed-models
- [ ] R-help 2002-2007
- [ ] R-help 1997-2001

Procurando ajuda no R

Ajuda na Internet: http://search.r-project.org/

R Site Search

Query: odds ratio Search! [How to search]

Display: 100 **Description:** normal **Sort:** by score

Target:

- [x] Functions
- [ ] Vignettes
- [ ] R-help 2008-2009
- [x] R-help 2010-
- [ ] Task views
- [ ] R-sig-mixed-models
- [ ] R-help 2002-2007
- [ ] R-help 1997-2001
- [ ] R-devel

For problems WITH THIS PAGE (not with R) contact baron@psych.upenn.edu.

Results:

References:

- **Rhelp10**: [odds: 83] [ratio: 246] [TOTAL: 22]
- **functions**: [odds: 641] [ratio: 3314] [TOTAL: 380]

Total 402 documents matching your query.

1. Converting Odds Ratio to Relative Risk with Partial Data Information (score: 63)
   Author: *Zhu Wang*
   Date: *Sat, 16 Jul 2011 15:50:11 -0500*
   Converting **Odds Ratio** to Relative Risk with Partial Data Information Zhu Wang Connecticut Children's Medical Center University of Connecticut School of Medicine Abstract In medical and epidemiology

Procurando ajuda no R

Listas de emails (Grupos de discussão)

http://www.r-project.org/mail.html

Special Interest Group (=: SIG) mailing lists

R-SIG-Mac	R Special Interest Group on Mac ports of R
R-sig-DB	R SIG on Database Interfaces
R-SIG-Debian	R Special Interest Group for Debian ports of R
R-sig-dynamic-models	Special Interest Group for Dynamic Simulation Models in R
R-sig-Epi	R for epidemiological data analysis
R-sig-ecology	Using R in ecological data analysis
R-SIG-Fedora	R Special Interest Group for Fedora and Redhat ports of R
R-SIG-Finance	Special Interest Group for 'R in Finance'
R-sig-Geo	R Special Interest Group on using Geographical data and Mapping
R-sig-gR	R SIG on gRaphical models
R-SIG-GUI	R Special Interest Group on GUI Development
R-SIG-HPC	R SIG on High-Performance Computing
R-sig-Jobs	R SIG List for Announcements of Jobs where R is used
R-sig-mixed-models	R SIG on Mixed Effect Models, notably lmer() related
R-sig-mediawiki	R SIG on the R Extension for Mediawiki
R-sig-networks	R SIG for users and developers of network- or graph-related software within R
R-sig-phylo	R SIG on phylogenetic and comparative methods and analyses
R-sig-QA	R SIG on Quality Assurance & Validation
R-sig-Robust	R SIG on Robust Statistics
R-sig-teaching	SIG on Teaching Statistics (and more) using R
R-sig-Wiki	SIG on the Development of an "R Wiki"

Procurando ajuda no R

Lista de email brasileira

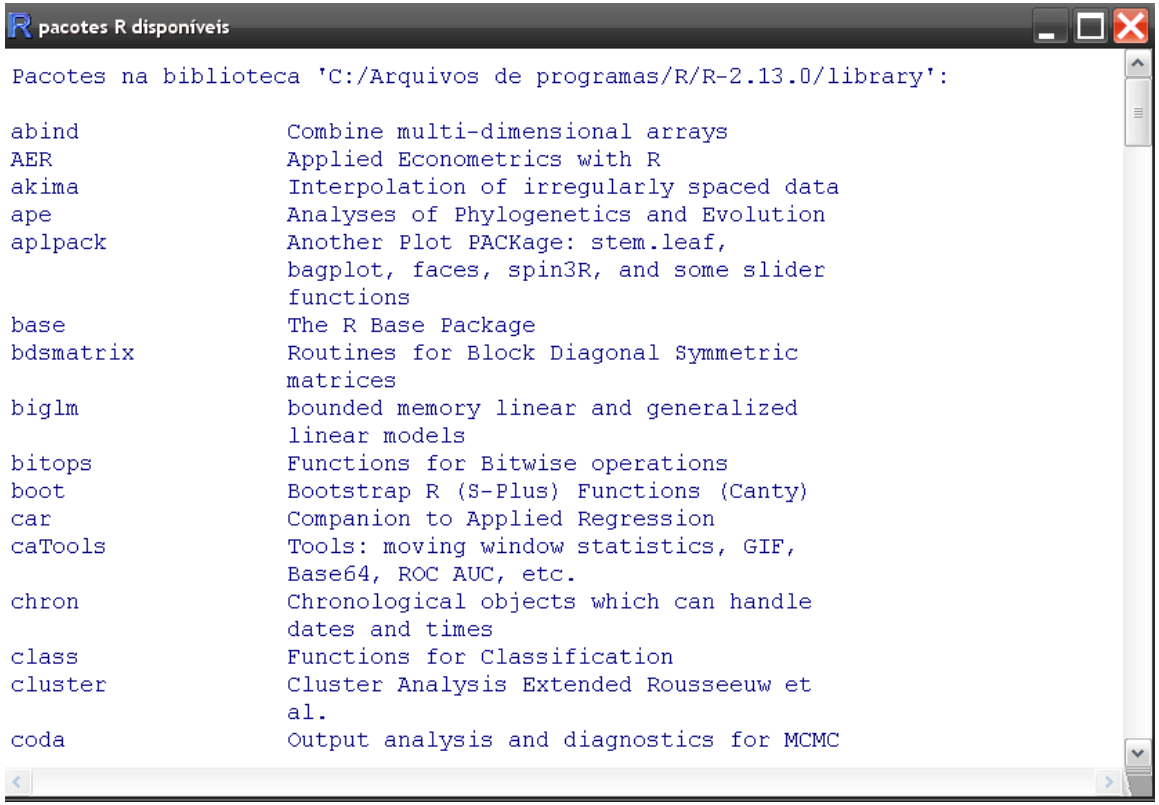
https://listas.inf.ufpr.br/cgi-bin/mailman/listinfo/r-br

Pacotes

- Pacotes são arquivos contendo funções, dados e manuais.
- O programa R vem com alguns pacotes instalados.

Lista pacotes instalados no R: library()

> library()

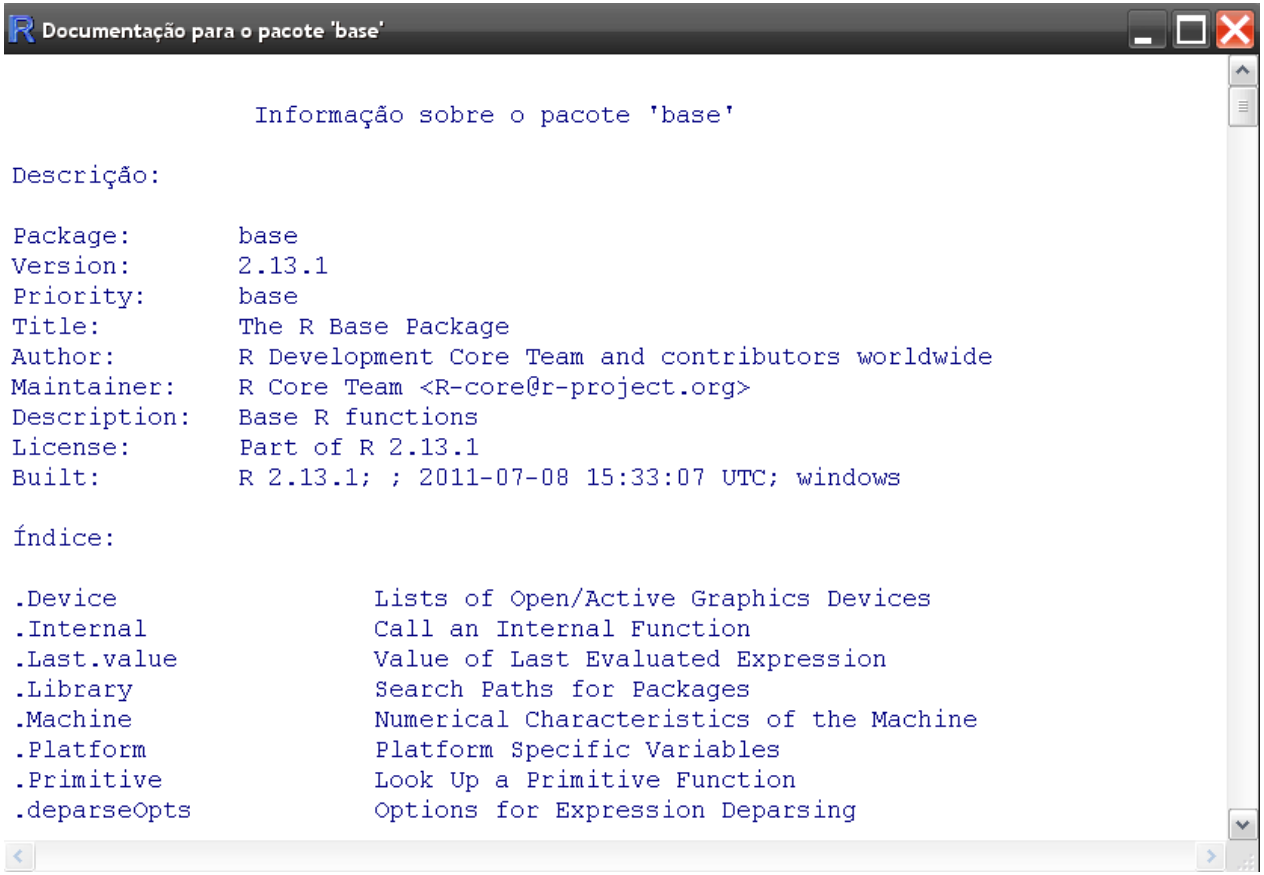


Pacotes

- O pacote principal do R é o base.

Obtém informação sobre um pacote: library(help="nomedopacote")

> library(help="base")



Pacotes

- O R não carrega todos os pacotes ao iniciar (economiza memória).

Lista os pacotes carregados numa sessão de trabalho: (.packages())

```
> (.packages())
[1] "stats"     "graphics"  "grDevices" "utils"     "datasets"  "methods"
[7] "base"
```

Carrega um pacote no R: library(nomedopacote)

```
> library(MASS)
> (.packages())
[1] "MASS"      "stats"     "graphics"  "grDevices" "utils"     "datasets"
[7] "methods"   "base"
```

- Um pacote só pode ser carregado se estiver instalado.

Pacotes

Descarrega um pacote no R: detach("package:nomedopacote")

```
> detach("package:MASS")
> (.packages())
[1] "stats"     "graphics"  "grDevices" "utils"     "datasets"  "methods"
[7] "base“
```

Checa se um pacote esta instalado no R: find.package("nomedopacote")

```
> find.package("utils")
[1] "C:/ARQUIV~1/R/R-213~1.0/library/utils“

> find.package("DMwR")
Erro em find.package("DMwR") : não há nenhum pacote chamado 'DMwR'
```

Pacotes

Instala um pacote no R: install.packages("nomedopacote")

```
> install.packages('Rcmdr')
also installing the dependency ‘car’

tentando a URL 'http://cran-r.c3sl.ufpr.br/bin/windows/contrib/2.13/car_2.0-11.zip'
Content type 'application/zip' length 760733 bytes (742 Kb)
URL aberta
downloaded 742 Kb

tentando a URL 'http://cran-r.c3sl.ufpr.br/bin/windows/contrib/2.13/Rcmdr_1.7-0.zip'
Content type 'application/zip' length 2954744 bytes (2.8 Mb)
URL aberta
downloaded 2.8 Mb

package 'car' successfully unpacked and MD5 sums checked
package 'Rcmdr' successfully unpacked and MD5 sums checked

The downloaded packages are in
        C:\Temp\Rtmpq32JwZ\downloaded_packages
```

Pacotes

- Existem atualmente 3236 pacotes no site do CRAN do R.
- Para utilizar um pacote na sessão de trabalho é preciso de duas etapas: instalar do pacote e carregar o pacote no R.
- Alguns pacotes dependem de outros na hora de instalar e/ou funcionar.
- A etapa de instalação pode ser efetuada diretamente pelo Menu na aba Pacote opção Instalar pacote(s)... . Esta opção requer ter conexão à Internet.
- Pode se optar por pegar o arquivo .ZIP (localizado na página do CRAN) do pacote, mas pode-se precisar dos arquivos .ZIP de outros pacotes dependentes.
- Quando se instala ou carrega um pacote, a lista do help se atualiza com os novos comandos.

Pacotes

http://cran-r.c3sl.ufpr.br/index.html

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Other

Documentation
Manuals
FAQs
Contributed

CRAN Task Views

Bayesian	Bayesian Inference
ChemPhys	Chemometrics and Computational Physics
ClinicalTrials	Clinical Trial Design, Monitoring, and Analysis
Cluster	Cluster Analysis & Finite Mixture Models
Distributions	Probability Distributions
Econometrics	Computational Econometrics
Environmetrics	Analysis of Ecological and Environmental Data
ExperimentalDesign	Design of Experiments (DoE) & Analysis of Experimental Data
Finance	Empirical Finance
Genetics	Statistical Genetics
Graphics	Graphic Displays & Dynamic Graphics & Graphic Devices & Visualization
gR	gRaphical Models in R
HighPerformanceComputing	High-Performance and Parallel Computing with R
MachineLearning	Machine Learning & Statistical Learning
MedicalImaging	Medical Image Analysis
Multivariate	Multivariate Statistics
NaturalLanguageProcessing	Natural Language Processing
OfficialStatistics	Official Statistics & Survey Methodology
Optimization	Optimization and Mathematical Programming
Pharmacokinetics	Analysis of Pharmacokinetic Data
Phylogenetics	Phylogenetics, Especially Comparative Methods
Psychometrics	Psychometric Models and Methods
ReproducibleResearch	Reproducible Research
Robust	Robust Statistical Methods
SocialSciences	Statistics for the Social Sciences
Spatial	Analysis of Spatial Data

Pacotes

http://cran-r.c3sl.ufpr.br/index.html

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Available CRAN Packages By Date of Publication

Date	Package	Title
2011-08-22	LaplacesDemon	Software for Bayesian Inference
2011-08-22	LearnBayes	Functions for Learning Bayesian Inference
2011-08-22	exams	Automatic Generation of Standardized Exams for Large-Lecture Courses
2011-08-22	last.call	Utility for returning previous commands as unevaluated calls and the full context of function calls
2011-08-22	pragma	Provides a pragma / directive / keyword syntax for R
2011-08-22	smatr	(Standardised) Major Axis Estimation and Testing Routines
2011-08-22	zoo	S3 Infrastructure for Regular and Irregular Time Series (Z's ordered observations)
2011-08-21	GrapheR	A multiplatform GUI for drawing customizable graphs in R
2011-08-21	RTextTools	Automatic Text Classification via Supervised Learning
2011-08-21	chron	Chronological objects which can handle dates and times
2011-08-21	clue	Cluster ensembles
2011-08-21	hergm	Hierarchical Exponential-Family Random Graph Models
2011-08-21	mediation	R Package for Causal Mediation Analysis
2011-08-21	optimx	A Replacement and Extension of the optim() Function
2011-08-20	QuACN	This package offers a set of topological network measures to analyze complex Networks structurally
2011-08-20	RNetLogo	Provides an interface to the agent-based modelling plattform NetLogo

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DMwR: Functions and data for "Data Mining with R"

This package includes functions and data accompanying the book "Data Mining with R, learning with case studies" by Luis Torgo, CRC Press 2010.

Version:	0.2.1
Depends:	R (≥ 2.10), methods, graphics, xts (≥ 0.6-7), quantmod (≥ 0.3-8), ROCR (≥ 1.0-2), class (≥ 7.3-1), rpart (≥ 3.1-46), abind (≥ 1.1-0), cluster (≥ 1.12.1), lattice (≥ 0.18-3), grid (≥ 2.10.1), zoo (≥ 1.6-4)
Published:	2011-04-15
Author:	Luis Torgo
Maintainer:	Luis Torgo <ltorgo at dcc.fc.up.pt>
License:	GPL (≥ 2)
Citation:	DMwR citation info
CRAN checks:	DMwR results

Downloads:

Package source:	DMwR_0.2.1.tar.gz
MacOS X binary:	DMwR_0.2.1.tgz
Windows binary:	DMwR_0.2.1.zip
Reference manual:	DMwR.pdf
Old sources:	DMwR archive

Pacotes

Lista arquivos de dados do pacote datasets: data()

```
> data()
```

R data sets

```
Data sets in package 'datasets':

AirPassengers           Monthly Airline Passenger Numbers 1949-1960
BJsales                 Sales Data with Leading Indicator
BJsales.lead (BJsales)
                        Sales Data with Leading Indicator
BOD                     Biochemical Oxygen Demand
CO2                     Carbon Dioxide Uptake in Grass Plants
ChickWeight             Weight versus age of chicks on different diets
DNase                   Elisa assay of DNase
EuStockMarkets          Daily Closing Prices of Major European Stock
                        Indices, 1991-1998
Formaldehyde            Determination of Formaldehyde
HairEyeColor            Hair and Eye Color of Statistics Students
Harman23.cor            Harman Example 2.3
Harman74.cor            Harman Example 7.4
Indometh                Pharmacokinetics of Indomethacin
InsectSprays            Effectiveness of Insect Sprays
JohnsonJohnson          Quarterly Earnings per Johnson & Johnson Share
LakeHuron               Level of Lake Huron 1875-1972
LifeCycleSavings        Intercountry Life-Cycle Savings Data
Loblolly                Growth of Loblolly pine trees
Nile                    Flow of the River Nile
Orange                  Growth of Orange Trees
OrchardSprays           Potency of Orchard Sprays
```

Pacotes

Acessa um arquivo de dados disponível num pacote: data(nomedopacote)

- **Acessa um arquivo de dados de um pacote previamente carregado.**

```
> (.packages())
[1] "stats"     "graphics"  "grDevices" "utils"     "datasets"  "methods"
[7] "base "

> data(CO2)

> CO2
   Plant       Type  Treatment conc uptake
1    Qn1     Quebec nonchilled   95   16.0
2    Qn1     Quebec nonchilled  175   30.4
3    Qn1     Quebec nonchilled  250   34.8
4    Qn1     Quebec nonchilled  350   37.2
5    Qn1     Quebec nonchilled  500   35.3
6    Qn1     Quebec nonchilled  675   39.2
7    Qn1     Quebec nonchilled 1000   39.7
```

Pacotes

Informação sobre um arquivo de dados de um pacote: help(nomedoarquivo)

> help(CO2)

CO2 {datasets} R Documentation

Carbon Dioxide Uptake in Grass Plants

Description

The `CO2` data frame has 84 rows and 5 columns of data from an experiment on the cold tolerance of the grass species *Echinochloa crus-galli*.

Usage

```
CO2
```

Format

This object of class `c("nfnGroupedData", "nfGroupedData", "groupedData", "data.frame")` containing the following columns:

Plant
: an ordered factor with levels `Qn1` < `Qn2` < `Qn3` < ... < `Mc1` giving a unique identifier for each plant.

Type
: a factor with levels `Quebec` `Mississippi` giving the origin of the plant

Treatment
: a factor with levels `nonchilled` `chilled`

conc
: a numeric vector of ambient carbon dioxide concentrations (mL/L).

uptake
: a numeric vector of carbon dioxide uptake rates (*umol/m^2* sec).

Pacotes

Visualiza um arquivo de dados: data(nomedoarquivo)

```
> edit(CO2)
```

Editor de dados

	Plant	Type	Treatment	conc	uptake	var6	var7	var8
1	Qn1	Quebec	nonchilled	95	16			
2	Qn1	Quebec	nonchilled	175	30.4			
3	Qn1	Quebec	nonchilled	250	34.8			
4	Qn1	Quebec	nonchilled	350	37.2			
5	Qn1	Quebec	nonchilled	500	35.3			
6	Qn1	Quebec	nonchilled	675	39.2			
7	Qn1	Quebec	nonchilled	1000	39.7			
8	Qn2	Quebec	nonchilled	95	13.6			
9	Qn2	Quebec	nonchilled	175	27.3			
10	Qn2	Quebec	nonchilled	250	37.1			
11	Qn2	Quebec	nonchilled	350	41.8			
12	Qn2	Quebec	nonchilled	500	40.6			
13	Qn2	Quebec	nonchilled	675	41.4			
14	Qn2	Quebec	nonchilled	1000	44.3			
15	Qn3	Quebec	nonchilled	95	16.2			
16	Qn3	Quebec	nonchilled	175	32.4			
17	Qn3	Quebec	nonchilled	250	40.3			
18	Qn3	Quebec	nonchilled	350	42.1			

Sumario de funções

Função	Função
getwd()	library(help="nomedopacote“)
dir.create()	(.packages())
setwd()	library(nomedopacote)
ls()	detach("package:nomedopacote")
rm()	find.package("nomedopacote")
rm(list = ls())	install.packages("nomedopacote")
save.image()	data()
dir()	edit()
load()	
savehistory()	
help()	
help.start()	
apropos()	
library()	