

Use R! in fifteen different ways: A survey of R front-ends in Quantian

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Outline

- 1 Introduction
 - What is Quantian?
- 2 Frontends
 - Classic
 - Web-based
 - GUIs
 - Programmatically
- 3 Summary
 - Main points

What is Quantian?

A live-dvd for quantitative work

- **Quantian** is a directly bootable and self-configuring Linux system that runs from a compressed dvd image.
- **Quantian** can run concurrently to your existing OS thanks to the free-only-as-in-beer **VMWare Player** (or the free-but-slower Qemu) emulator, including virtual and networked disk access to persistent session.
- Quantian contains over 7.5gb of software, including an additional 5gb of 'quantitative' software with scientific, numerical, statistical, engineering, ... application.
- Quantian also contains editors, programming languages, complete latex support, two 'office' suites, networking tools and more.
- <http://dirk.eddelbuettel.com/quantian>



Quantian and R

R, CRAN, BioConductor, and more

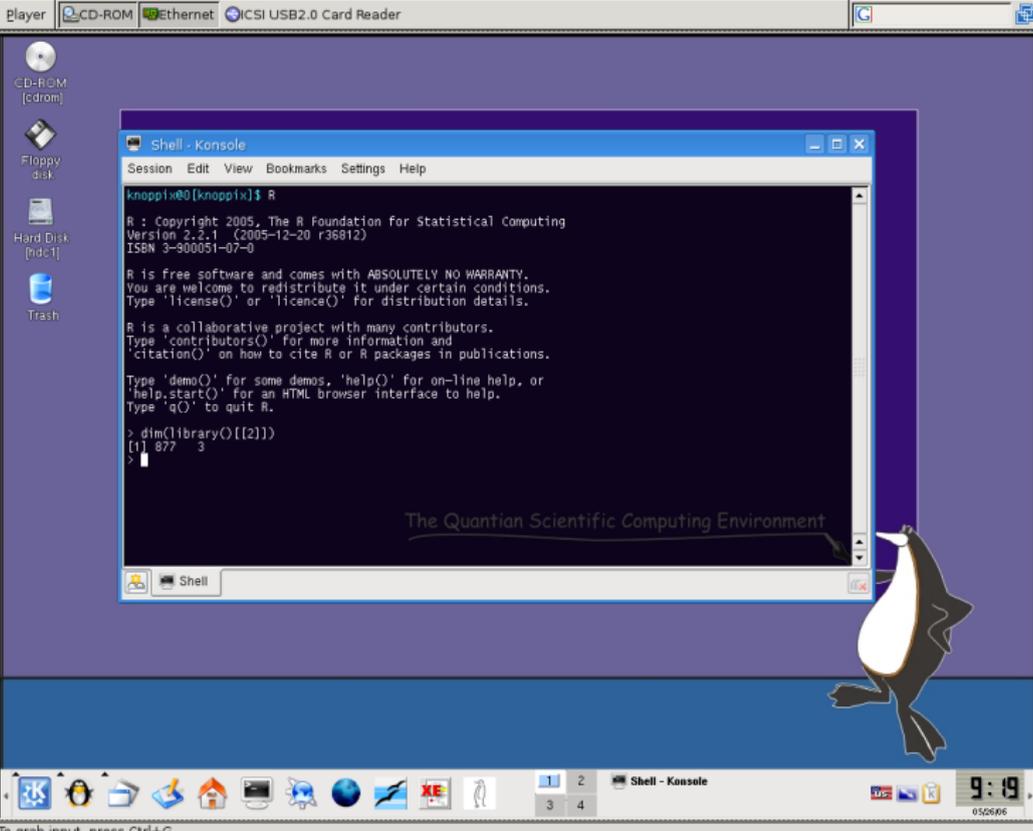
- **Quantian** has always included **R**, and release 0.7.9.2 contains 877 **R** packages providing a complete collection of **R** code: essentially all Unix-installable packages from CRAN, the complete **BioConductor** release 1.7, as well as packages from **Omegahat**, from J. Lindsey and from T. Yee.
- Suitable editors (ESS for Emacsen, Vim, Kate), LaTeX support, and more – making **Quantian** possibly the single-best source of **R** and related software.
- Several related projects such as **Ggobi**, **Mondrian**, **Weka** or **GRASS** further complement **Quantian** for particular scientific communities.
- This presentation focuses on **R** interfaces: direct, graphical, or programmed.



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Standard command-line



The screenshot shows a desktop environment with a purple background. On the left is a sidebar with icons for CD-ROM, Floppy disk, Hard Disk, and Trash. A window titled "Shell - Konsole" is open, displaying the R console output. The console shows the R version (2.2.1) and copyright information. Below this, it lists several help topics: 'license()', 'licenace()', 'contributors()', 'citation()', 'demo()', 'help()', and 'help.start()'. The user has entered the command `> dim(library()[[2]])`, which returned the output `[1] 877 3`. At the bottom of the console window, the text "The Quantian Scientific Computing Environment" is visible. A cartoon penguin is standing on the right side of the desktop. The taskbar at the bottom contains various application icons, a system tray with the time 9:19 and date 05/06/06, and a status bar at the very bottom that reads "To grab input, press Ctrl+G".

```
knoppix@0[knoppix]~$ R
R : Copyright 2005, The R Foundation for Statistical Computing
Version 2.2.1 (2005-12-20 r36812)
ISBN 3-900051-07-0

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licenace()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> dim(library()[[2]])
[1] 877 3
>
```

The Quantian Scientific Computing Environment

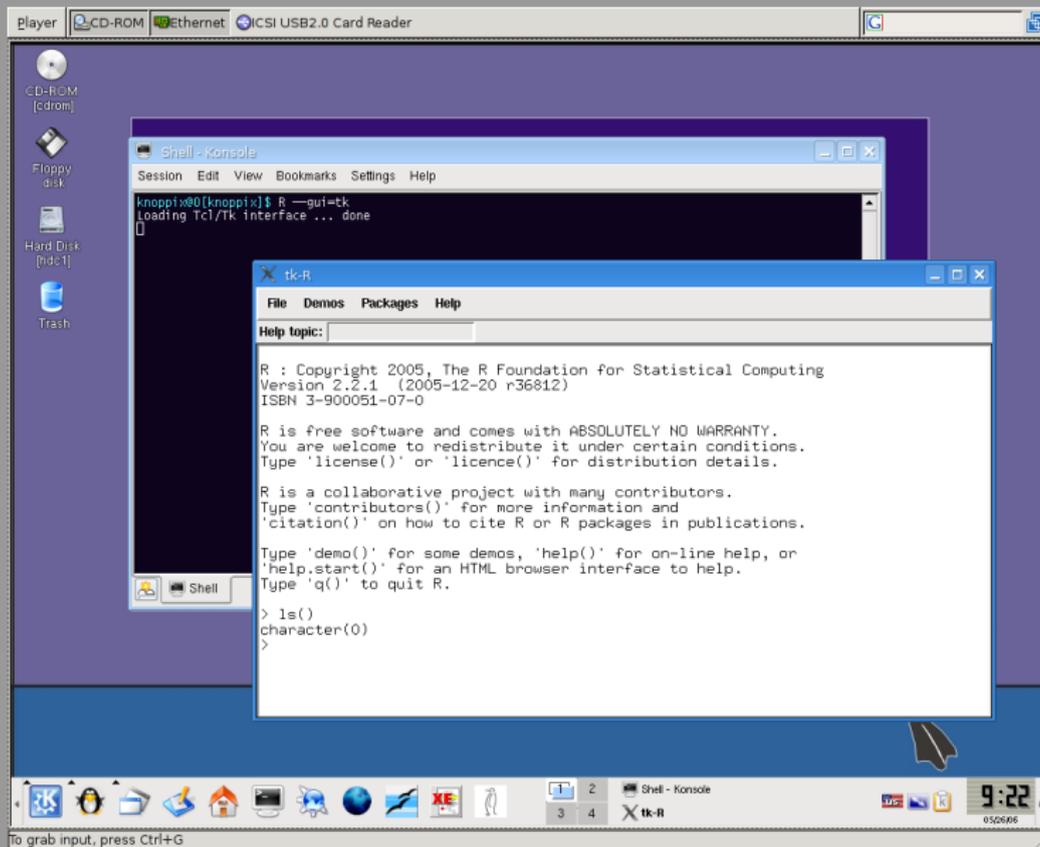
Standard command-line

Details

- Probably the only interface everybody is, or has been, using.
- Fairly flexible, searchable, customizable, ... thanks to GNU readline.
- Direct access to excellent help facilities, package administration, and more.
- Useable for scripting and piping, but still no direct script support.



Portable simple GUI

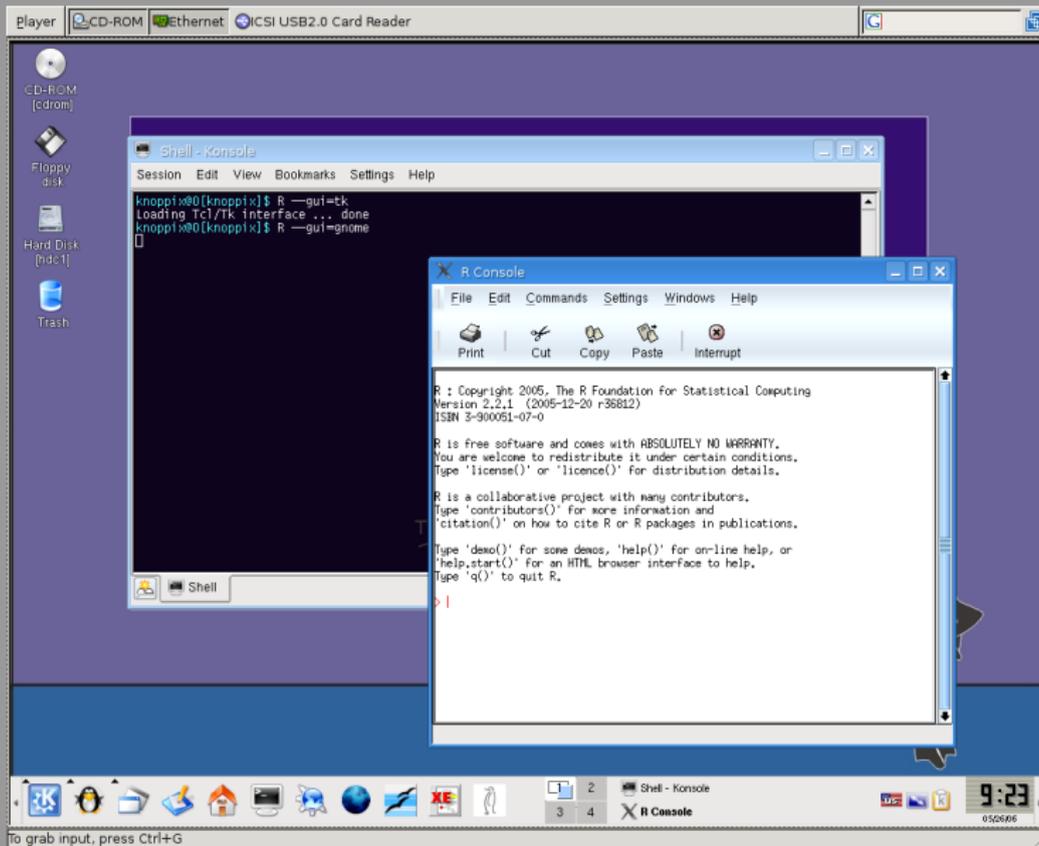


Portable simple GUI

Details

- Implemented using R's core tcltk package, it provides the only truly portable UI.
- This UI is more an illustration, but other projects have built successfully on tcltk: Rcmdr (more below) and Sciviews are examples.
- Tcl/Tk is mature, well known and ... somewhat ugly.
- Documentation is provided by P. Dalgaard in two R News articles (1(3), 2(3)), via J. Wettenhall's [examples site](#) and via postings on the [r-help](#) and [r-sig-gui](#) lists.

Gtk/Gnome GUI



Gtk/Gnome GUI

Details

- Status is dormant at best. Unsure about port to Gnome2.
- Only (?) available on Unix, though Gtk/Gnome has been ported to Windows
- **RGtk2** provides an updated port of Gtk2 toolkit to **R** this is used e.g. for J. Verzani's **PMG**.
- Now on CRAN as package `gnomeGUI`.



R via ESS

The screenshot displays an Emacs window running R via ESS. The main window shows the R console with the following code and output:

```
*R*
nobs <- 1000
xt <- rt(nobs, 5)
xn <- rnorm(nobs)
qqplot(xt, xn)
```

The ESS status bar at the bottom indicates the session is running. A secondary window shows the help page for the `rt` function, titled "The Student t Distribution".

A third window, titled "R Graphics: Device 2 (ACTIVE)", displays a Q-Q plot. The x-axis is labeled "xt" and ranges from -5 to 10. The y-axis is labeled "xn" and ranges from -3 to 3. The plot shows a series of data points that closely follow a straight diagonal line, indicating that the data is approximately normally distributed.

The system tray at the bottom shows the time as 9:30 and the date as 06/06/06. The taskbar includes icons for various applications and system utilities.

To grab input, press Ctrl+G

R via ESS

Details

- Probably *the* power user's interface
- R FAQ 6.2: Should I run R from within Emacs? Yes, *definitely*.
- Lots of power, lots of documentation, and even an UseR 2006 tutorial session.
- Don't leave home without it.
- <http://ess.r-project.org/>



Rcmdr

The screenshot shows a desktop environment with a window titled "R Commander". The window has a menu bar with "File", "Edit", "Data", "Statistics", "Graphs", "Models", "Distributions", "Tools", and "Help". Below the menu bar, there are buttons for "Data set: <No active dataset>", "Edit data set", "View data set", and "Model: <No active model>". The main area is divided into three panes: "Script Window" (empty), "Output Window" (empty), and "Messages" (containing the text "NOTE: R Commander Version 1.1-6: Fri May 26 21:25:10 2006").

In the background, a "Shell - Konsole" window is open, showing the R command prompt. The user has entered the command `R`. The output shows the R version information and a list of required packages: `library(Rcmdr)`, `Loading required package: tcltk`, `Loading Tcl/Tk interface ... done`, and `Loading required package: car`. The prompt now shows `Rcmdr Version 1.1-6` and a cursor.

The desktop environment includes a taskbar with various icons and a system tray showing the time as 9:25 and the date as 05/26/06. The window title bar of the R Commander window reads "R Commander".

To grab input, press Ctrl+G

useR!

Rcmdr

Details

- Very impressive tcltk-based UI by John Fox.
- Aimed at R beginners, allowing them gradually morph from clicking menus to entering commands.
- Provides plugin mechanism used by urca; has been extended too by QCAGUI.
- Described in an [JSS article](#).
- <http://socserv.mcmaster.ca/jfox/Misc/Rcmdr/>

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Rpad

Player | CD-ROM | Ethernet | ICSI USB2.0 Card Reader

```
root@knoppix:~# /etc/init.d/apache start
Starting web server: apache [Mon May 29 14:03:39 2006] [warn] module ssl_module l
s already loaded, skipping
```

Rpad Example - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost/Rpad/Example1.Rpad

KNOPPIX - Webse...

Rpad | Insert | Calculate [F9] | Help

Here is a basic R input section followed by the output:

```
data(iris)
dataset = iris
options(width=50)
summary(dataset)
```

Sepal.Length	Sepal.Width	Petal.Length
Min. :4.300	Min. :2.000	Min. :1.000
1st Qu.:5.100	1st Qu.:2.800	1st Qu.:1.600
Median :5.800	Median :3.000	Median :4.350
Mean :5.843	Mean :3.057	Mean :3.758
3rd Qu.:6.400	3rd Qu.:3.300	3rd Qu.:5.100
Max. :7.900	Max. :4.400	Max. :6.900

Petal.Width	Species
Min. :0.100	setosa :50
1st Qu.:0.300	versicolor:50
Median :1.300	virginica :50
Mean :1.199	
3rd Qu.:1.800	
Max. :2.500	

Now let's do some fancy HTML output:

```
cat("\nSortable table (click the headings):")
HTMLon()
HTML(head(dataset))
```

Here's a simple distribution plotting example with a lognormal distribution with meanlog=10 and variable logsd:

2 Standard deviation

```
plot(function(x) dlnorm(x, meanlog = 5, sdlog = sdlog),
      0, 100, main = "lognormal density", ylab="",
      xlab="", col="red")
HTMLon()
showgraph()
```

Transferring data from localhost...

To grab input, press Ctrl+G

2 X Root Rpad Example - Mi 2:07
3 4 X Starting Knoppix In 05C906

Rpad

Details

- Rpad integrates R with the Apache webserver
- Rpad also uses some Mozilla webbrowser customisation using the textile menu bar extension.
- Together, they provide R using the ‘browser as an operating system’ paradigm; this can be useful when little or no software can be installed on the client side, or when pre-programmed solutions need to be distributed.
- Alternatively, Quantian also provides Rcgi as a second web-based interface.
- <http://www.rpad.org/Rpad>

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Player | CD-ROM | Ethernet | CSI USB2.0 Card Reader

Shell - Konsole

Session Edit View Bookmarks Settings Help

knoppi@t1 [knoppi@] JGR

Console

File Edit Tools Packages Workspace Window Help

Help

File Edit Window

Exact Match

packages

```

Type 'license()' or 'licence()' for distribution
R is a collaborative project with many contributors
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.
Type 'demo()' for some demos, 'help()' for on-line
'help.start()' for an HTML browser interface to help,
Type 'q()' to quit R.

Loading required package: methods
Loading required package: JavaGD
Creating per-session help links...
Loading required package: grDevices
> help.start()
> package.wanager()
Warning messages:
1: 'DESCRIPTION' file has 'Encoding' field and no
2: 'DESCRIPTION' file has 'Encoding' field and no
3: 'DESCRIPTION' file has 'Encoding' field and no
4: 'DESCRIPTION' file has 'Encoding' field and no
5: 'DESCRIPTION' file has 'Encoding' field and no
6: 'DESCRIPTION' file has 'Encoding' field and no
7: 'DESCRIPTION' file has 'Encoding' field and no
8: 'DESCRIPTION' file has 'Encoding' field and no
9: 'DESCRIPTION' file has 'Encoding' field and no
10: 'DESCRIPTION' file has 'Encoding' field and no
>

```

Package Manager

Window

loaded	default	Package	Description
<input type="checkbox"/>	<input type="checkbox"/>	AMORE	A MORE flexible neural network...
<input type="checkbox"/>	<input type="checkbox"/>	AlgDesign	AlgDesign
<input type="checkbox"/>	<input type="checkbox"/>	AnalyzefMRI	Functions for analysis of fMRI ...
<input type="checkbox"/>	<input type="checkbox"/>	AnnBuilder	Bioconductor annotation data ...
<input type="checkbox"/>	<input type="checkbox"/>	ArDec	Time series autoregressive de...
<input type="checkbox"/>	<input type="checkbox"/>	BHH2	Useful Functions for Box, Hunt...
<input type="checkbox"/>	<input type="checkbox"/>	BMA	Bayesian Model Averaging
<input type="checkbox"/>	<input type="checkbox"/>	BSDA	Basic Statistics and Data Analy...
<input type="checkbox"/>	<input type="checkbox"/>	BayesTree	Bayesian Methods for Tree Ba...
<input type="checkbox"/>	<input type="checkbox"/>	Bhat	General likelihood exploration
<input type="checkbox"/>	<input type="checkbox"/>	Biobase	Biobase: Base functions for Bi...
<input type="checkbox"/>	<input type="checkbox"/>	Biomed	Biodemography functions
<input type="checkbox"/>	<input type="checkbox"/>	Biostings	String objects representing b...
<input type="checkbox"/>	<input type="checkbox"/>	Bolstad	Bolstad functions
<input type="checkbox"/>	<input type="checkbox"/>	BradleyTerry	Bradley-Terry models
<input type="checkbox"/>	<input type="checkbox"/>	BsMD	Bayes Screening and Model Di...
<input type="checkbox"/>	<input type="checkbox"/>	CDNmoney	Components of Canadian Mon...
<input type="checkbox"/>	<input type="checkbox"/>	CGIwithR	CGI Programming in R
<input type="checkbox"/>	<input type="checkbox"/>	Category	Category Analysis
<input type="checkbox"/>	<input type="checkbox"/>	ChromoViz	Multimodal visualization of ge...
<input type="checkbox"/>	<input type="checkbox"/>	CircStats	Circular Statistics

Refresh Close

Packages in /usr/local/lib/R/site-library

[AMORE](#) A MORE flexible neural network package

[AlgDesign](#) AlgDesign

[AnalyzefMRI](#) Functions for analysis of fMRI datasets stored in the ANALYZE format.

[AnnBuilder](#) Bioconductor annotation data package builder

[ArDec](#) Time series autoregressive decomposition

[BHH2](#) Useful Functions for Box, Hunter and Hunter II

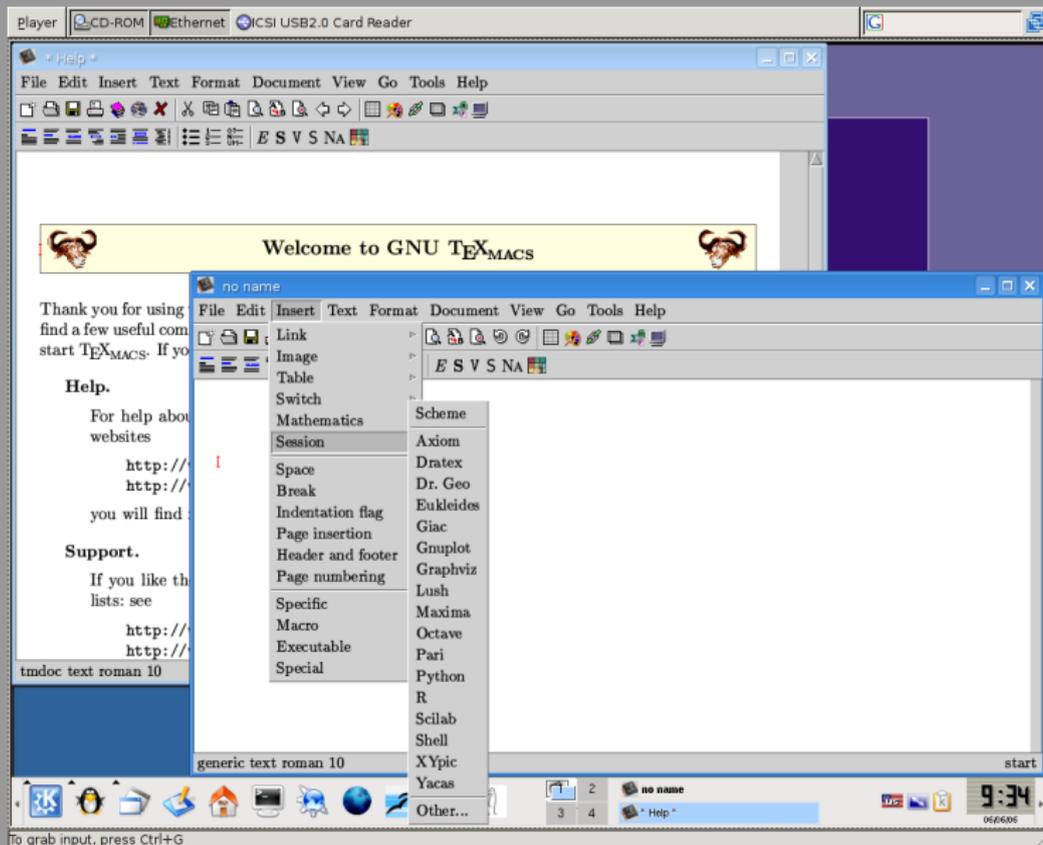
[BMA](#) Bayesian Model Averaging

Root Shell - Konsole 2:15

Starting Knoppi in Org-rosuda-JGR

To grab input, press Ctrl+G

- Cross-platform *Java GUI for R* that is the winner of the 2005 Chambers Award.
- Very nice integration of developer IDE (including syntax highlighting, autocompletion and context-sensitive help pop-ups), multi-tab help system, object browser, dynamic graphs, package manager, and more. Very slick.
- <http://www.rosuda.org/JGR/>



To grab input, press Ctrl+G

TeXmacs

Details

- GNU TeXmacs calls itself a ‘wysiwyw (what you see is what you want)’ editing platform.
- Aims to provide a unified framework for editing structured documents with different types of content (text, graphics, mathematics, interactive content, etc.).
- Rendering engine uses high-quality typesetting algorithms to produce professionally looking documents.
- Includes a text editor with support for mathematical formulas, a small technical picture editor and a tool for making presentations from a laptop.
- TeXmacs can be used as an interface to numerous external programs for computer algebra, numerical analysis, statistics, shells, etc.
- <http://www.texmacs.org/>



Rkward

The screenshot displays the Rkward graphical user interface. At the top, there are tabs for 'Player', 'CD-ROM', 'Ethernet', and 'CSI USB2.0 Card Reader'. The main window is titled 'Shell - Konsole' and shows the following R session output:

```
knoppix@0[knoppix]$ a
Display all 212 possibilities? (y or n)
knoppix@0[knoppix]$ rkward
Debug-Flags as decimal: 0191
kDecore (KAction): WARNING: KAction::insertKAccel( kAccel = 0x81d3a20 ): KAccel object already contains an action name "window_close"
guessing_R_HOME

R : Copyright 2005, The R Foundation For Statistical Computing
Version 2.2.1 (2005-12-20 r36812)
ISBN 3-900051-07-0

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type '?' for help, or 'help()' for on-line help, or 'help.type()' for on-line help.
Type 'q()' to quit R.

>
```

Overlaid on the terminal is the 'Untitled - RKward' workspace window. It features a menu bar (File, Workspace, Edit, Analysis, Plots, Windows, Settings, Help) and a toolbar. The main area contains a table with 5 columns and 2 rows of data:

	1	2	3	4	5
Label					
Type	Unknown	Unknown	Unknown	Unknown	
Levels					
Format					
Name	var	var0	var1	var2	
1					
2					

At the bottom of the workspace window, there are buttons for 'Command log', 'Command Stack', 'R Console', and 'Help search'. Below the workspace window, the text 'Ready R engine idle' is visible. The system tray at the bottom shows various icons, including the R logo, a penguin, and a clock displaying '4:05' and '05/20/06'. A mouse cursor is visible over the workspace window.

To grab input, press Ctrl+G

useR!

Rkward

Details

- Rkward aims to become a modern GUI for R.
- Uses the KDE / Qt libraries and toolkits providing nice desktop integration.
- Currently in alpha status.
- <http://rkward.sourceforge.net/>



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Rserve

Player | CD-ROM | Ethernet | CSI USB2.0 Card Reader

Shell - Konsole

Session Edit View Bookmarks Settings Help

```
knoppi@0[knoppi]$ R CMD Rserve

R : Copyright 2005, The R Foundation for Statistical Computing
Version 2.2.1 (2005-12-20 r36812)
ISBN 3-900051-07-0

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R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()'
'help.start()' for an HTML browser interface or
Type 'q()' to quit R.

Rserve started in daemon mode.
knoppi@0[knoppi]$
knoppi@0[knoppi]$ []
```

Shell - Konsole <2>

Session Edit View Bookmarks Settings Help

```
knoppi@1[Rserve]$ cd src/client/
knoppi@1[client]$ make
g++ -I../include -I.. -I. -c -o Rconnection.o Rconnection.cc
g++ -I../include -I.. -I. -c -o demo.o demo1.cc
g++ Rconnection.o demo1.o -o demo1 -ldl -lcrypt
g++ -I../include -I.. -I. -c -o rcons.o rcons.cc
g++ Rconnection.o rcons.o -o rcons -ldl -lcrypt -lreadline
knoppi@1[client]$ ./demo1
Rdouble[4]
2 by 2 matrix
33.97 -2.1 -2.1 10.09

3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 3.7 3.4 3 3.4 4.4 3.9 3.5 3 3.8 3.8 3.4 3.7 3.6 3.3 3.4 3 3.4 3.5
3.4 3.2 3.1 3.4 4.1 4.2 3.1 3.2 3.5 3.6 3 3.4 3.5 2.3 3.2 3.5 3.8 3.3 3.7 3.3 3.2 3.2 3.1 2.3 2.
0 2.8 3.3 2.4 2.9 2.7 2 3 2.2 2.9 2.9 3.1 3 2.7 2.2 2.5 3.2 2.8 2.9 2.8 2.9 3 2.8 3 2.9 2.6 2.4 2.4 2.
7 2.7 3 3.4 3.1 2.3 3 2.5 2.6 3 2.6 2.3 2.7 3 2.9 2.9 2.5 2.8 3 3 2.7 3 2.9 3 3 2.5 3.6 3.2 2.
7 3 2.5 2.8 3 2.3 3.8 2.6 2.2 3.2 2.8 2.8 2.7 3 3 3.2 2.8 3 2.8 3 2.6 3.8 2.8 2.8 2.6 3 3.4 3 3.1
3.1 3.1 2.7 2.2 3 2.5 3 3.4 3

knoppi@1[client]$ ./rcons
connected. Type 'q' to quit.
Rc11> a <- rnorm(100)
type=33, len=100, result:Rdouble[100]
Rc11> summary(a)
type=33, len=48, result:Rdouble[6]
attributes: R1list[tag=Rsymbol][names],head=Rvector[count=6:"Min.", "1st Qu.", "Median", "Mean", "3rd Qu.",
Max.", "tail"]R1list[tag=Rsymbol][class],head="table"
Rc11>
```

Shell

Shell - Konsole

Shell - Konsole <2>

05C006 4:11

To grab input, press Ctrl+G

Rserve

Details

- Rserve provides a 'headless' R server accessible programmatically via TCP/IP from various languages over the network.
- Initially only provided with Java clients, it now also contains provides C++ client examples (which are currently not installed in Quantian).
- Every connection gets a separate workspace and working directory.
- Supports remote connection, authentication and file transfer.
- <http://www.rosuda.org/Rserve/>



The screenshot shows a virtual machine interface with a terminal window and a plot window.

Terminal Window (Shell - Konsole):

```
knoppix@0[-]$ ipython
Welcome to IPython, I will try to create a personal configuration directory
where you can customize many aspects of IPython's functionality in:

/home/knoppix/.ipython

Successful installation!

Please read the sections 'Initial Configuration' and 'Quick Tips' in
the IPython manual (there are both HTML and PDF versions supplied with the
distribution) to make sure that your system environment is properly
configured to take advantage of IPython's features.
Please press <RETURN> to start IPython.
Python 2.3.5 (#2, Aug 30 2005, 15:50:26)
Type "copyright", "credits" or "license()" for more information.

IPython 0.6.15 -- An enhanced Interactive Python.
?      -> Introduction to IPython's features.
%magic -> Information about IPython's 'magic' % functions.
help   -> Python's own help system.
object? -> Details about 'object'. Object also works, ?? prints more

In [1]: from rpy import *
In [2]: x = range(0, 10)
In [3]: y = [ 2**i for i in x ]
In [4]: r.plot_default(x, y)
In [5]:
```

R Graphics: Device 2 (ACTIVE):

A scatter plot showing the relationship between x and y. The x-axis is labeled 'c(0, 1, 2, 3, 4, 5, 6, 7, 8, 9)' and the y-axis is labeled 'c(0, 2, 4, 6, 8, 10, 12, 14, 16, 10)'. The plot shows a clear upward trend, with data points at (0,0), (1,2), (2,4), (3,6), (4,8), (5,10), (6,12), (7,14), and (8,16). The point at (9,10) is an outlier.

Taskbar: Shows the system tray with a clock displaying 4:28 and the date 05/29/06. The taskbar also includes icons for the Shell - Konsole and R Graphics: Device 2 (ACTIVE).

To grab input, press Ctrl+G

- RPy provides a simple yet robust interface to R from Python.
- An option for those familiar with Python but not (yet) with R.
- Related to, but simpler than, Omegahat's RSPython
- RPy can manage all kinds of R objects and can execute arbitrary R functions (including the graphic functions).
- Errors from the R language are converted to Python exceptions.
- Any module installed for the R system can be used from within Python.
- The examples and documentation are not currently installed in Quantian.
- RPy is a part of G. Warnes' OpenStatServer / RStatServer / Chaco projects.
- <http://rpy.sourceforge.net>

RSPerl

The screenshot shows a Linux desktop environment with a terminal window running R. The terminal window displays the following commands and output:

```
knoppi@0 [-]$ cd /usr/local/lib/R/site-library/RSPerl/examples/
knoppi@0 [examples]$ cat plot1.pl
use R;
use RReferences;

@xdata=(1,2,3,4);
@ydata=(2,3,6,7);

R::initR("--vanilla");
R::x11();
R::plot(\@xdata,\@ydata);
sleep(10);
knoppi@0 [examples]$ R_HOME=/usr/lib/R LD_LIBRARY_PATH=./libs/ perl -I../share/lib/perl/5.8.8 plot1.pl

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Version 2.2.1 (2005-12-20 r36812)
ISBN 3-900051-07-0

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R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[]
```

The R graphics window, titled "R Graphics: Device 2 (ACTIVE)", displays a scatter plot with the following data points:

x	y
1	2
2	3
3	6
4	7

The plot shows a positive correlation between the x and y variables. The x-axis is labeled "c(2, 3, 6, 7)" and the y-axis is labeled "c(1, 2, 3, 4)".

To grab input, press Ctrl+G

useR!

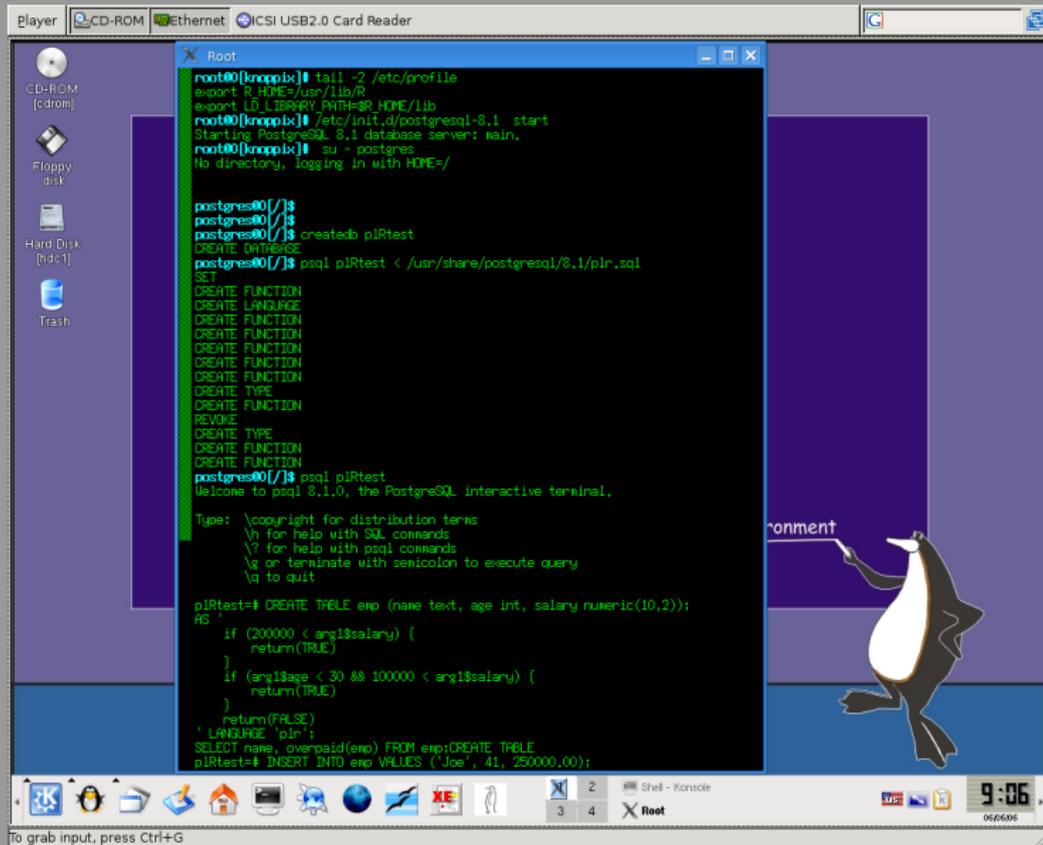
RSPerl

Details

- Bi-directional interface between Perl and R.
- Embeds one interpreter (e.g. R) within the process of the other interpreter (e.g. Perl).
- Permits to call routines and functions in the other language as if they were part of the local environment – avoids having to program in a different language while making the functionality in the other system transparently available with no additional coding.
- This makes Perl more interactive, also allows the R/Splus programmer to use convenient and familiar syntax to mix computations in the two different systems, and provide statistical functionality to Perl applications.
- Some environment variables are needed as seen on the screenshot.
- <http://www.omegahat.org/RSPerl>



Embedded: PI/R



```
root00[knopplx]# tail -2 /etc/profile
export R_HOME=/usr/lib/R
export LD_LIBRARY_PATH=$R_HOME/lib
root00[knopplx]# /etc/init.d/postgresql-8.1 start
Starting PostgreSQL 8.1 database server: main.
root00[knopplx]# su - postgres
No directory, logging in with HOME=/

postgres00[~]#
postgres00[~]#
postgres00[~]# createdb p1Rtest
CREATE DATABASE
postgres00[~]# psql p1Rtest < /usr/share/postgresql/8.1/plr.sql
SET
CREATE FUNCTION
CREATE LANGUAGE
CREATE FUNCTION
CREATE FUNCTION
CREATE FUNCTION
CREATE FUNCTION
CREATE TYPE
CREATE FUNCTION
REVOKE
CREATE TYPE
CREATE FUNCTION
CREATE FUNCTION
postgres00[~]# psql p1Rtest
Welcome to psql 8.1.0, the PostgreSQL interactive terminal.

Type: \copyright for distribution terms
      \h for help with SQL commands
      \? for help with psql commands
      \g or terminate with semicolon to execute query
      \q to quit

p1Rtest=# CREATE TABLE emp (name text, age int, salary numeric(10,2));
RS
      if (200000 < arg1$salary) {
        return(TRUE)
      }
      if (arg1$age < 30 && 100000 < arg1$salary) {
        return(TRUE)
      }
      return(FALSE)
      LANGUAGE plin";
SELECT name, overpaid(emp) FROM emp;CREATE TABLE
p1Rtest=# INSERT INTO emp VALUES ('Joe', 41, 250000.00);
```

comment



To grab input, press Ctrl+G



Embedded: PI/R

Details

- Probably the earliest production-quality example of embedding R into another application.
- In this case, R is embedded into the PostgreSQL RDBM – as 'just another embedded language'.
- Obvious appeal: *Programming with data* goes directly to where the data resides.
- PI/R is shipped with the PostgreSQL sources.
- <http://www.joeconway.com/plr/>



The screenshot displays a Linux desktop environment with a window titled "Mondrian(Class, Age, Sex, Survived)". This window contains a large, complex plot with red and grey rectangular blocks, characteristic of a Mondrian-style visualization. Below this plot is a terminal window showing R code and its output:

```

class=Age*Sex*Survived
f:0 g2: 0.0 X2: 0.0 p: 1.0
STEM = 128
use = 0
use press: ... 16 16 1 8 2
use Action before check: 0
use Action to check: 1
use Action: DRAGGING
use rel: ... 16 16 1 8
dragEnd!
Click Selection !!
SYSTEM = 128
mouse = 0
Mouse press: ... 16 16 1 8 2
Mouse Action before check: 0
Mouse Action to check: 1
Mouse Action: DRAGGING
Mouse rel: ... 16 16 1 8
dragEnd!
Click Selection !!

```

Surrounding the main plot are several smaller bar charts:

- Barchart(Sex)**: Shows two bars, "Female" (short red bar) and "Male" (longer red bar).
- Barchart(Age)**: Shows three bars, "Adult" (medium red bar), "Child" (short red bar), and "Infant" (very short red bar).
- Barchart(Survived)**: Shows two bars, "No" (medium red bar) and "Yes" (short red bar).
- Barchart(Class)**: Shows three bars, "Crew" (medium red bar), "First" (short red bar), and "Third" (long red bar).

The desktop also features a file manager window titled "Mondrian(Titanic.txt)" with a menu bar (File, Plot, Calc, Options, Window, Help) and a list of variables: Class, Age, Sex, and Survived. A progress bar at the bottom left indicates 706/2201 (32.08%) completion. The system tray at the bottom right shows the time as 9:08 and the date as 09/26/06.

To grab input, press Ctrl+G

- rJava is a simple R-to-Java interface. It is comparable to the .C/.Call C interface.
- rJava provides a low-level bridge between R and Java (via JNI). It allows to create objects, call methods and access fields of Java objects from R.
- rJava is used e.g. by the recent RWeka package (also in Quantian).
- Eclipse should be in the next Quantian revision.
- <http://www.rosuda.org/rJava>

Player | CD-ROM | Ethernet | CSI USB2.0 Card Reader

```

Shell - Konsole - Shell - Konsole
Session Edit View Bookmarks Settings Help

knoppi@0[snow]$ head -46 ./lam_example.sh
#!/bin/sh

## get a tempFile
tempFile='tempFile'

## write our local hosts
cat <<EOF > $tempFile
localhost
localhost
EOF

#echo "Tempfile is:"
#cat $tempFile

## start lam
echo ""
echo ""
echo "==== Starting lam"
#echo "conf" | pvx $tempFile
#lamboot $tempFile
#lamboot /etc/lam/bhost.def
#lamboot

## start R and do a few things
echo ""
echo ""
echo "==== Starting R"
cat <<EOF | R --vanilla --slave
library(snow)
cl <- makeCluster(4, "MPI")
#print(cl)
cat("\n\nSome cluster information\n")
clusterCall(cl, function() Sys.info()[c("nodename", "machine")])

#print(sum(parApply(cl, matrix(1:100,10), 1, sum)))
#print(sum(parApply(cl, matrix(1:10000,100), 1, sum)))

# Luke's bootstrap example
library(boot)
# In this example we show the use of boot in a prediction from
# regression based on the nuclear data. This example is taken
# from Example 6.8 of Davison and Hinkley (1997). Notice also
# that two extra arguments to statistic are passed through by
data(nuclear)
nuke <- nuclear[,c(1,2,5,7,8,10,11)]
knoppi@0[snow]$

```

```

Shell - Konsole
Session Edit View Bookmarks Settings Help

==== Starting lam
LAM 7.1.1/MPI 2 C++/ROMIO - Indiana University

==== Starting R
Loading required package: Rmpi
4 slaves are spawned successfully. 0 failed.

Some cluster information
[[[1]]
  nodename machine
  "knoppi"  "1686"

[[[2]]
  nodename machine
  "knoppi"  "1686"

[[[3]]
  nodename machine
  "knoppi"  "1686"

[[[4]]
  nodename machine
  "knoppi"  "1686"

[1] 53.52 0.94 55.46 0.00 0.00
[[[1]]
  [1] "boot" "snow" "Rmpi" "methods" "stats" "graphics"
  [7] "grDevices" "utils" "datasets" "base"

[[[2]]
  [1] "boot" "snow" "Rmpi" "methods" "stats" "graphics"
  [7] "grDevices" "utils" "datasets" "base"

[[[3]]
  [1] "boot" "snow" "Rmpi" "methods" "stats" "graphics"
  [7] "grDevices" "utils" "datasets" "base"

[[[4]]
  [1] "boot" "snow" "Rmpi" "methods" "stats" "graphics"
  [7] "grDevices" "utils" "datasets" "base"

```

To grab input, press Ctrl+G

Taskbar: 2 Shell - Konsole - Shell - Konsole, 3 4 Shell - Konsole, 9:48, 06/06/06

SNOW

Details

- SNOW provides the 'Simple Network of Workstations', a simple wrapper around MPI, PVM and sockets to permit computation on a (possibly heterogenous) cluster of machines.
- Beowulf-style distributed statistical computing – with an easy R frontend.
- Works out of the box in Quantian, with or without an underlying openMosix cluster.
- We explored distributed statistical computing with Quantian in previous presentations ([Useenix 2004](#); [DSC 2005](#)).
- <http://www.stat.uiowa.edu/~luke/R/cluster/cluster.html>



Outline

- 1 Introduction
 - What is Quantian?
- 2 Frontends
 - Classic
 - Web-based
 - GUIs
 - Programmatically
- 3 Summary
 - Main points

Summary

- Quantian provides unparalleled support for various ways to 'Use R' – ready-to-run directly out-of-the box.
- Quantian can be used directly, via various graphical interfaces, different programming interfaces, embedded, as part of distributed computing, ...
- Thanks to virtualization, users can also access Quantian without reboots.
- Easy to try Quantian: just download and write to DVD, or order an inexpensive pre-made DVD.
- <http://dirk.eddelbuettel.com/quantian>

