

Section 7.2.1. Improvements to this example include using `coef()` instead of `$coef`, and using the `predict` generic function, i.e., `predict(gb, data.frame(pop15=seq(20,48,by=1)))`. The two (dotted) lines described in the text actually do not show up on the plot. Furthermore, although it is instructional to create two basis functions `lhs()` and `rhs()`, the reader is not informed that `bs(pop15, degree=1, df=1, knot=35)` would be equivalent.

In conclusion, the book is quite suitable to serve for the practical component of an advanced undergraduate course in linear models to reasonably prepared students. A sequel on generalized linear models and extensions would be a natural next step!

R Foundation News

by Bettina Grün

Donations and new members

Donations

Adelchi Azzalini (Italy)
 BC Cancer Agency, Vancouver (Canada)
 David W. Crawford (USA)
 Peter L. Flom (USA)
 Google Inc., Mountain View, California (USA)
 Faculty of Economics, University of Groningen (Netherlands)
 Shigeru Mase (Japan)
 Merck and Co., Inc. (USA)
 Network Theory Ltd, Bristol (United Kingdom)
 Stanford University, California (USA)
 Douglas Wilson (Canada)
 Ivo Welch (USA)

New benefactors

Burns Statistics Ltd., London, U.K.
 Loyalty Matrix Inc., California, USA
 Statisticon AB, Uppsala, Sweden
 Merck and Co., Inc., USA

Changes in R

by the R Core Team

User-visible changes

- box plots by `boxplot()` or `bxp()` now have the median line three times the normal line width

Bibliography

- J. Fox. *An R and S-Plus Companion to Applied Regression*, 2002. Thousand Oaks, CA: Sage Publications. [56](#)
- G. A. F. Seber and A. J. Lee. *Linear Regression Analysis*, 2nd Edition, 2003. New York: Wiley. [56](#)
- Chambers, J. M. and Hastie, T. J. *Statistical Models in S*, 1991. Pacific Grove, Calif.: Wadsworth & Brooks/Cole. [56](#)

Thomas Yee
 University of Auckland, New Zealand
yee@stat.auckland.ac.nz

New supporting institutions

Baxter Healthcare Corp., California, USA
 Department of Mathematics and Statistics, Utah State University, USA
 Department of Statistics, Iowa State University, USA
 Dipartimento di Statistica, Università Ca' Foscari di Venezia, Italy
 School of Economics and Finance, Victoria University of Wellington, New Zealand

New supporting members

Claudio Agostinelli (Italy)
 Roger J. Bos (USA)
 Dianne Cook (USA)
 Gregor Gorjanc (Slovenia)
 Ivan Kojadinovic (France)
 Iago Mosqueira (Spain)
 Jonas Ranstam (Sweden)
 Christian Schulz (Germany)
 Mario Walter (Germany)

Bettina Grün
 Technische Universität Wien, Austria
Bettina.Gruen@ci.tuwien.ac.at

in order to distinguish it from the quartile ones.

- Unix-alike versions of R can now be used in UTF-8 locales on suitably equipped OSes. See the internationalization section below.

- The meaning of 'encoding' for a connection has changed: See the internationalization section below.
- There has been some rationalization of the format of warning/error messages, to make them easier to translate. Generally names of functions and arguments are single-quoted, and classes double-quoted.
- Reading text files with embedded "\" (as in Windows file names) may now need to use `scan(*, allowEscapes = FALSE)`, see also below.

New features

- `%%` now warns if its accuracy is likely to be affected by lack of precision (as in 1e18 `%%` 11, the unrealistic expectation of PR#7409), and tries harder to return a value in range when it is.
- `abbreviate()` now warns if used with non-ASCII chars, as the algorithm is designed for English words.
- The default methods for `add1()` and `drop1()` check for changes in the number of cases in use. The "lm" and "glm" methods for `add1()` quoted the <none> model on the original fitted values when using (with a warning) a smaller set of cases for the expanded models.
- Added `alarm()` function to generate a bell or beep or visual alert.
- `all/any()` now attempt to coerce their arguments to logical, as documented in the Blue Book. This means e.g. `any(list())` works.
- New functions for multivariate linear models: `anova.mlm()`, `SSD()`, `estVar()`, `mauchley.test()` (for sphericity). `vcov()` now does something more sensible for "mlm" class objects.
- `as.data.frame.table()` has a new argument 'responseName' (contributed by Bill Venables).
- `as.dist()` and `cophenetic()` are now generic, and the latter has a new method for objects of class "dendrogram".
- `as.ts()` is now generic.
- `binomial()` has a new "cauchit" link (suggested by Roger Koenker).
- `chisq.test()` has a new argument 'rescale.p'. It is now possible to simulate (slowly) the P value also in the 1D case (contributed by Rolf Turner).
- `choose(n,k)` and `lchoose(.)` now also work for arbitrary (real) n in accordance with the general binomial theorem. `choose(*,k)` is more accurate (and faster) for small k.
- Added `colorRamp()` and `colorRampPalette()` functions for color interpolation.
- `colSums()/rowSums()` now allow arrays with a zero-length extent (requested by PR#7775).
- `confint()` has stub methods for classes "glm" and "nls" that invoke those in package MASS. This avoids using the "lm" method for "glm" objects if MASS is not attached.

`confint()` has a default method using asymptotic normality.
- `contr.SAS()` has been moved from the 'nlme' package to the 'stats' package.
- New function `convertColors()` maps between color spaces. `colorRamp()` uses it.
- The `cov()` function in the non-Pearson cases now ranks data after removal of missing values, not before. The pairwise-complete method should now be consistent with `cor.test`. (Code contributed by Shigenobu Aoki.)
- Added `delayedAssign()` function to replace `delay()`, which is now deprecated.
- `dir.create()` has a new argument 'recursive' serving the same purpose as Unix's `mkdir -p`.
- `do.call()` now takes either a function or a character string as its first argument. The supplied arguments can optionally be quoted.
- `duplicated()` and `unique()` now accept "list" objects, but are fast only for simple list objects.
- `ecdf()` now has jumps of the correct size (a multiple of $1/n$) if there are ties. (Wished by PR#7292).
- `eff.aovlist()` assumed orthogonal contrasts for any term with more than one degree of freedom: this is now documented and checked for. Where each term only occurs in only one stratum the efficiencies are all one: this is detected and orthogonal contrasts are not required.
- New function `encodeString()` to encode character strings in the same way that printing does.

- `file("clipboard")` now work for reading the primary selection on Unix-alikes with an active X11 display. (It has long worked for reading and writing under Windows.) The secondary selection can also be read: see `?file`.
`file()` now allows mode "w+b" as well as "w+".
- `file.append()` has been tuned, including for the case of appending many files to a single file.
- Functions `flush.console()` and `select.list()` are now available on all platforms. There is a Tcl/Tk-based version of `select.list()` called `tk_select.list()` in package `tcltk`.
- `gc()` now reports maximum as well as current memory use.
- A new function `getGraphicsEvent()` has been added which will allow mouse or keyboard input from a graphics device. (NB: currently only the Windows screen device supports this function. This should improve before the 2.1.0 release.)
- New functions `gray.colors()/grey.colors()` for gray color palettes.
- `grep()`, `gsub()`, `sub()` and `regexpr()` now always attempt to coerce their 'pattern', 'x', 'replacement' and 'text' arguments to character. Previously this was undocumented but done by `[g]sub()` and `regexpr()` for some values of their other arguments. (Wish of PR#7742.)
- `gsub/sub()` have a new 'fixed' method.
- New function `hcl()` for creating colors for a given hue, chroma and luminance (i.e. perceptual hsv).
- `isTRUE()` convenience function to be used for programming.
- `kmeans()` now returns an object of class "kmeans" which has a `print()` method.
Two alternative algorithms have been implemented.
If the number of centres is supplied, it has a new option of multiple random starts.
- The limits on the grid size in `layout()` are now documented, and have been raised somewhat by using more efficient internal structures.
- `legend()` now accepts positioning by keyword, e.g. "topleft", and can put a title within the legend. (Suggested by Elizabeth Purdom in PR#7400.)
- `mahalanobis()` now has a '...' argument which is passed to `solve()` for computing the inverse of the covariance matrix, this replaces the former 'tol.inv' argument.
- `menu()` uses a multi-column layout if possible for more than 10 choices.
`menu(graphics = TRUE)` is implemented on most platforms via `select.list()` or `tk_select.list()`.
- New function `message()` in 'base' for generating "simple" diagnostic messages, replacing such a function in the 'methods' package.
- `na.contiguous()` is now (S3) generic with first argument renamed to 'object'.
- New function `normalizePath()` to find canonical paths (and on Windows, canonical names of components).
- The default in `options("expressions")` has been increased to 5000, and the maximal settable value to 500000.
- `p.adjust()` has a new method "BY".
- `pbeta()` now uses a different algorithm for large values of at least one of the shape parameters, which is much faster and is accurate and reliable for very large values. (This affects `pbinom()`, `pf()`, `qbeta()` and other functions using `pbeta` at C level.)
- `pch="."` now by default produces a rectangle at least 0.01" per side on high-resolution devices. (It used to be one-pixel square even on high-resolution screens and Windows printers, but 1/72" on `postscript()` and `pdf()` devices.) Additionally, the size is now scalable by 'cex'; see `?points` and note that the details are subject to change.
- `pdf()` now responds to the 'paper' and 'page-centre' arguments. The default value of 'paper' is "special" for backward-compatibility (this is different from the default for `postscript()`).
- `plot.data.frame()` tries harder to produce sensible plots for non-numeric data frames with one or two columns.
- The `predict()` methods for "prcomp" and "princomp" now match the columns of 'new-data' to the original fit using column names if these are available.
- New function `recordGraphics()` to encapsulate calculations and graphics output together on graphics engine display list. To be used with care.

- New function `RSiteSearch()` to query R-related resources on-line (contributed by Jonathan Baron and Andy Liaw).

- `scan()` arranges to share storage of duplicated character strings read in: this can dramatically reduce the memory requirements for large character vectors which will subsequently be turned into factors with relatively few levels. For a million items this halved the time and reduced storage by a factor of 20.

`scan()` has a new argument 'allowEscapes' (default TRUE) that controls when C-style escapes in the input are interpreted. Previously only `\n` and `\r` were interpreted, and then only within quoted strings when no separator was supplied.

`scan()` used on an open connection now pushes back on the connection its private 'ungetc' and so is safer to use to read partial lines.

- `scatter.smooth()` and `loess.smooth()` now handle missing values in their inputs.
- `seq.Date()` and `seq.POSIXt()` now allow 'to' to be before 'from' if 'by' is negative.

- `sprintf()` has been enhanced to allow the POSIX/XSI specifiers like `"%2$d"`, and also accepts `"%x"` and `"%X"`.

`sprintf()` does limited coercion of its arguments.

`sprintf()` accepts vector arguments and operates on them in parallel (after re-cycling if needed).

- New function `strtrim()` to trim character vectors to a display width, allowing for double-width characters in multi-byte character sets.
- `subset()` now has a method for matrices, similar to that for data frames.
- Faster algorithm in `summaryRprof()`.
- `sunflowerplot()` has new arguments 'col' and 'bg'.
- `sys.function()` now has argument 'which' (as has long been presaged on its help page).
- `Sys.setlocale("LC_ALL",)` now only sets the locale categories which R uses, and `Sys.setlocale("LC_NUMERIC",)` now gives a warning (as it can cause R to malfunction).

- `unclass()` is no longer allowed for environments and external pointers (since these cannot be copied and so `unclass()` was destructive of its argument). You can still change the "class" attribute.

- File-name matching is no longer case-insensitive with `unz()` connections, even on Windows.

- New argument 'immediate.' to `warning()` to send an immediate warning.

- New convenience wrappers `write.csv()` and `write.csv2()`.

- There is a new version for `write.table()` which is implemented in C. For simple matrices and data frames this is several times faster than before, and uses negligible memory compared to the object size.

The old version (which no longer coerces a matrix to a data frame and then back to a matrix) is available for now as `write.table0()`.

- The functions `xinch()`, `yinch()`, and `xyinch()` have been moved from package 'grDevices' into package 'graphics'.

- Plotmath now allows underline in expressions. (PR#7286, contributed by Uwe Ligges.)

- BATCH on Unix no longer sets `--gui="none"` as the X11 module is only loaded if needed.

- The X11 module (and the hence `X11()`, `jpeg()` and `png()` devices and the X-based dataentry editor) is now in principle available under all Unix GUIs except `--gui="none"`, and this is reflected in `capabilities()`.

`capabilities("X11")` determines if an X server can be accessed, and so is more likely to be accurate.

- Printing of arrays now honours the 'right' argument if there are more than two dimensions.

- Tabular printing of numbers now has headers right-justified, as they were prior to version 1.7.0 (spotted by Rob Baer).

- Lazy-loading databases are now cached in memory at first use: this enables R to run much faster from slow file systems such as USB flash drives. There is a small (less than 2Mb) increase in default memory usage.

- The implicit class structure for numeric vectors has been changed, so that integer/real vectors try first methods for class "integer"/"double" and then those for class "numeric".

The implicit classes for matrices and arrays have been changed to be "matrix"/"array" followed by the `class(es)` of the underlying vector.

- `splines::splineDesign()` now allows the evaluation of a B-spline basis everywhere instead of just inside the "inner" knots, by setting the new argument `'outer.ok = TRUE'`.
- Hashing has been tweaked to use half as much memory as before.
- Readline is not used for tilde expansion when R is run with `--no-readline`, nor from embedded applications. Then "name" is no longer expanded, but "" still is.
- The regular expression code is now based on that in glibc 2.3.3. It has stricter conformance to POSIX, so metachars such as `+ *` may need to be escaped where before they did not (but could have been).
- New encoding `'TeXtext.enc'` improves the way `postscript()` works with Computer Modern fonts.
- Replacement in a non-existent column of a data frame tries harder to create a column of the correct length and so avoid a corrupt data frame.
- For Windows and readline-based history, the saved file size is re-read from `R_HISTSZ` immediately before saving.
- Collected warnings during start-up are now printed before the initial prompt rather than after the first command.
- Changes to package `'grid'`:
 - `preDrawDetails()`, `drawDetails()`, and `postDrawDetails()` methods are now recorded on the graphics engine display list. This means that calculations within these methods are now run when a device is resized or when output is copied from one device to another.
 - Fixed bug in `grid.text()` when `'rot'` argument has length 0. (privately reported by Emmanuel Paradis)
 - New `getNames()` function to return just the names of all top-level grobs on the display list.
 - Recording on the grid display list is turned off within `preDrawDetails()`, `drawDetails()`, and `postDrawDetails()` methods.
 - Grid should recover better from errors or user-interrupts during drawing (i.e., not leave you in a strange viewport or with strange graphical parameter settings).
 - New function `grid.refresh()` to redraw the grid display list.
 - New function `grid.record()` to capture calculations with grid graphics output.
 - `grobWidth` and `grobHeight` ("grobwidth" and "grobheight" units) for primitives (text, rects, etc, ...) are now calculated based on a bounding box for the relevant grob.
NOTE: this has changed the calculation of the size of a scalar rect (or circle or lines).
 - New arguments `'warn'` and `'wrap'` for function `grid.grab()`
 - New function `grid.grabExpr()` which captures the output from an expression (i.e., not from the current scene) without doing any drawing (i.e., no impact on the current scene).
 - `upViewport()` now (invisibly) returns the path that it goes up (suggested by Ross Ihaka).
 - The `'gamma'` gpar has been deprecated (this is a device property not a property of graphical objects; suggested by Ross Ihaka).
 - New `'lex'` gpar; a line width multiplier.
 - `grid.text()` now handles any language object as mathematical annotation (instead of just expressions).
 - `plotViewport()` has default value for `'margins'` argument (that match the default value for `par(mar)`).
 - The `'extension'` argument to `dataViewport()` can now be vector, in which case the first value is used to extend the xscale and the second value is used to extend the y scale. (suggested by Ross Ihaka).
 - All `'just'` arguments (for viewports, layouts, rectangles, text) can now be numeric values (typically between 0 [left] and 1 [right]) as well as character values ("left", "right", ...).
For rectangles and text, there are additional `'hjust'` and `'vjust'` arguments which allow numeric vectors of justification in each direction (e.g., so that several pieces of text can have different justifications). (suggested by Ross Ihaka)
 - New `'edits'` argument for `grid.xaxis()` and `grid.yaxis()` to allow specification of on-the-fly edits to axis children.
 - `applyEdit(x, edit)` returns `x` if target of edit (i.e., child specified by a `gPath`) cannot be found.
 - Fix for calculation of length of max/min/sum unit. Length is now (correctly) reported as 1 (was reported as length of first arg).

- Viewport names can now be any string (they used to have to be a valid R symbol).
- The 'label' argument for `grid.xaxis()` and `grid.yaxis()` can now also be a language object or string vector, in which case it specifies custom labels for the tick marks.

Internationalization

- Unix-alike versions of R can now be used in UTF-8 and other multi-byte locales on suitably equipped OSes if configured with option `--enable-mbcs` (which is the default). [The changes to font handling in the X11 module are based on the Japanization patches of Eiji Nakama.]

Windows versions of R can be used in 'East Asian' locales on suitable versions of Windows.

See the 'Internationalization' chapter in the 'Installation and Administration' manual.

- New command-line flag `--encoding` to specify the encoding to be assumed for stdin (but not for a console).
- New function `iconv()` to convert character vectors between encodings, on those OSes which support this. See the new capabilities("iconv").
- The meaning of 'encoding' for a connection has changed: it now allows any charset encoding supported by `iconv` on the platform, and can re-encode output as well as input.

As the new specification is a character string and the old was numeric, this should not cause incorrect operation.

- New function `localeToCharset()` to find/guess encoding(s) from the locale name.
- `nchar()` returns the true number of bytes stored (including any embedded nuls), this being 2 for missing values. It has an optional argument 'type' with possible non-default values "chars" and "width" to give the number of characters or the display width in columns.
- Characters can be entered in hexadecimal as e.g. `\x9c`, and in UTF-8 and other multibyte locales as `\uxxxx`, `\u{xxxx}`, `\Uxxxxxxxx` or `\U{xxxxxxxx}`. Non-printable Unicode characters are displayed C-style as `\uxxxx` or `\Uxxxxxxxx`.
- `LC_MONETARY` is set to the locale, which affects the result of `Sys.localeconv()`, but nothing else in R itself. (It could affect add-on packages.)

- `source()` now has an 'encoding' argument which can be used to make it try out various possible encodings. This is made use of by `example()` which will convert (non-UTF-8) Latin-1 example files in a UTF-8 locale.
- `read/writeChar()` work in units of characters, not bytes.
- `.C()` now accepts an `ENCODING=` argument where re-encoding is supported by the OS. See 'Writing R Extensions'.
- `delimMatch (tools)` now reports match positions and lengths in units of characters, not bytes. The delimiters can be strings, not just single ASCII characters.
- `.Rd` files can indicate via a `\encoding{}` argument the encoding that should be assumed for non-ASCII characters they contain.
- Phrases in `.Rd` files can be marked by `\enc{-}{-}` to show a transliteration to ASCII for use in e.g. text help.
- The use of 'pch' in `points()` now allows for multi-byte character sets: in such a locale a glyph can either be specified as a multi-byte single character or as a number, the Unicode point.
- New function `l10n_info()` reports on aspects of the locale/charset currently in use.
- `scan()` is now aware of double-byte locales such as Shift-JIS in which ASCII characters can occur as the second ('trail') byte.
- Functions `sQuote()` and `dQuote()` use the Unicode directional quotes if in a UTF-8 locale.
- The infrastructure is now in place for C-level error and warning messages to be translated and used on systems with Native Language Support. This has been used for the startup message in English and to translate Americanisms such as 'color' into English: translations to several other languages are under way, and some are included in this release.
See 'Writing R Extensions' for how to make use of this in a package: all the standard packages have been set up to do translation, and the 'language' 'en@quot' is implemented to allow Unicode directional quotes in a UTF-8 locale.
- R-level `stop()`, `warning()` and `message()` messages can be translated, as can other messages via the new function `gettext()`. Tools `xgettext()` and `xgettext2pot()` are provided in package tools to help manage error messages.
`gettextf()` is a new wrapper to call `sprintf()` using `gettext()` on the format string.

- Function `ngettext()` allows the management of singular and plural forms of messages.

Utilities

- New functions `mirror2html()` and `checkCRAN()`.
- R CMD check has a new option `'--use-valgrind'`.
- R CMD check now checks that Fortran and C++ files have LF line endings, as well as C files. It also checks `Makevars[.in]` files for portable compilation flags.
- R CMD check will now work on a source tarball and prints out information about the version of R and the package.
- `tools:::install_package_code_files()` (used to collate R files when installing packages) ensures files are separated by a line feed.
- `vignette()` now returns an object of class "vignette" whose `print()` method opens the corresponding PDF file. The `edit()` method can be used to open the code of the vignette in an editor.
- R CMD INSTALL on Unix has a new option `'--build'` matching that on Windows, to package as tarball the installed package.
- R CMD INSTALL on Unix can now install binary bundles.
- R CMD build now changes src files to LF line endings if necessary.
- R CMD build now behaves consistently between source and binary builds: in each case it prepares a source directory and then either packages that directory as a tarball or calls R CMD INSTALL `-build` on the prepared sources. This means that R CMD build `--binary` now respects `.Rbuildignore` and will rebuild vignettes (unless the option `--no-vignettes` is used). For the latter, it now installs the current sources into a temporary library and uses that version of the package/bundle to rebuild the vignettes.
- R CMD build now reports empty directories in the source tree.
- New function `write_PACKAGES()` in package 'tools' to help with preparing local package repositories. (Based on a contribution by Uwe Ligges.) How to prepare such repositories is documented in the 'R Installation and Administration' manual.

- `package.skeleton()` adds a bit more to DESCRIPTION.
- Sweave changes:
 - `\usepackage[nogin]{Sweave}` in the header of an Sweave file suppresses auto-setting of graphical parameters such as the width of the graphics output.
 - The new `\SweaveInput{}` command works similar to LaTeX's `\input{}` command.
 - Option value `strip.white=all` strips all blank lines from the output of a code chunk.
 - Code chunks with `eval=false` are commented out by `Stangle()` and hence no longer tested by R CMD check.

Documentation

- File `doc/html/faq.html` no longer exists, and `doc/manual/R-FAQ.html` (which has active links to other manuals) is used instead. (If `makeinfo >= 4.7` is not available, the version on CRAN is linked to.)
- Manual 'Writing R Extensions' has further details on writing new front-ends for R using the new public header files.
- There are no longer any restrictions on characters in the `\name{}` field of a `.Rd` file: in particular `_` is supported.

C-level facilities

- There are new public C/C++ header files `Rinterface.h` and `R_ext/RStartup.h` for use with external GUIs.
- Added an `onExit()` function to graphics devices, to be executed upon user break if non-NULL.
- ISNAN now works even in C++ code that undefines the 'isnan' macro.
- `R_alloc`'s limit on 64-bit systems has been raised from just under 2^{31} bytes (2Gb) to just under 2^{34} (16Gb), and is now checked.
- New math utility functions `log1pmx(x)`, `lgamma1p(x)`, `logspace_add(logx, logy)`, and `logspace_sub(logx, logy)`.

Deprecated & defunct

- The aqua module for MacOS X has been removed: `--with-aqua` now refers to the unbundled Cocoa GUI.
- Capabilities "bzip2", "GNOME", "libz" and "PCRE" are defunct.
- The undocumented use of `UseMethod()` with no argument was deprecated in 2.0.1 and is now regarded as an error.
- Capability "IEEE754" is deprecated.
- The 'CRAN' argument to `update.packages()`, `old.packages()`, `new.packages()`, `download.packages()` and `install.packages()` is deprecated in favour of 'repos', which replaces it as a positional argument (so this is only relevant for calls with named args).
- The S3 methods for getting and setting names of "dist" objects have been removed (as they provided names with a different length from the "dist" object itself).
- Option "repositories" is no longer used and so not set.
- `loadURL()` is deprecated in favour of `load(url())`.
- `delay()` is deprecated. Use `delayAssign()` instead.

Installation changes

- New configure option `--enable-utf8` to enable support for UTF-8 locales, on by default.
- `R_XTRA_[CF]FLAGS` are now used during the configuration tests, and `[CF]PICFLAGS` if `--enable-R-shlib` was specified. This ensures that features such as inlining are only used if the compilation flags specified support them. (PR#7257)
- Files `FAQ`, `RESOURCES`, `doc/html/resources.html` are no longer in the SVN sources but are made by 'make dist'.
- The GNOME GUI is unbundled, now provided as a package on CRAN.
- Configuring without having the recommended packages is now an error unless `--with-recommended-packages=no` (or equivalent) is used.
- Configuring without having the X11 headers and libraries is now an error unless `--with-x=no` (or equivalent) is used.

- Configure tries harder to find a minimal set of FLIBS. Under some circumstances this may remove from `R_LD_LIBRARY_PATH` path elements that ought to have specified in `LD_FLAGS` (but were not).
- The C code for most of the graphics device drivers and their `afm` files are now in package `grDevices`.
- R is now linked against `ncurses/term/lib/termcap` only if `readline` is specified (now the default) and that requires it.
- `Makeinfo 4.7` or later is now required for building the HTML and Info versions of the manuals.

Installation changes

- There are new types of packages, identified by the `Type` field in the `DESCRIPTION` file. For example the GNOME console is now a separate package (on CRAN), and translations can be distributed as packages.
- There is now support of installing from within R both source and binary packages on MacOS X and Windows. Most of the R functions now have a 'type' argument defaulting to `getOption("pkgType")` and with possible values "source", "win.binary" and "mac.binary". The default is "source" except under Windows and the CRAN GUI build for MacOS X.
- `install.packages()` and friends now accept a vector of URLs for 'repos' or 'contriburl' and get the newest available version of a package from the first repository on the list in which it is found. The argument 'CRAN' is still accepted, but deprecated.

`install.packages()` on Unix can now install from local `.tar.gz` files via `repos = NULL` (as has long been done on Windows).

`install.packages()` no longer asks if downloaded packages should be deleted: they will be deleted at the end of the session anyway (and can be deleted by the user at any time).

If the repository provides the information, `install.packages()` will now accept the name of a package in a bundle.

If 'pkgs' is omitted `install.packages()` will use a listbox to display the available packages, on suitable systems.

'dependencies' can be a character vector to allow only some levels of dependencies (e.g. not "Suggests") to be requested.

- There is a new possible value `update.packages(ask="graphics")` that uses a widget to (de)select packages, on suitable systems.
- The option used is now `getOption("repos")` not `getOption("CRAN")` and it is initially set to a dummy value. Its value can be a character vector (preferably named) giving one or several repositories.
A new function `chooseCRANmirror()` will select a CRAN mirror. This is called automatically if the `contrib.url()` encounters the initial dummy value of `getOption("repos")`
A new function `setRepositories()` can be used to create `getOption("repos")` from a (platform-specific) list of known repositories.
- New function `new.packages()` to report uninstalled packages available at the requested repositories. This also reports incomplete bundles. It will optionally install new packages.
- New function `available.packages()`, similar to `CRAN.packages()` but for use with multiple repositories. Both now only report packages whose R version requirements are met.
- `update.packages()` and `old.packages()` have a new option 'checkBUILT' to allow packages installed under earlier versions of R to be updated.
- `remove.packages()` can now remove bundles.
- The Contains: field of the DESCRIPTION file of package bundles is now installed, so later checks can find out if the bundle is complete.
- `packageStatus()` is now built on top of `*.packages`, and gains a 'method' argument. It defaults to the same repositories as the other tools, those specified by `getOption("repos")`.

Bug fixes

- Configuring for Tcl/Tk makes use of `#{TK_LIB_SPEC} #{TK_LIBS}` not `#{TK_LIB_SPEC} #{TK_XLIBSW}`, which is correct for recent versions of Tk, but conceivably not for old `tkConfig.sh` files.
- `detach()` was not recomputing the S4 methods for primitives correctly.
- Methods package now has class "expression" partly fixed in basic classes, so S4 classes can extend these (but "expression" is pretty broken as a vector class in R).
- Collected warnings had messages with unneeded trailing space.
- S4 methods for primitive functions must be exported from namespaces; this is now done automatically. Note that `is.primitive()` is now in 'base', not 'methods'.
- Package grid:
 - Fixed bug in `grid.text()` when "rot" argument has length 0. (reported by Emmanuel Paradis)
- `.install_package_vignette_index()` created an index even in an empty 'doc' directory.
- The `print()` method for factors now escapes characters in the levels in the same way as they are printed.
- `str()` removed any class from environment objects.
`str()` no longer interprets control characters in character strings and factor levels; also no longer truncates factor levels unless they are longer than 'nchar.max'. Truncation of such long strings is now indicated "outside" the string.
`str(<S4.object>)` was misleading for the case of a single slot.
`str()` now also properly displays S4 class definitions (such as returned by `getClass()`).
- `print.factor(quote=TRUE)` was not quoting levels, causing ambiguity when the levels contained spaces or quotes.
- R CMD check was confused by a trailing / on a package name.
- `write.table()` was writing incorrect column names if the data frame contained any matrix-like columns.
- `write.table()` was not quoting row names for a 0-column x.
- `t(x)`'s default method now also preserves names(`dimnames(x)`) for 1D arrays 'x'.
- `r <- a %*% b` no longer gives names(`dimnames(r)`) == `c("", "")` unless one of a or b has named dimnames.
- Some .Internal functions that were supposed to return invisibly did not. This was behind PR#7397 and PR#7466.
- `eval(expr, NULL, encl)` now looks up variables in encl, as `eval(expr, list(), encl)` always did
- Coercing `as.data.frame(NULL)` to a pairlist caused an error.

- `p.adjust(p, ...)` now correctly works when 'p' contains NAs (or when it is of length 0 or length 2 for `method = "hommel"`).
- 'methods' initialization was calling a function intended for `.Call()` with `.C()`.
- `optim()` needed a check that the objective function returns a value of length 1 (spotted by Ben Bolker).
- `X11()` was only scaling its fonts to pointsize if the dpi was within 0.5 of 100dpi.
- `X11()` font selection was looking for any symbol font, and sometimes got e.g. bold italic if the server has such a font.
- `dpois(*, lambda=Inf)` now returns 0 (or -Inf for log).
- Using `pch=""` gave a square (`pch=0`)! Now it is regarded as the same as NA, which was also undocumented but omits the point.
- Base graphics now notices (ab)lines which have a zero coordinate on log scale, and omits them. (PR#7559)
- `stop()` and `warning()` now accept NULL as they are documented to do (although this seems of little use and is equivalent to "").
- `weighted.mean()` now checks the length of the weight vector `w`.
- `getAnywhere()` was confused by names with leading or trailing dots (spotted by Robert McGehee)
- `eval()` was not handling values from `return()` correctly.
- `par(omd)` is now of the form `c(x1, x2, y1, y2)` to match the documentation and for S-PLUS compatibility.
[Previously, `par(omd)` was of the form `c(bottom, left, top, right)` like `par(oma)` and `par(omi)`]
- `formatC()` did not check its 'flag' argument, and could segfault if it was incorrect. (PR#7686)
- Contrasts needed to be coerced to numeric (e.g. from integer) inside `model.matrix`. (PR#7695)
- `socketSelect()` did not check for buffered input.
- Reads on a non-blocking socket with no available data were not handled properly and could result in a segfault.
- The "aovlist" method for `se.contrast()` failed in some very simple cases that were effectively not multistratum designs, e.g. only one treatment occurring in only one stratum.
- `pgamma()` uses completely re-written algorithms, and should work for all (even very extreme) arguments; this is based on Morten Welinder's contribution related to PR#7307.
- `dpois(10, 2e-308, log=TRUE)` and similar cases gave -Inf.
- `x <- 2^(0:1000); plot(x, x^.9, type="l", log="xy")` and `x <- 2^-(1070:170); plot(x, x^.9, type="l", log="xy")` now both work
- `summary.lm()` asked for a report on a reasonable occurrence, but the check failed to take account of NAs.
- `lm()` was miscalculating 'df.residual' for empty models with a matrix response.
- `summary.lm()` now behaves more sensibly for empty models.
- `plot.window()` was using the wrong sign when adjusting `xlim/ylim` for positive 'asp' and a reversed axis.
- If `malloc()` fails when allocating a large object the allocator now does a gc and tries the `malloc()` again.
- `packageSlot()` and `getGroupMembers()` are now exported from the 'methods' package as they should from documentation and the Green Book.
- `rhyper()` was giving numbers slightly too small, due to a bug in the original algorithm. (PR#7314)
- `gsub()` was sometimes incorrectly matching `^` inside a string, e.g. `gsub("^12", "x", "1212")` was "xx".
- `[g]sub(perl = TRUE)` was giving random results for a 0-length initial match. (PR#7742)
- `[g]sub` was ignoring most 0-length matches, including all initial ones. Note that substitutions such as `gsub("[[:space:]]*", " ", ...)` now work as they do in 'sed' (whereas the effect was previously the same as `gsub("[[:space:]]+", " ", ...)`). (In part PR#7742)
- Promises are now evaluated when extracted from an environment using '\$' or '[[]]'.
- `reshape(direction="wide")` had some sorting problems when guessing time points (PR#7669)

- `par()` set 'xaxp' before 'xlog' and 'yaxp' before 'ylog', causing PR#831.
- The logic in `tclRequire()` to check the availability of a Tcl package turned out to be fallible. It now uses a try()-and-see mechanism instead.
- Opening a `unz()` connection on a non-existent file left a file handle in use.
- "dist" objects of length 0 failed to print.
- `INSTALL` and the `libR` try harder to find a temporary directory (since there might be one left over with the same PID).
- `acf()` could cause a segfault with some datasets. (PR#7771)
- `tan(1+LARGEi)` now gives `0+1i` rather than `0+NaNi` (PR#7781)
- `summary(data.frame(mat = I(matrix(1:8, 4))))` does not go into infinite recursion anymore.
- `writeBin()` performed byte-swapping incorrectly on complex vectors, also swapping real and imaginary parts. (PR#7778)
- `read.table()` sometimes discarded as blank lines containing only white space, even if `sep=","`.

Changes on CRAN

by Kurt Hornik

New contributed packages

AMORE A MORE flexible neural network package.

This package was born to release the TAO robust neural network algorithm to the R users. It has grown and can be of interest for the users wanting to implement their own training algorithms as well as for those others whose needs lie only in the "user space". By Manuel Castejón Limas, Joaquín B. Ordieres Meré, Eliseo P. Vergara González, Francisco Javier Martínez de Pisón Ascacibar, Alpha V. Pernía Espinoza, and Fernando Alba Elías.

BHH2 Functions and data sets reproducing some examples in "Statistics for Experimenters II" by G. E. P. Box, J. S. Hunter, and W. C. Hunter, 2005, John Wiley and Sons. By Ernesto Barrios.

Bolstad Functions and data sets for the book "Introduction to Bayesian Statistics" by W. M. Bolstad, 2004, John Wiley and Sons. By James Curran.

Ecdat Data sets from econometrics textbooks. By Yves Croissant.

GDD Platform and X11 independent device for creating bitmaps (png, gif and jpeg). By Simon Urbanek.

GeneNT The package implements a two-stage algorithm to screen co-expressed gene pairs with controlled FDR and MAS. The packages also constructs relevance networks and clusters co-expressed genes (both similarly co-expressed

and transitively co-expressed). By Dongxiao Zhu.

Geneland Detection of spatial structure from genetic data. By Gilles Guillot.

HTMLapplets Functions inserting dynamic scatterplots and grids in documents generated by **R2HTML**. By Gregoire Thomas.

IDPmisc The IDPmisc package contains different high-level graphics functions for displaying large datasets, brewing color ramps, drawing nice arrows, creating figures with differently colored margins and plot regions, and other useful goodies. By Andreas Ruckstuhl, Thomas Unternährer, and Rene Locher.

LDheatmap Produces a graphical display, as a heatmap, of measures of pairwise linkage disequilibrium between SNPs. Users may optionally include the physical locations or genetic map distances of each SNP on the plot. By Ji-Hyung Shin, Sigal Blay, Jinko Graham, and Brad McNeney.

LogicReg Routines for Logic Regression. By Charles Kooperberg and Ingo Ruczinski.

MEMSS Data sets and sample analyses from "Mixed-effects Models in S and S-PLUS" by J. Pinheiro and D. Bates, 2000, Springer. By Douglas Bates.

MatchIt Select matched samples of the original treated and control groups with similar covariate distributions—can be used to match exactly on covariates, to match on propensity scores, or perform a variety of other matching procedures. By Daniel Ho, Kosuke Imai, Gary King, and Elizabeth Stuart.