R Packages

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What is a package?

- Structured, standardized unit of:
  - R code
  - documentation
  - data
  - external code

Why use packages

- Installation & administration
- Validation
- Distribution
- Documentation
- Organization

Handling packages

- Load with `library(`*name*`)`
- Package-level help:
  - `library(help=`*name*`)`
- Unload with `detach(package:`*name*`)`
  - You shouldn't have to do this

Handling packages with RStudio

- See the packages tab
- Check to load
  - Some are already loaded!!
- Click on the name for help

Creating packages

- Structure
- Tools
- Details:
  - dependencies
  - “public” vs “private” functions
  - help pages
- Getting help

package.skeleton()

- Convenient for turning a set of existing functions and scripts into a package
- Let's do it with the anova.mlm code that we wrote earlier

- New project:
  - scdemoXX@vscarl1.stat.ubc.ca:~scdemo/pkg
- source('anova.mlm.R')
- package.skeleton("anovaMlm", ls())

DESCRIPTION

- The only required part of a package
- Name, author, license, etc.

R/

- Directory for R code
- package.skeleton creates one file per function
- This is not a rule, you can put as many functions into a single file

man/

- Help files

NAMESPACE

- Defines which objects are visible to the user and other functions
- Public vs. private to the package

- The default is to make everything visible that starts with a letter

Command-line tools

- Check
- Install
- Build

INSTALL

- Let's install our package
- R CMD INSTALL anova.mlm
- Delete the "man" directory
  - (it's optional and we'll recreate it later)
- Redo INSTALL
- Restart R studio
- library("anova.mlm")

check

- Really important!!!
- Finds common errors, non-standard parts
- CRAN requires no ERRORS or WARNINGS

Optional contents

- man/: documentation
- data/: datasets
- demo/: R code for demo purposes
- inst/: other files to include in the package (PDFs, vignettes)
- tests/: package test files
- src/: C, C++, or Fortran source code
- NEWS: history of changes to the package
- LICENSE or LICENCE: package license

DESCRIPTION

- Depends:
  - packages used by this one
  - **and** loaded as part of its loading
  - i.e., visible to the user
- Imports:
  - packages used by this one
  - **but not loaded**
  - i.e, **not visible** to the user
- Suggests:
  - used in examples or vignettes
  - non-essential functionality

NAMESPACE

- exportPattern("^[[:alpha:]]")
- export(anova.mlm, est.beta)

- S3method(print, anova.mlm)
- S3method(plot, anova.mlm)

- import(MASS)
- importFrom(MASS, lda)

Documentation

- Let's re-generate the documentation files
- promptPackage("anova.mlm")
- prompt(anova.mlm)

anova.mlm.Rd

- Description: Compute a (generalized) analysis of variance table for one or more multivariate linear models.
- Arguments:
  - object: an object of class '"mlm"'
  - ...: further objects of class '"mlm"'.
  - force.int: Force intercept
- Value: An object of class “anova” inheriting from class “matrix”

Help files for methods

- \usage{anova.mlm(…)}
- For S3 methods:
  - \usage{\method{print}{anova.mlm}(….)}

Vignettes

- .rnw extension
- Written in Sweave
  - similar to knitr
- Latex + R code
- Produces a PDF available in the installed package
- vignette()
- vignette('Sweave')

Help on writing packages

- Lots of tutorials on the Web
  - many of them are not necessarily correct
  - NAMESPACES, Imports, etc.
- Authoritative guide: Writing R Extensions
- R-devel mailing list