F04

制作 R 套件
(使用RStudio)

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https://hmwu.idv.tw

R套件 (R packages)

- A collection of source code allows the user to attach to R session.
- 在R中，使用 **`library(pk.name)`** or **`require(pk.name)`**呼叫套件.
- 官方套件: http://cran.r-project.org/web/packages/

clValid: Validation of Clustering Results

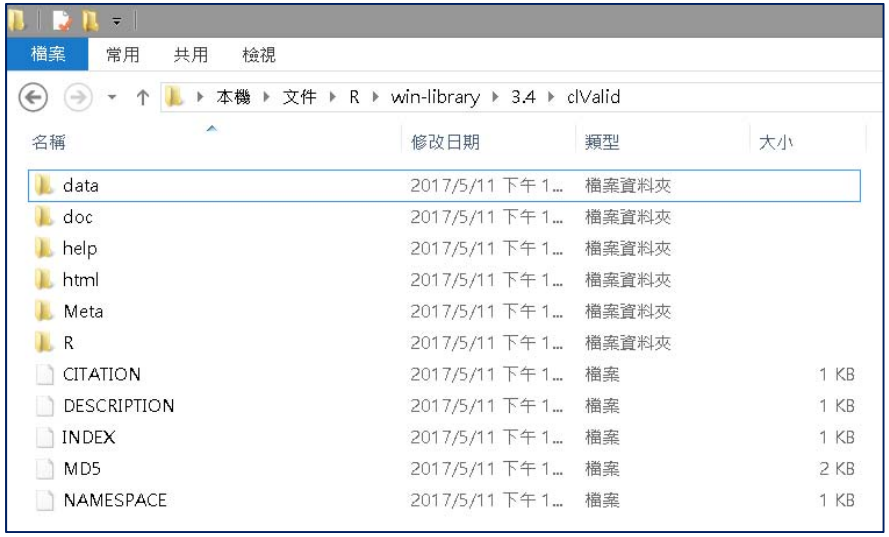
Statistical and biological validation of clustering results.

Version:	0.6-6
Depends:	R (≥ 2.0), cluster
Imports:	methods, class
Suggests:	Biobase, annotate, GO.db, moe430a.db, RankAggreg, kohonen, mclust
Published:	2014-03-25
Author:	Guy Brock, Vasyl Pihur, Susmita Datta, and Somnath Datta
Maintainer:	ORPHANED
License:	LGPL-3
URL:	http://guybrock.gpbrock.net/research
NeedsCompilation:	no
Citation:	clValid citation info
Materials:	ChangeLog
In views:	Cluster
CRAN checks:	clValid results

Downloads:

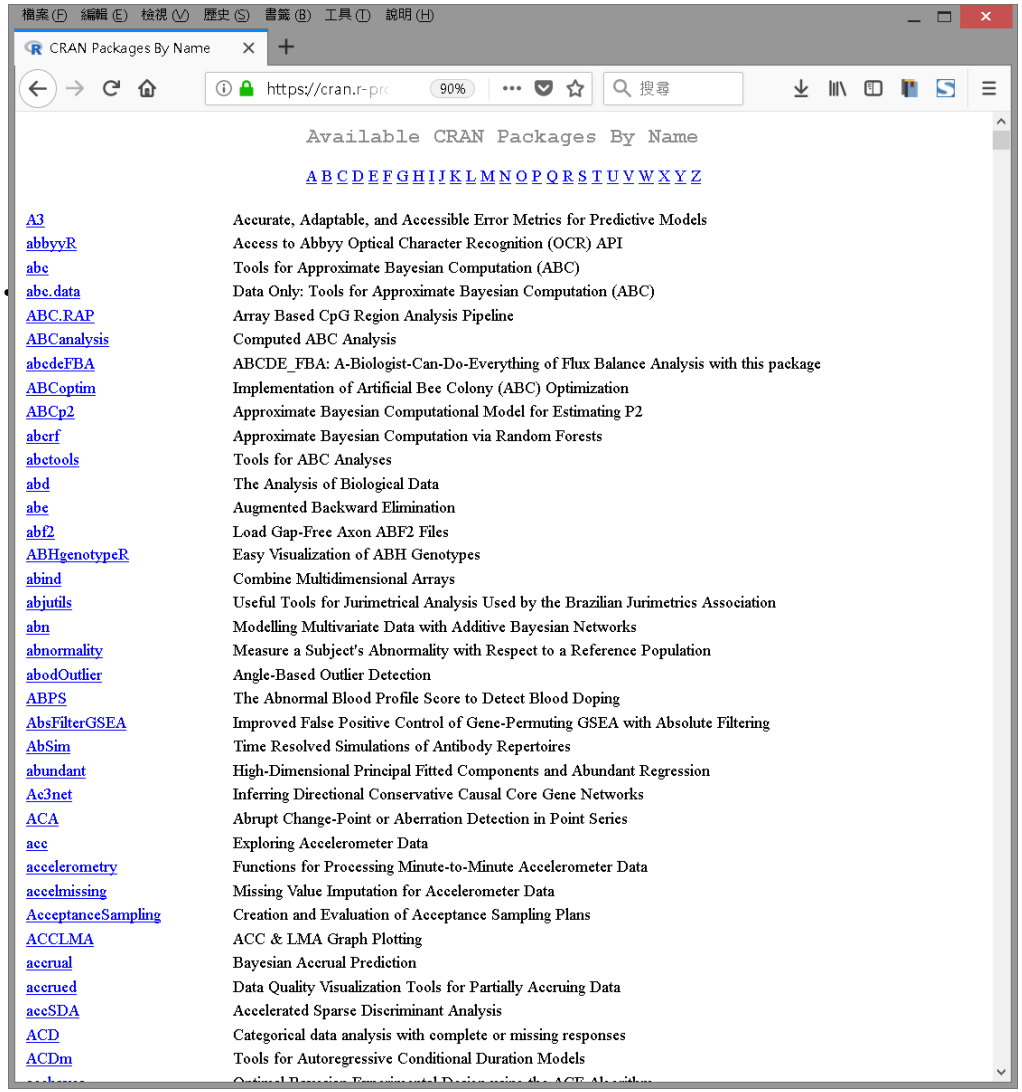
Reference manual:	clValid.pdf
Vignettes:	clValid Overview
Package source:	clValid_0.6-6.tar.gz
Windows binaries:	r-devel: clValid_0.6-6.zip, r-release: clValid_0.6-6.zip, r-oldrel: clValid_0.6-6.zip
OS X binaries:	r-release: clValid_0.6-6.tgz, r-oldrel: clValid_0.6-6.tgz
Old sources:	clValid archive

範例



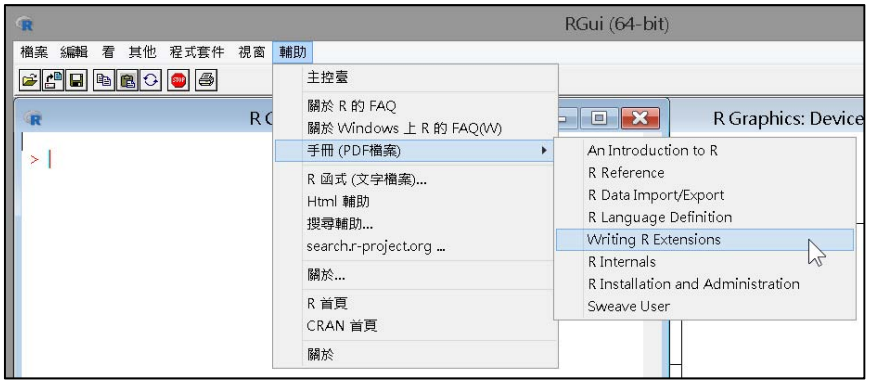
為什麼要有套件?

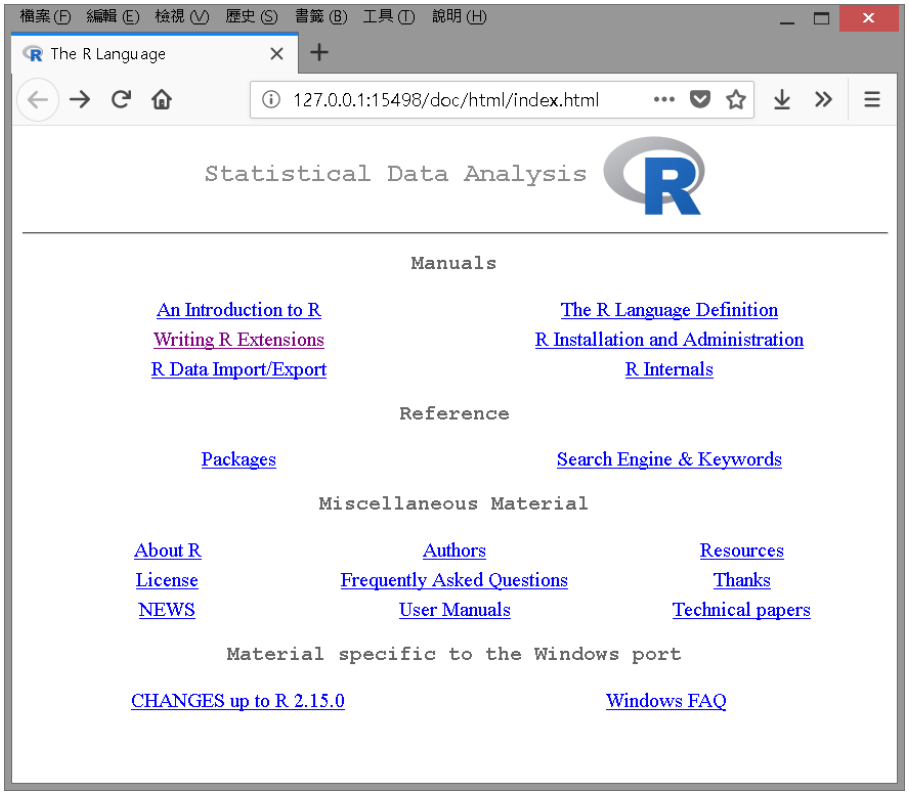
- 組織程式碼。
- 以套件方式共享程式碼。
- 提供可信賴的存取。
- 提供作者與使用者的溝通橋樑。

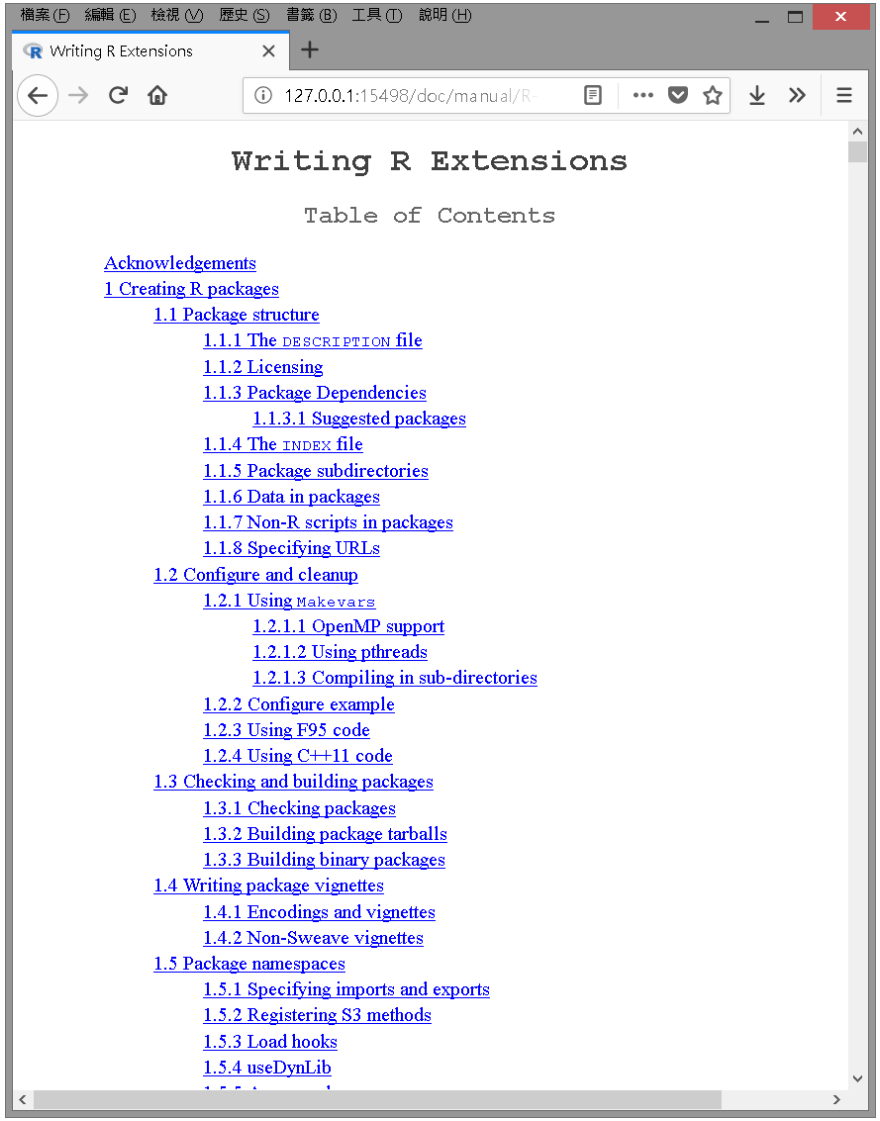


12585

「制作R套件」官方文件


RGui (64-bit)
檔案 編輯 看 其他 程式套件 視窗 輔助
主控臺
關於 R 的 FAQ
關於 Windows 上 R 的 FAQ(W)
手冊 (PDF檔案)
R 函式 (文字檔案)...
Html 輔助
搜尋輔助...
search.r-project.org ...
關於...
R 首頁
CRAN 首頁
關於
An Introduction to R
R Reference
R Data Import/Export
R Language Definition
Writing R Extensions
R Internals
R Installation and Administration
Sweave User
R Graphics: Device


The R Language
127.0.0.1:15498/doc/html/index.html
Statistical Data Analysis
Manuals
An Introduction to R
The R Language Definition
Writing R Extensions
R Installation and Administration
R Data Import/Export
R Internals
Reference
Packages
Search Engine & Keywords
Miscellaneous Material
About R
Authors
Resources
License
Frequently Asked Questions
Thanks
NEWS
User Manuals
Technical papers
Material specific to the Windows port
CHANGES up to R 2.15.0
Windows FAQ


Writing R Extensions
127.0.0.1:15498/doc/manual/R-
Writing R Extensions
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制作R套件步驟

- 安裝必要軟體及R套件
- 建立 package skeleton (**檔案目錄結構**)
- 編輯/撰寫R程式(*.R)
- 利用"roxygen2"套件，撰寫R程式說明檔(*.Rd)
- 建立R程式說明檔及NAMESPACE檔
- 編輯DESCRIPTION檔
- 增加資料檔、增加demos or vignettes
- 檢測套件(Check)
- 重覆上述程序數次
- 編譯並建立套件(Build)
- 發佈套件(Distribute) (if you want to)

制作R套件所需的軟體安裝 (Windows)

(1) GNU software development tools including a C/C++ compiler;

Rtools: https://cran.rstudio.com/bin/windows/Rtools/

(2) LaTeX for building R manuals and vignettes.

MikTeX: http://miktex.org/download

Building R for Windows

This document is a collection of resources for building packages for R under Microsoft Windows, or for building R itself (version 1.9.0 or later). The original collection was put together by Prof. Brian Ripley and Duncan Murdoch; it is currently maintained by Jeroen Ooms.

The authoritative source of information for tools to work with the current release of R is the "R Administration and Installation" manual. In particular, please read the "Windows Toolset" appendix.

Rtools Downloads

Some of the tools are incompatible with obsolete versions of R. We maintain one actively updated version of the tools, and other "frozen" snapshots of them. We recommend that users use the latest release of Rtools with the latest release of R.

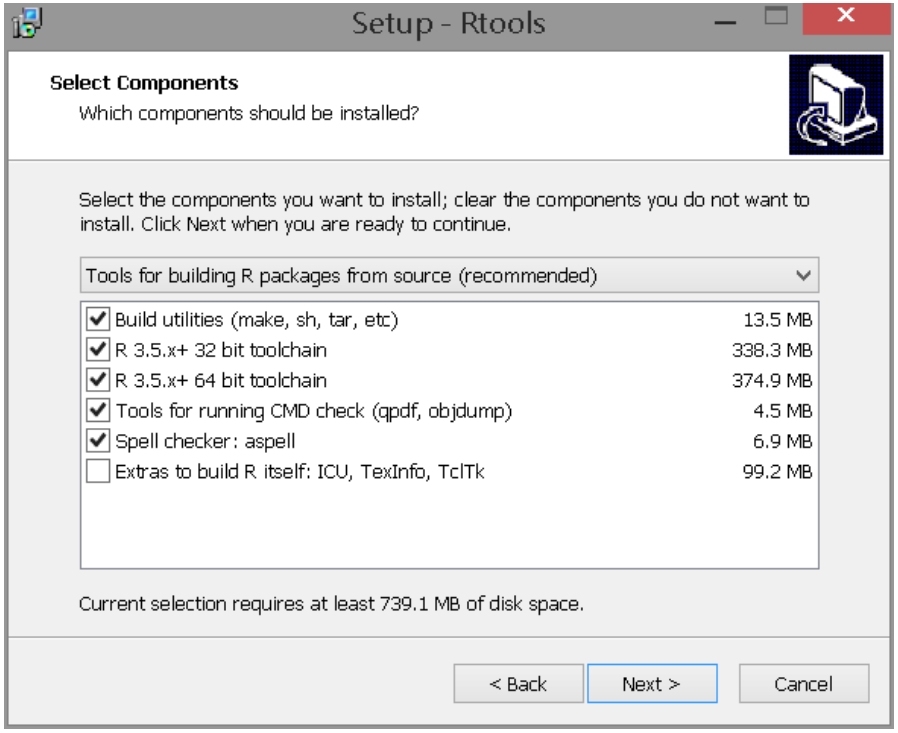
The current version of this file is recorded here: VERSION.txt.

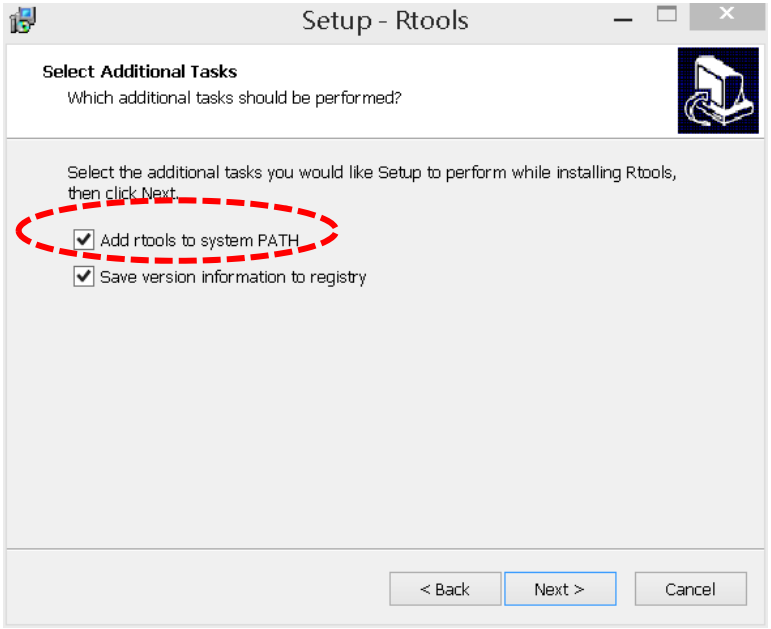
Download	R compatibility	Frozen?
Rtools35.exe	R 3.3.x and later	No
Rtools34.exe	R 3.3.x and later	Yes
Rtools33.exe	R 3.2.x to 3.3.x	Yes
Rtools32.exe	R 3.1.x to 3.2.x	Yes
Rtools31.exe	R 3.0.x to 3.1.x	Yes
Rtools30.exe	R >2.15.1 to R 3.0.x	Yes
Rtools215.exe	R >2.14.1 to R 2.15.1	Yes
Rtools214.exe	R 2.13.x or R 2.14.x	Yes
Rtools213.exe	R 2.13.x	Yes

Other platform:

https://support.rstudio.com/hc/en-us/articles/200486498-Package-Development-Prerequisites

安裝過程

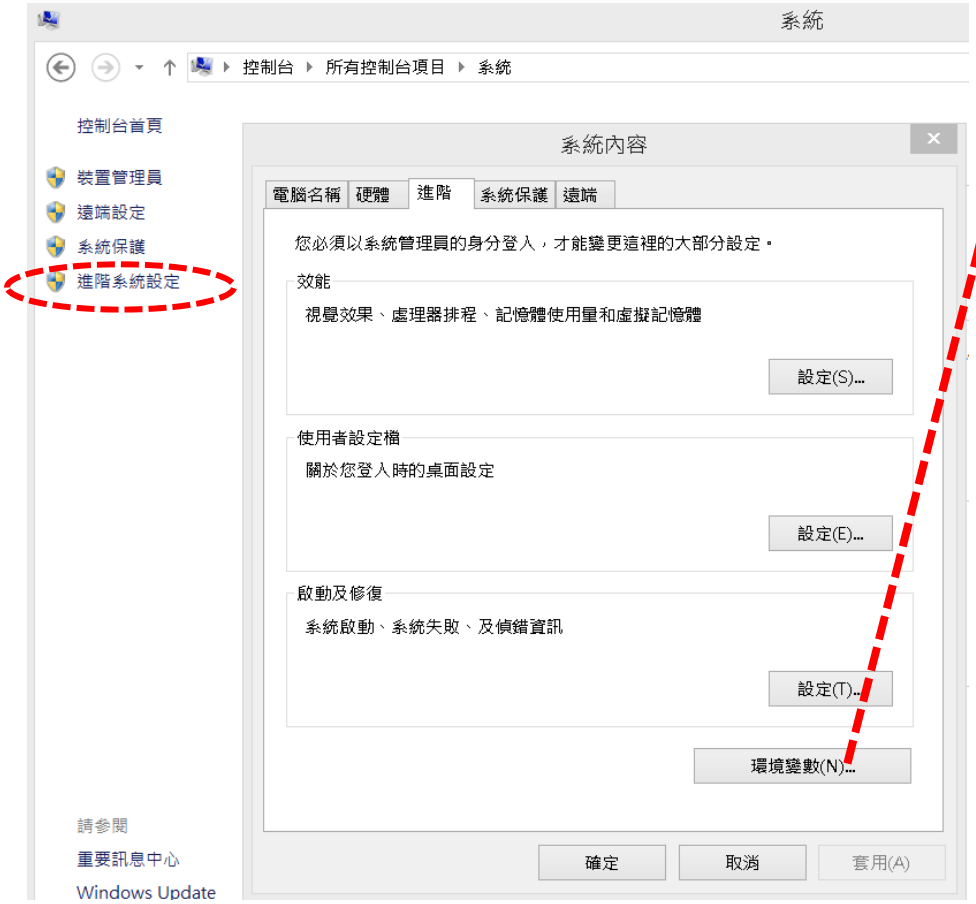

Setup - Rtools
Select Components
Which components should be installed?
Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue.
Tools for building R packages from source (recommended)
Build utilities (make, sh, tar, etc) 13.5 MB
R 3.5.x+ 32 bit toolchain 338.3 MB
R 3.5.x+ 64 bit toolchain 374.9 MB
Tools for running CMD check (qpdf, objdump) 4.5 MB
Spell checker: aspell 6.9 MB
Extras to build R itself: ICU, TexInfo, TclTk 99.2 MB
Current selection requires at least 739.1 MB of disk space.
< Back
Next >
Cancel

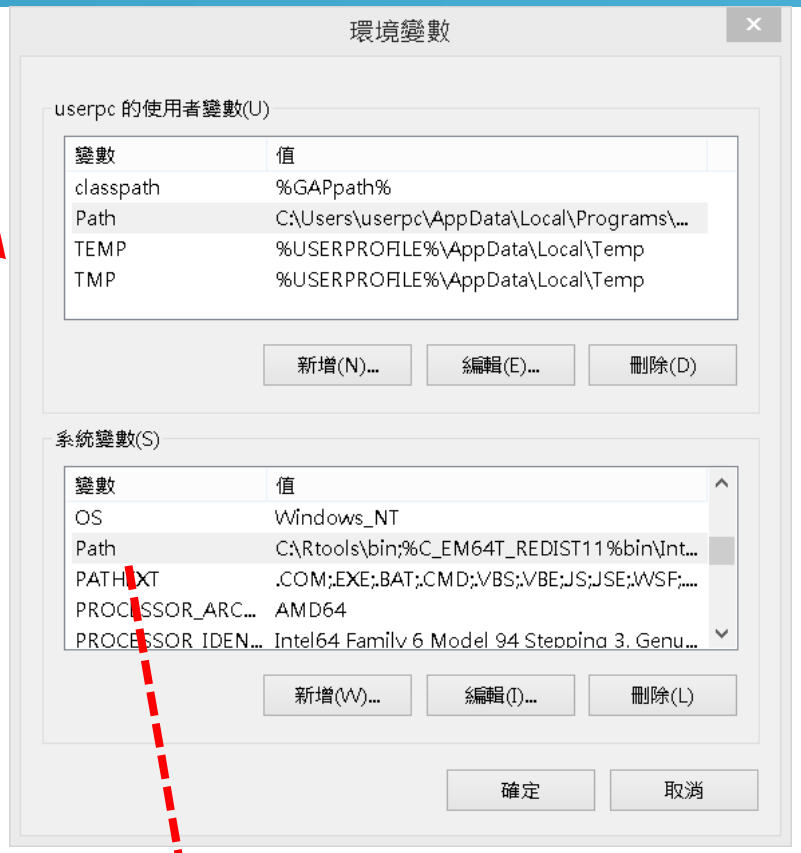

Setup - Rtools
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing Rtools, then click Next.
Add rtools to system PATH
Save version information to registry
< Back
Next >
Cancel

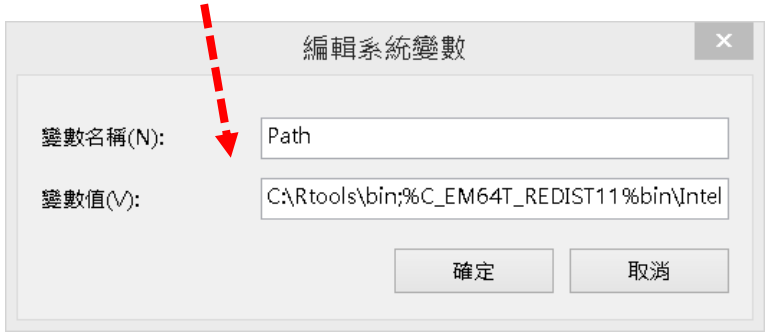
安裝完畢，檢查Rtools路徑

開始 => 控制台 => 系統

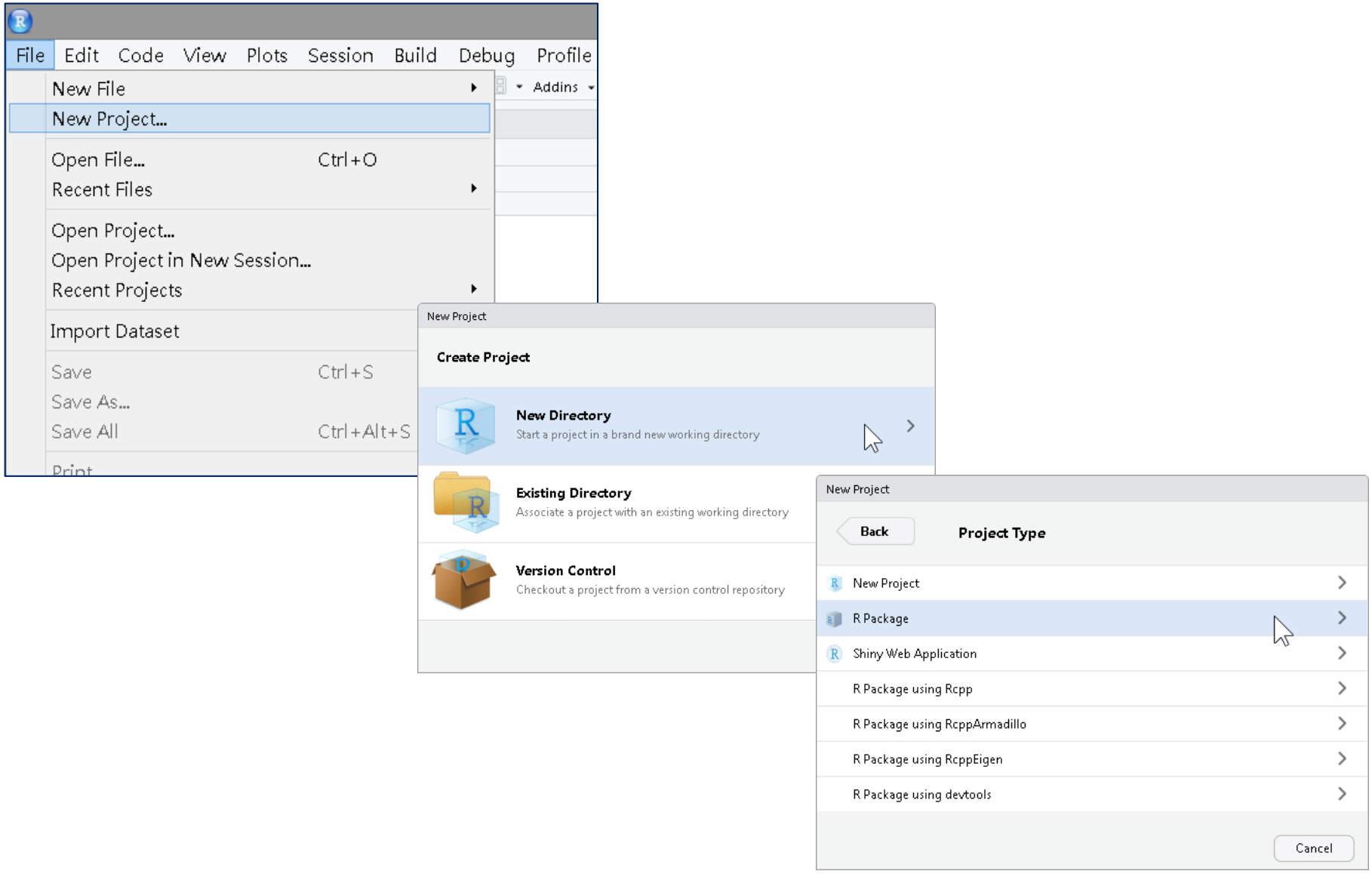
必要時重開機。



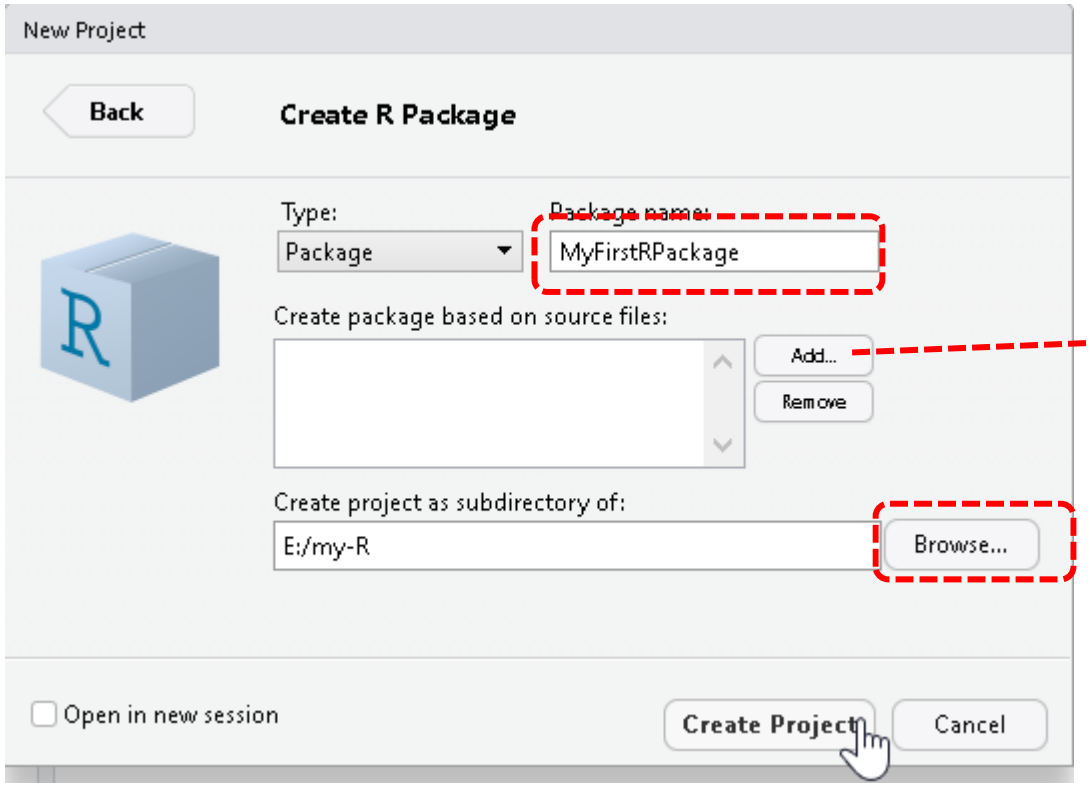




利用RStudio新增一套件專案

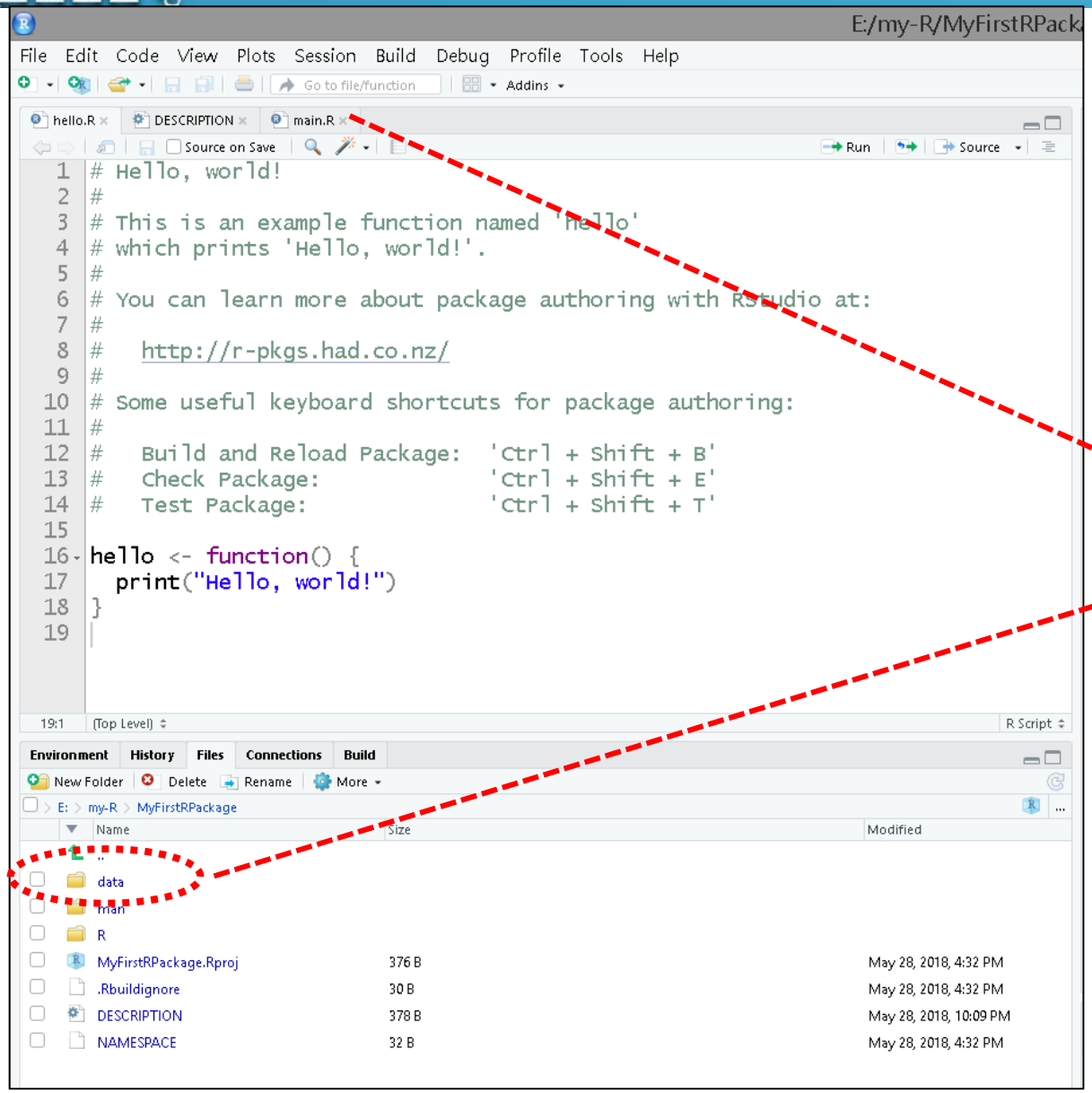


填入「套件名稱」



若已有現成R程式碼，可由此加入

產生套件樣版



待會加入R程式及資料檔

修改"DESCRIPTION"

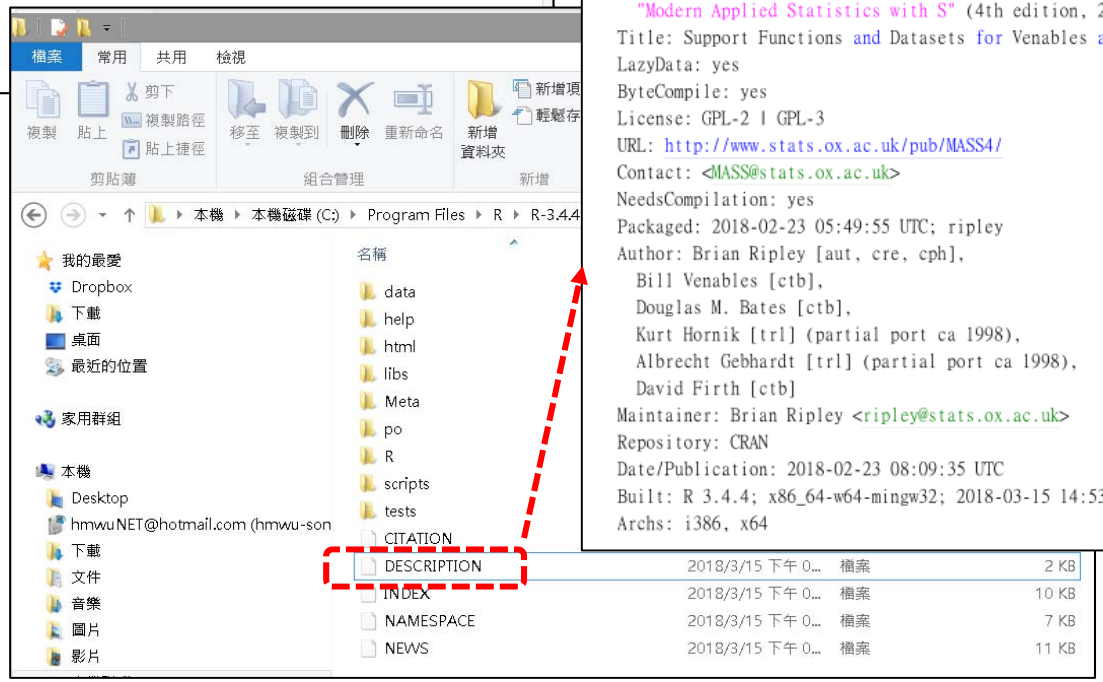
E:/my-R/MyFirstRPack

File Edit Code View Plots Session Build Debug Profile Tools Help

hello.R | DESCRIPTION | main.R

```
1  Package: MyFirstRPackage
2  Type: Package
3  Date: 2018-05-28
4  Title: An exmaple R code for building an R package
5  Version: 0.1.0
6  Author: Han-Ming Wu
7  Maintainer: Han-Ming Wu <hmwu@gm.ntpu.edu.tw>
8  Description: This is an example for how to build an R package
9  Depends: R (>= 3.3.0), MASS
10 License: GPL (>= 2)
11 URL: http://www.hmwu.idv.tw/
12 Encoding: UTF-8
13 LazyData: true
14
15
16
```

範例




```
Package: MASS
Priority: recommended
Version: 7.3-49
Date: 2018-02-23
Revision: $Rev: 3481 $
Depends: R (>= 3.1.0), grDevices, graphics, stats, utils
Imports: methods
Suggests: lattice, nlme, nnet, survival
Authors@R: c(person("Brian", "Ripley", role = c("aut", "cre", "cph"),
                    email = "ripley@stats.ox.ac.uk"),
          person("Bill", "Venables", role = "ctb"),
          person(c("Douglas", "M."), "Bates", role = "ctb"),
          person("Kurt", "Hornik", role = "trl",
                 comment = "partial port ca 1998"),
          person("Albrecht", "Gebhardt", role = "trl",
                 comment = "partial port ca 1998"),
          person("David", "Firth", role = "ctb"))
Description: Functions and datasets to support Venables and Ripley,
  "Modern Applied Statistics with S" (4th edition, 2002).
Title: Support Functions and Datasets for Venables and Ripley's MASS
LazyData: yes
ByteCompile: yes
License: GPL-2 | GPL-3
URL: http://www.stats.ox.ac.uk/pub/MASS4/
Contact: <MASS@stats.ox.ac.uk>
NeedsCompilation: yes
Packaged: 2018-02-23 05:49:55 UTC; ripley
Author: Brian Ripley [aut, cre, cph],
  Bill Venables [ctb],
  Douglas M. Bates [ctb],
  Kurt Hornik [trl] (partial port ca 1998),
  Albrecht Gebhardt [trl] (partial port ca 1998),
  David Firth [ctb]
Maintainer: Brian Ripley <ripley@stats.ox.ac.uk>
Repository: CRAN
Date/Publication: 2018-02-23 08:09:35 UTC
Built: R 3.4.4; x86_64-w64-mingw32; 2018-03-15 14:53:20 UTC; windows
Archs: i386, x64
```

撰寫R程式及說明檔

hello.R | DESCRIPTION | main.R*

Source on Save | Run | Source

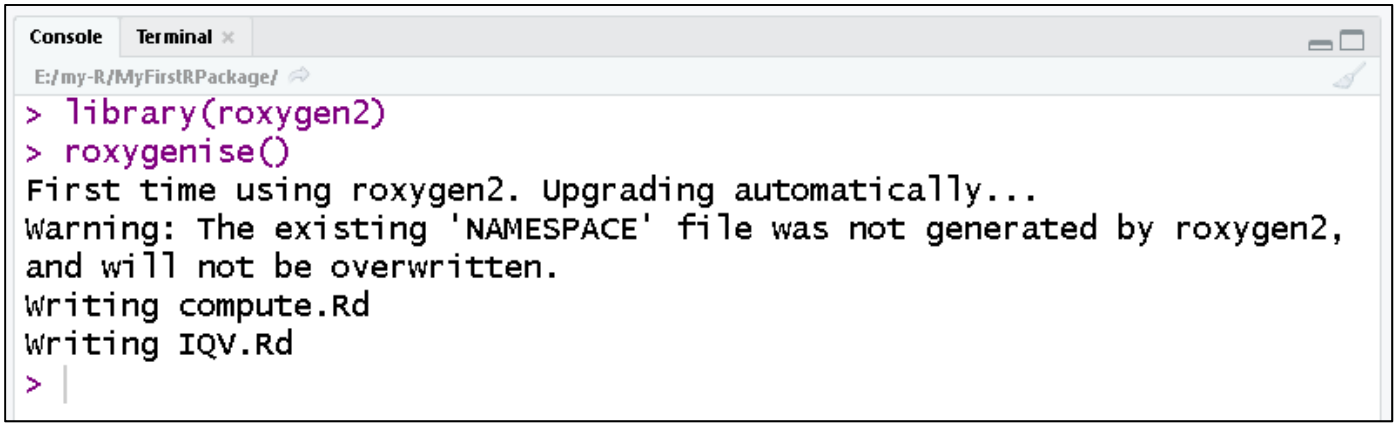
```r
#  An exmaple R code for building an R package
#  Han-Ming Wu (hmwu@gm.ntpu.edu.tw)
#  Department of Statistics, National Taipei University

#' @title Four Fundamental Operations of Arithmetic
#' @description The four basic operations of arithmetic are covered. These
#'              operations are addition, subtraction, multiplication
#'              and division.
#' @param a a number or a vetcor
#' @param b a number or a vector (default 0.5)
#' @details ...
#' @return The results of addition, subtraction, multiplication
#'              and division.
#' @author Han-Ming Wu
#' @seealso ...
#' @examples
#' compute(2, 5)
#' compute(1:4, 6)
#' compute(1:4)
compute <- function(a, b = 0.5) {
  sum <- a + b
  diff <- a - b
  prod <- a * b
  if (b != 0) {
    div <- a / b
  } else{
    div <- "divided by zero"
  }
  list(sum = sum, diff = diff, product = prod, divide = div)
}

# my two smaple t test
# two.sample.test(iris[,1], iris[,2])
two.sample.test <- function(x, y) {
  nx <- length(x)
  ny <- length(y)
  mx <- mean(x)
  my <- mean(y)
  s2x <- var(x)
  s2y <- var(y)
  s <- ((nx - 1) * s2x + (ny - 1) * s2y) / (nx + ny - 2)
  stat <- (mx - my) / sqrt(s * (1 / nx + 1 / ny))
  list(means = c(mx, my), pool.var = s, stat = stat)
}
```

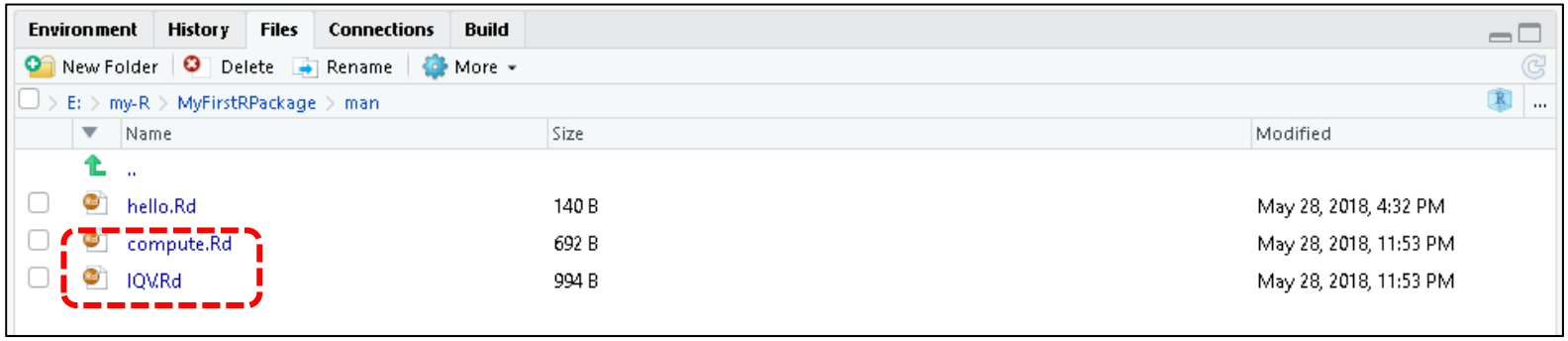
roxygen2: Generating Rd files
https://cran.r-project.org/web/packages/roxygen2/vignettes/rd.html

```r

#' @title Index of Qualitative Variation
#' @description An index of qualitative variation (IQV) is a measure of
#'              statistical dispersion in nominal distributions.
#' @param x a vetcor with nominal categories
#' @details The index of qualitative variation (IQV) is a measure of variability
#'          for nominal variables, such as race, ethnicity, or gender. The IQV
#'          is based on the ratio of the total number of differences in the
#'          distribution to the maximum number of possible differences in the
#'          same distribution.
#'          See https://en.wikipedia.org/wiki/Qualitative_variation
#' @return an index of qualitative variation
#' @author Han-Ming Wu
#' @seealso ...
#' @examples
#' set.seed(12345)
#' no <- sample(20:100, 1)
#' nv <- LETTERS[sample(1:26, 5)][sample(1:5, no, replace=T)]
#' IQV(nv)

IQV <- function(x) {
  n <- length(x)
  f <- table(x)
  k <- length(f)
  iqv <- k * (n^2 - sum(f^2)) / (n^2 - (k - 1))
  iqv
}

# build a data set
build.my.data <- function(){
  data(cats, package="MASS")
  catsSample <- cats[sample(1:nrow(cats), 50),]
  devtools::use_data(catsSample, overwrite = TRUE)
}
```

利用roxygen2，建立R說明檔(*.Rd)

```
install.packages("roxygen2")
```





Generating .Rd files:
- `roxygen2::roxygenise()`, or
- `devtools::document()`, if you're using devtools

建立套件專用資料 (*.rda)

```
73
74  # build a data set
75  build.my.data <- function(){
76    data(cats, package="MASS")
77    catsSample <- cats[sample(1:nrow(cats), 50),]
78    devtools::use_data(catsSample, overwrite = TRUE)
79  }
80
81
```

74:1 (Top Level)

Environment | History | Files | Connections | Build

New Folder | Delete | Rename | More

E: > my-R > MyFirstRPackage > data

Name	Size
catsSample.rda	521 B

Console | Terminal

E:/my-R/MyFirstRPackage/

```
> # build a data set
> build.my.data <- function(){
+   data(cats, package="MASS")
+   catsSample <- cats[sample(1:nrow(cats), 50),]
+   devtools::use_data(catsSample, overwrite = TRUE)
+ }
> build.my.data()
Saving catsSample as catsSample.rda to E:\my-R\MyFirstRPackage/dat
a
>
```

Environment | History | Files | Connections | Build

Install and Restart | Check | More

```
==> Rcmd.exe INSTA
ge

* installing to li
* installing *sour
** R
** data
*** moving dataset
** preparing packa
** help
*** installing help indices
** building package indices
** testing if installed package can be loaded
* DONE (MyFirstRPackage)
```

Load All Ctrl+Shift+L
Clean and Rebuild
Test Package Ctr
Check Package Ctrl+Shift+E
Build Source Package
Build Binary Package
Configure Build Tools...

-multiarch --with-keep.source MyFirstRPacka

execute devtools::load_all

cuments/R/win-library/3.4'

stRPackage' ...

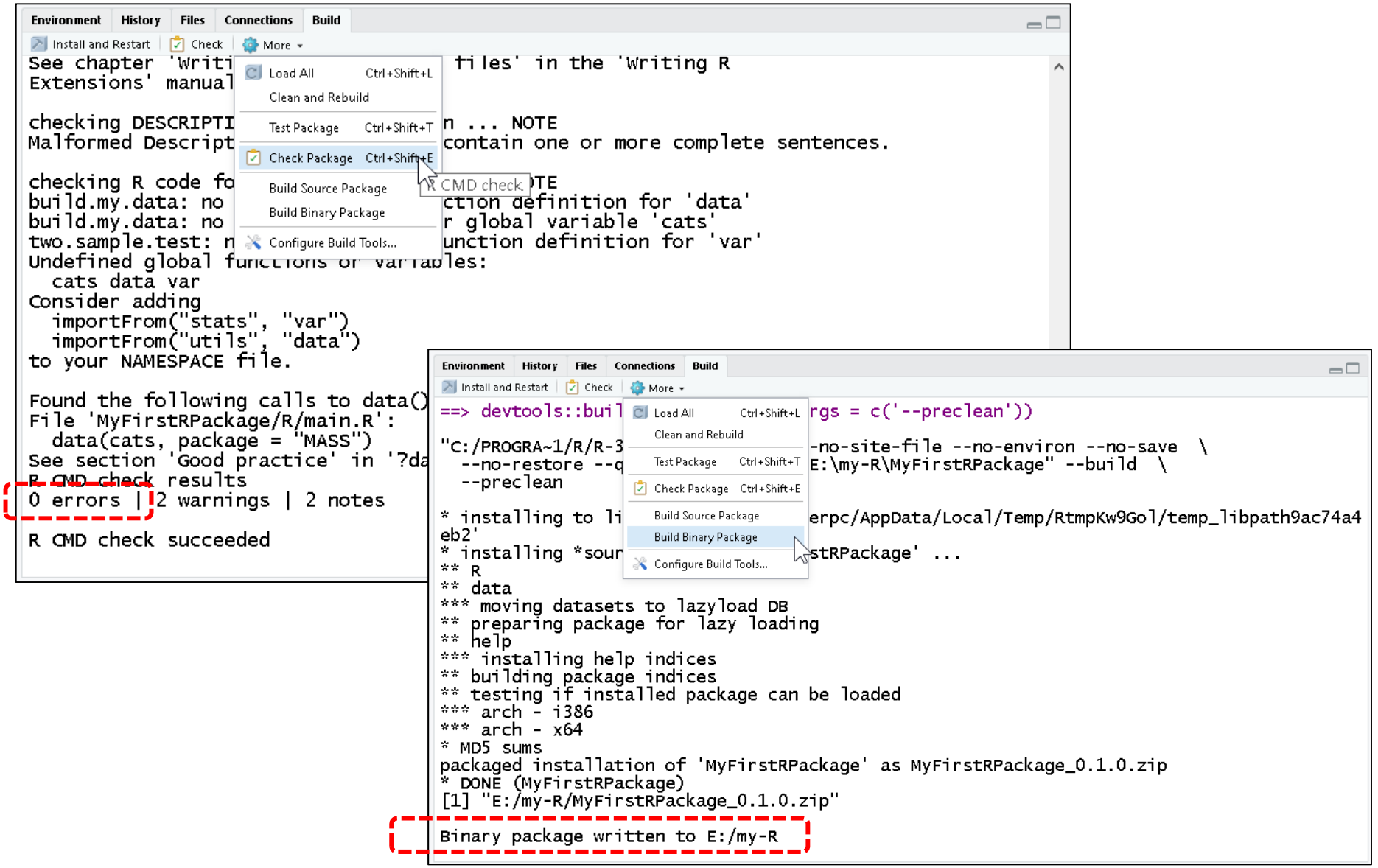
g

Console | Terminal

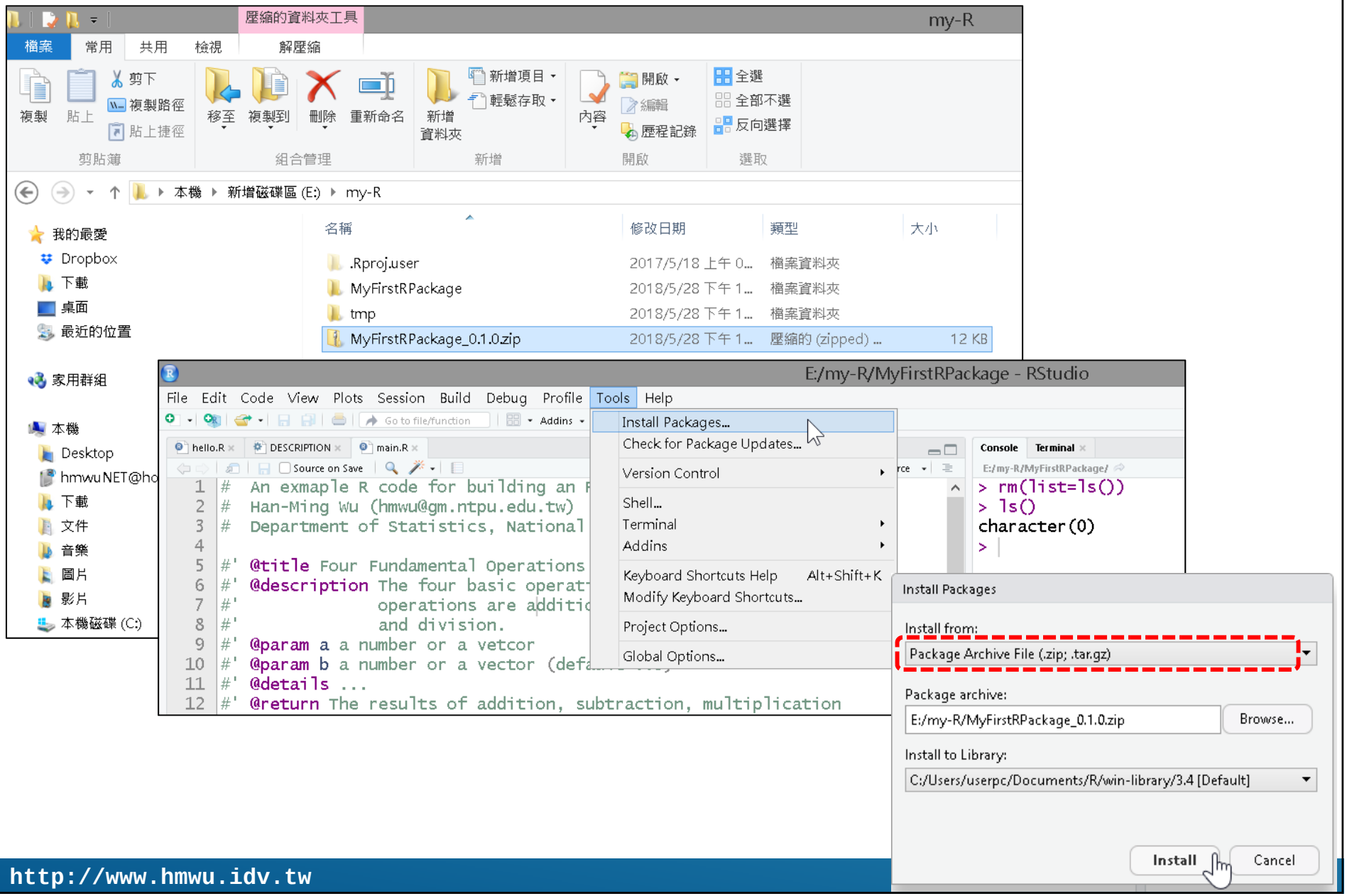
E:/my-R/MyFirstRPackage/

```
> devtools::load_all(".")
'roxygen2' >= 5.0.0 must be installed for this functionality.
Would you like to install it?

1: Yes
2: No

Selection: 1
Installing package into 'C:/Users/userpc/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
also installing the dependencies 'brew', 'desc', 'commonmark'
```

套件檢測(Check)及編譯(Build)



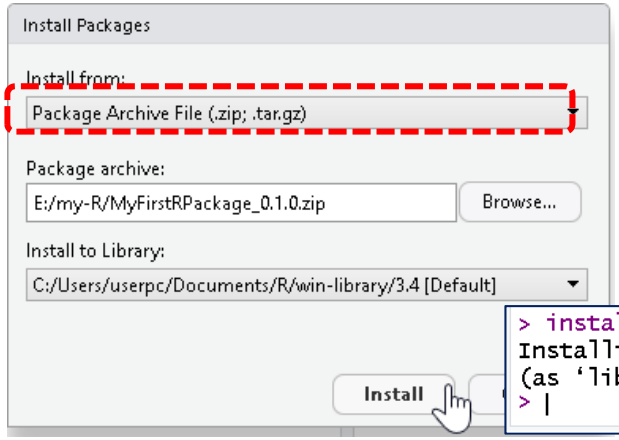
安裝新建立的套件


壓縮的資料夾工具
my-R
檔案 常用 共用 檢視 解壓縮
複製 貼上 剪下 複製路徑 貼上捷徑
移至 複製到 刪除 重新命名
新增資料夾 新增項目 輕鬆存取
內容 開啟 編輯 歷程記錄
全選 全部不選 反向選擇
剪貼簿 組合管理 新增 開啟 選取
本機 ▸ 新增磁碟區 (E:) ▸ my-R
我的最愛
Dropbox
下載
桌面
最近的位置
家用群組
本機
Desktop
下載
文件
音樂
圖片
影片
本機磁碟 (C:)
名稱 修改日期 類型 大小
.Rproj.user 2017/5/18 上午 0... 檔案資料夾
MyFirstRPackage 2018/5/28 下午 1... 檔案資料夾
tmp 2018/5/28 下午 1... 檔案資料夾
MyFirstRPackage_0.1.0.zip 2018/5/28 下午 1... 壓縮的 (zipped) ... 12 KB
E:/my-R/MyFirstRPackage - RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Install Packages...
Check for Package Updates...
Version Control
Shell...
Terminal
Addins
Keyboard Shortcuts Help Alt+Shift+K
Modify Keyboard Shortcuts...
Project Options...
Global Options...
hello.R DESCRIPTION main.R
Source on Save
1 # An exmaple R code for building an
2 # Han-Ming Wu (hmwu@gm.ntpu.edu.tw)
3 # Department of Statistics, National
4
5 #' @title Four Fundamental Operations
6 #' @description The four basic operat
7 #' operations are additio
8 #' and division.
9 #' @param a a number or a vetcor
10 #' @param b a number or a vector (defa
11 #' @details ...
12 #' @return The results of addition, subtraction, multiplication
Console Terminal
E:/my-R/MyFirstRPackage/
> rm(list=ls())
> ls()
character(0)
>
Install Packages
Install from:
Package Archive File (.zip; .tar.gz)
Package archive:
E:/my-R/MyFirstRPackage_0.1.0.zip
Browse...
Install to Library:
C:/Users/userpc/Documents/R/win-library/3.4 [Default]
Install
Cancel

若有問題，先刪除此套件

```
rm(list=ls())
detach("package:MyFirstRPackage", unload=TRUE)
remove.packages("MyFirstRPackage")
```

```
Console  Terminal
E:/my-R/MyFirstRPackage/
> install.packages("E:/my-R/MyFirstRPackage_0.1.0.zip", repos = NULL, type = "win.binary")
Installing package into 'C:/Users/userpc/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
Warning in install.packages :
  package 'MyFirstRPackage' is in use and will not be installed
>
>
> rm(list=ls())
> detach("package:MyFirstRPackage", unload=TRUE)
> remove.packages("MyFirstRPackage")
Removing package from 'C:/Users/userpc/Documents/R/win-library/3.4'
(as 'lib' is unspecified)

> |
```



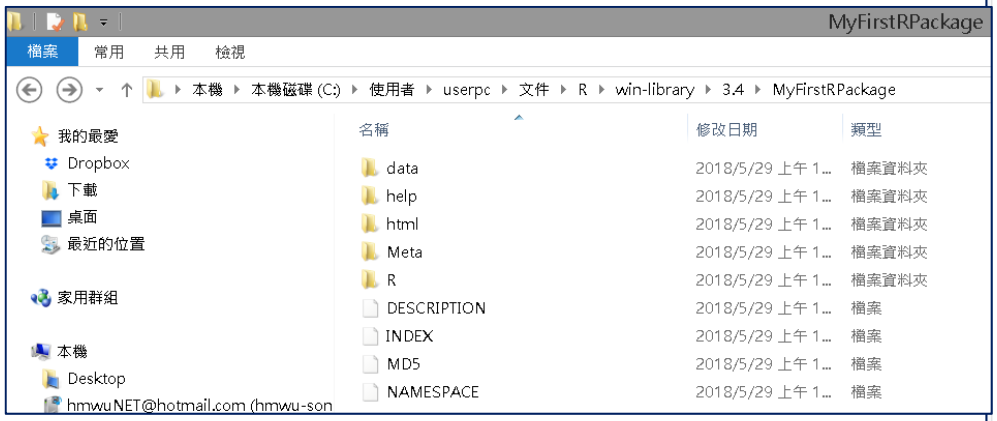
再重新安裝一次

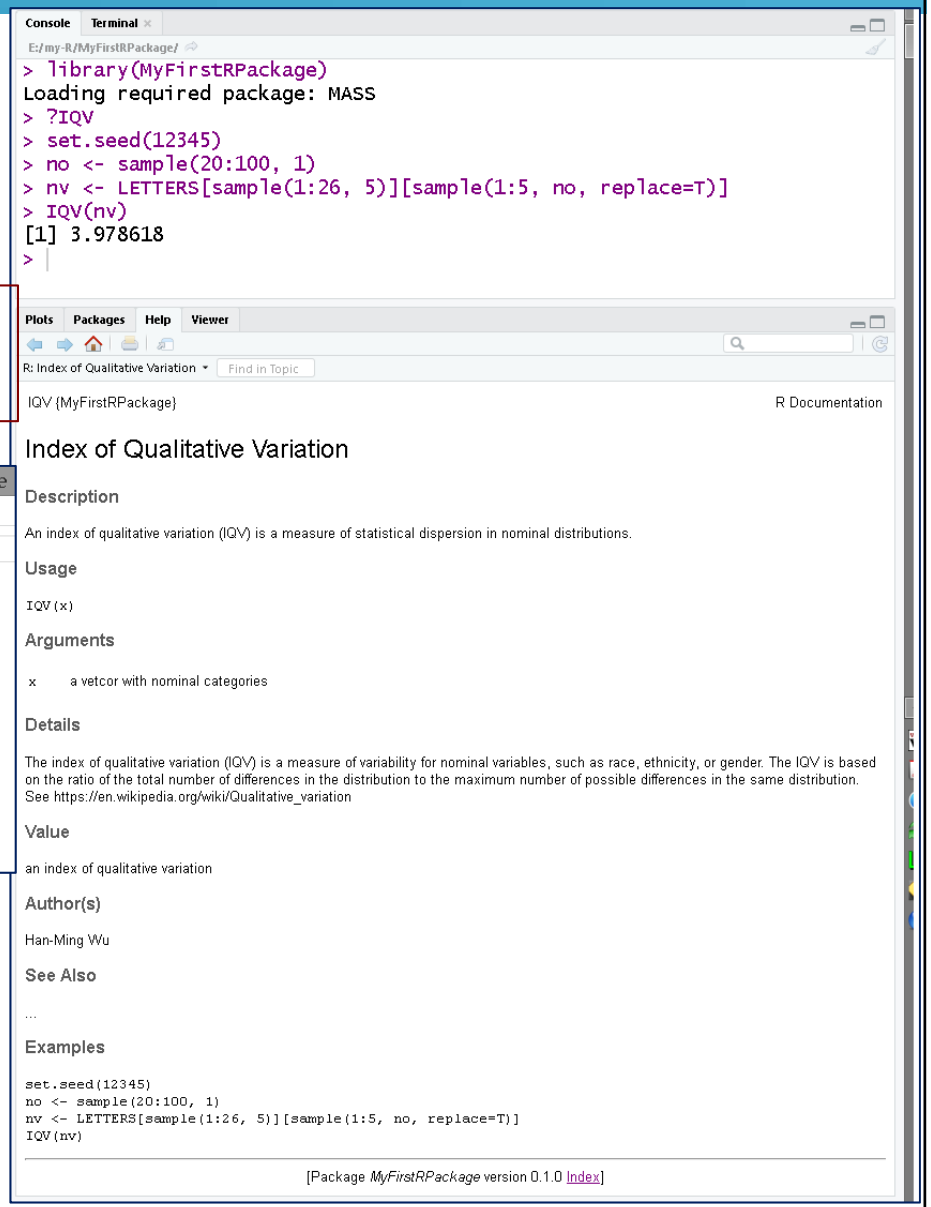
```
> install.packages("E:/my-R/MyFirstRPackage_0.1.0.zip", repos = NULL, type = "win.binary")
Installing package into 'C:/Users/userpc/Documents/R/win-library/3.4'
(as 'lib' is unspecified)
> |
```

使用套件提供之指令

安裝成功後，載入套件使用。
並查詢指令。

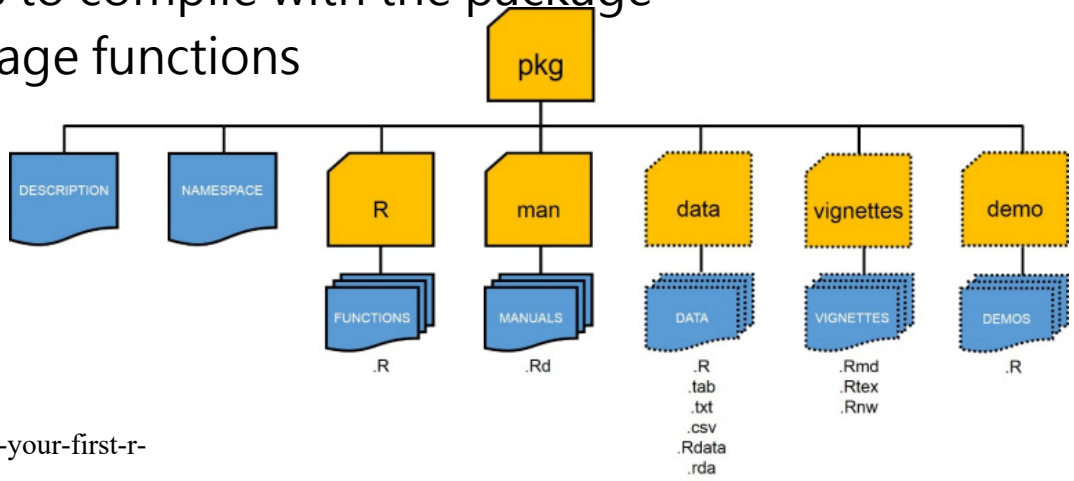
```
> .libPaths()
[1] "C:/Users/userpc/Documents/R/win-library/3.4"
[2] "C:/Program Files/R/R-3.4.0/library"
```





套件結構: 目錄

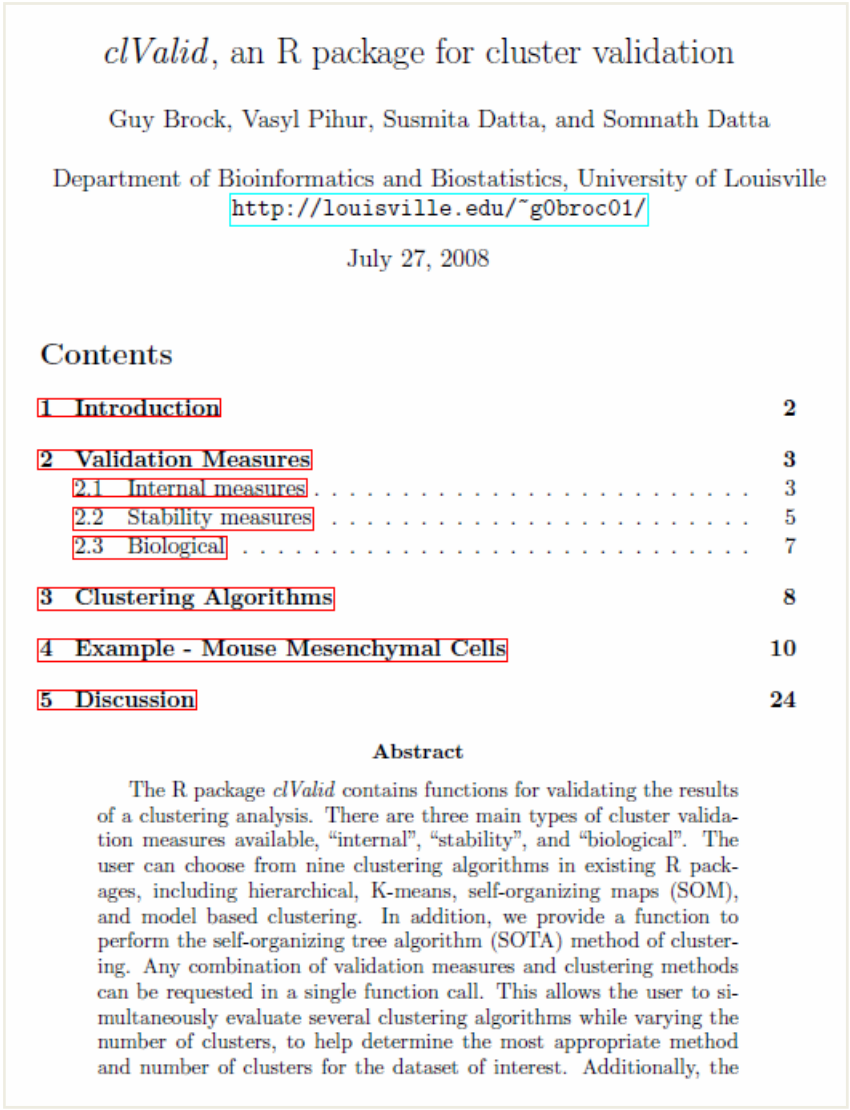
- chtml/ : windows help files
- data/ : contains files with data (txt, csv, rda)
- demo/ : demonstrate some of the functionality of the package
- exec/ : contain additional executables the package needs, typically scripts for interpreters such as the shell, Perl, or Tcl.
- html/ : help file for each function
- inst/ : contents are copied to installed package
- man/ : contain (only) documentation files for the objects in the package in R documentation (Rd) format
- R/ : R codes
- src/ : contains C, Fortran codes to compile with the package
- tests/ : R code for testing package functions
- CONTENTS
- DESCRIPTION
- INDEX
- NAMESPACE



https://methodsblog.wordpress.com/2015/11/30/building-your-first-r-package/

撰寫使用說明 (vignettes)

- R packages allow the inclusion of documents in arbitrary other formats.
- The standard location for these is subdirectory inst/doc of a source package, the contents will be copied to subdirectory doc when the package is installed.



clValid, an R package for cluster validation

Guy Brock, Vasyl Pihur, Susmita Datta, and Somnath Datta

Department of Bioinformatics and Biostatistics, University of Louisville
http://louisville.edu/~g0broc01/

July 27, 2008

Contents

Abstract

The R package *clValid* contains functions for validating the results of a clustering analysis. There are three main types of cluster validation measures available, "internal", "stability", and "biological". The user can choose from nine clustering algorithms in existing R packages, including hierarchical, K-means, self-organizing maps (SOM), and model based clustering. In addition, we provide a function to perform the self-organizing tree algorithm (SOTA) method of clustering. Any combination of validation measures and clustering methods can be requested in a single function call. This allows the user to simultaneously evaluate several clustering algorithms while varying the number of clusters, to help determine the most appropriate method and number of clusters for the dataset of interest. Additionally, the

提交套件到CRAN

- CRAN Repository Policy

https://cran.r-project.org/web/packages/policies.html

- Releasing a package

http://r-pkgs.had.co.nz/release.html

- Getting your R package on CRAN

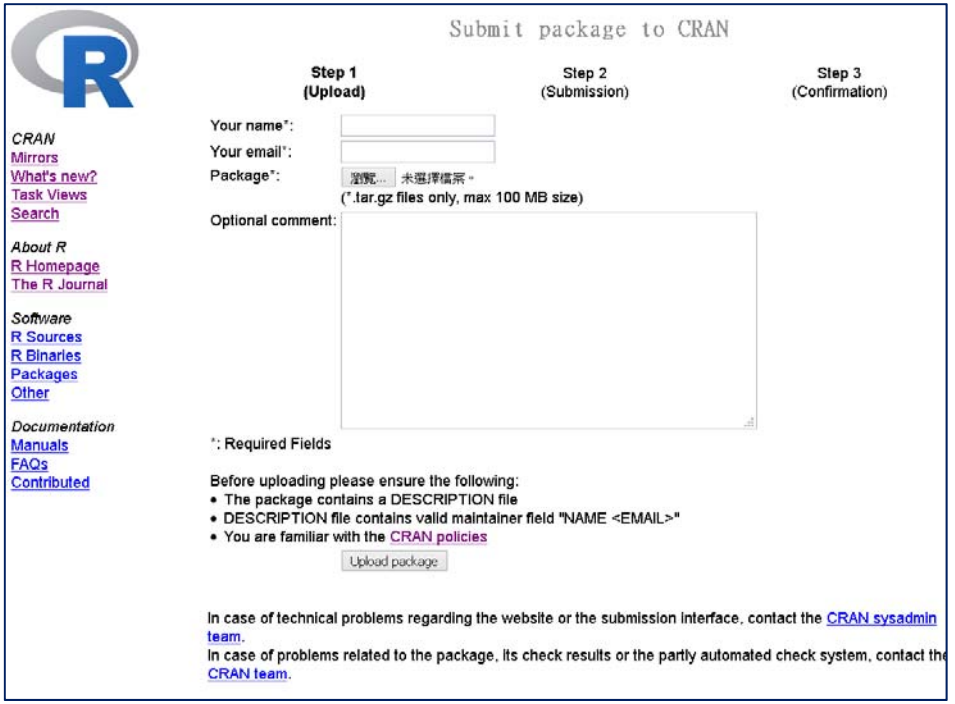
http://kbroman.org/pkg_primer/pages/cran.html

- Submitting your first package to CRAN, my experience

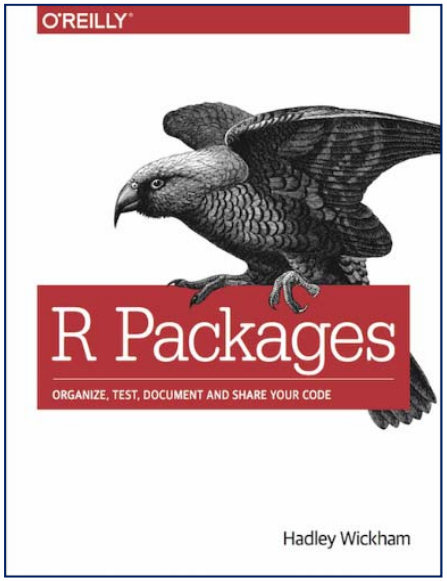
https://www.r-bloggers.com/submitting-your-first-package-to-cran-my-experience/

- Submit package to CRAN

https://cran.r-project.org/submit.html



相關參考資料



http://r-pkgs.had.co.nz/

A Quickstart Guide for Building Your First R Package
https://methodsblog.wordpress.com/2015/11/30/building-your-first-r-package/

Create an R Package in RStudio
https://www.youtube.com/watch?v=9PyQlbAEujY

除錯

update.packages(ask = FALSE)

Environment | History | Files | Connections | Build

Install and Restart | Check | More

```
* this is package 'MyFirstRPackage' version '0.1.0'
* package encoding: UTF-8
* checking package namespace information ... OK
* checking package dependencies ... OK
* checking if this is a source package ... OK
* checking if there is a namespace ... OK
* checking for executable files ... OK
* checking for hidden files and directories ... OK
* checking for portable file names ... OK
* checking whether package 'MyFirstRPackage' can be installed ... ERROR
Installation failed.
See 'E:/my-R/MyFirstRPackage.Rcheck/00install.out' for details.
* DONE
Status: 1 ERROR
Warning: ???锛?R?O '"C:/PROGRA~1/R/R-34~1.0/bin/x64/Rcmd.exe" INSTALL -l "E:/my-R/MyF
irstRPackage.Rcheck" --no-html "E:\my-R\MyFirstRPackage.Rcheck\00_pkg_src\MyFirstRPackag
e"' ?w?????A 1

See
  'E:/my-R/MyFirstRPackage.Rcheck/00check.log'
for details.

checking whether package 'MyFirstRPackage' can be installed ... ERROR
Installation failed.
See 'E:/my-R/MyFirstRPackage.Rcheck/00install.out' for details.
R CMD check results
1 error  | 0 warnings | 0 notes

R CMD check succeeded
```