Rcmdr-套件

大數據分析

- R/Python/Julia/SQL程式設計與應用 (R/Python/Julia/SQL Programming and Application)
- 資料視覺化 (Data Visualization)
- 機器學習 (Machine Learning)
- 統計品管 (Statistical Quality Control)
- 最佳化 (Optimization)

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大綱

- 1.套件簡介
- 2.套件的應用類別(CRAN Task Views)
- 3.套件的安裝與載入
- 4.內建安裝 lattice 套件簡介
- 5.自行安裝套件 chords

1.套件簡介

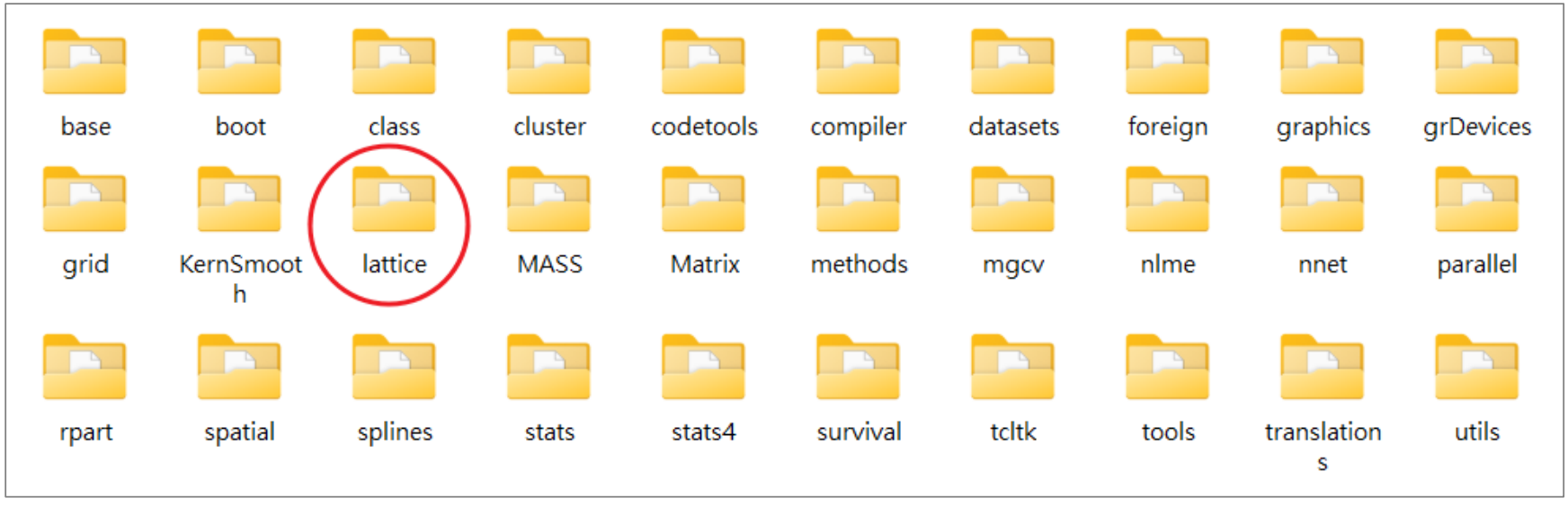
套件 (Package)

- 套件是R 程式語言的擴充功能。
- 套件可以包含R程式碼、其他語言程式碼、資料檔和說明檔案等。
- R使用者通常可以透過CRAN（Comprehensive R Archive Network，綜合R存檔網站）來安裝套件。
- R提供了大量的套件，並且易於安裝和使用，套件被認定是推動 R 語言在數據科學中廣泛採用的主要因素之一。
- R安裝完成後的套件包括二大類別：
  1. 30個基本套件
  2. 額外安裝套件

參考：https://en.wikipedia.org/wiki/R_package

30個基本套件

- R安裝完成已經內建30個基本套件
- Windows 套件安裝位置 C:\Program Files\R\R-4.4.0\library
- 30個基本套件明細
  - base
  - boot
  - class
  - cluster
  - …



Contributed Packages

- 選取 https://cloud.r-project.org/
- 按左側 [Packages] https://cloud.r-project.org/web/packages/index.html

依名稱排序套件清單

- https://cloud.r-project.org/web/packages/available_packages_by_name.html

Available CRAN Packages By Name

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A3	Accurate, Adaptable, and Accessible Error Metrics for Predictive Models
AalenJohansen	Conditional Aalen-Johansen Estimation
AATtools	Reliability and Scoring Routines for the Approach-Avoidance Task
ABACUS	Apps Based Activities for Communicating and Understanding Statistics
abasequence	Coding 'ABA' Patterns for Sequence Data
abbreviate	Readable String Abbreviation
abc	Tools for Approximate Bayesian Computation (ABC)
abc.data	Data Only: Tools for Approximate Bayesian Computation (ABC)

2.套件應用類別(CRAN Task Views)

CRAN Task Views (44類別)

- https://cloud.r-project.org/web/views/

Topics	
ActuarialScience	Actuarial Science
Agriculture	Agricultural Science
Bayesian	Bayesian Inference
CausalInference	Causal Inference
ChemPhys	Chemometrics and Computational Physics
ClinicalTrials	Clinical Trial Design, Monitoring, and Analysis
Cluster	Cluster Analysis & Finite Mixture Models
Databases	Databases with R
DifferentialEquations	Differential Equations
Distributions	Probability Distributions
Econometrics	Econometrics
Environmetrics	Analysis of Ecological and Environmental Data
Epidemiology	Epidemiology
ExperimentalDesign	Design of Experiments (DoE) & Analysis of Experimental Data

CRAN Task Views (44類別中文對照表)

- RWEPA →

- https://rwepa.blogspot.com/2013/10/packages-list-32.html

2013年10月8日 星期二

Task Views - R套件

更新日期: 2024.02.27 - 44個套件類別
CRAN Task View:
https://cran.csie.ntu.edu.tw/web/views/

CRAN (Taiwan):
https://cran.csie.ntu.edu.tw/

選取 CRAN 網站左側 [Packages] , 套件區分成以下類別, 中文說明如下:

1;ActuarialScience;Actuarial Science;精算學
2;Agriculture;Agricultural Science;農業學
3;Bayesian;Bayesian Inference;貝氏統計
4;CausalInference;Causal Inference;因果推論
5;ChemPhys;Chemometrics and Computational Physics;計量化學與計算物理
6;ClinicalTrials;Clinical Trial Design Monitoring and Analysis;臨床試驗設計、監測和分析
7;Cluster;Cluster Analysis & Finite Mixture Models;群集分析與有限混合模型

CRAN Task View: Machine Learning & Statistical Learning

機器學習 & 統計學習

CRAN Task View: Machine Learning & Statistical Learning

Maintainer:	Torsten Hothorn
Contact:	Torsten.Hothorn at R-project.org
Version:	2023-07-20
URL:	https://CRAN.R-project.org/view=MachineLearning
Source:	https://github.com/cran-task-views/MachineLearning/
Contributions:	Suggestions and improvements for this task view are very welcome and can be made through issues or pull requests on GitHub or via e-mail to the maintainer address. For further details see the Contributing guide.
Citation:	Torsten Hothorn (2023). CRAN Task View: Machine Learning & Statistical Learning. Version 2023-07-20. URL https://CRAN.R-project.org/view=MachineLearning.
Installation:	The packages from this task view can be installed automatically using the ctv package. For example, `ctv::install.views("MachineLearning", coreOnly = TRUE)` installs all the core packages or `ctv::update.views("MachineLearning")` installs all packages that are not yet installed and up-to-date. See the CRAN Task View Initiative for more details.

Several add-on packages implement ideas and methods developed at the borderline between computer science and statistics - this field of research is usually referred to as machine learning. The packages can be roughly structured into the following topics:

- *Neural Networks and Deep Learning*: Single-hidden-layer neural network are implemented in package nnet (shipped with base R). Package RSNNS offers an interface to the Stuttgart Neural Network Simulator (SNNS). Packages implementing deep learning flavours of neural networks include deepnet (feed-forward neural network, restricted Boltzmann machine, deep belief network, stacked autoencoders), RcppDL *(archived)* (denoising autoencoder, stacked denoising autoencoder, restricted Boltzmann machine, deep belief network) and h2o (feed-forward neural network, deep autoencoders). An interface to tensorflow is available in tensorflow. The torch package implements interface to the libtorch library. Prediction uncertainty can be quantified by the ENNreg evidential regression neural network model implemented in evreg.
- *Recursive Partitioning*: Tree-structured models for regression, classi… and survival analysis, following the ideas in the CART book, are implemented in rpart (shipped with base R) and tree. Package rpart is recommended for computing CART-like trees. A rich toolbox of partitioning algorithms is available in Weka, package RWeka provides an interface to this implementation, including the J4.8-variant of C4.5 and M5. The Cubist package fits rule-based models (similar to trees) with linear regression models in the terminal leaves, instance-based

- 類神經網路 & 深度學習
- 遞迴分割(決策樹)

torch

rpart (內建)

Machine Learning & Statistical Learning

- Neural Networks and Deep Learning 類神經網路與深度學習
- Recursive Partitioning 遞迴分割(決策樹)
- Random Forests 隨機森林法
- Regularized and Shrinkage Methods 正規化與收縮法
- Boosting and Gradient Descent 提升法與梯度遞減法
- Support Vector Machines and Kernel Methods 支持向量機與核方法
- Bayesian Methods 貝氏法
- Optimization using Genetic Algorithms 基因演算法最佳化
- Association Rules 關聯規則
- Fuzzy Rule-based Systems 模糊規則系統
- Model selection and validation 模型選擇與驗證
- Causal Machine Learning 因果機器學習
- Meta packages 元套件
- Visualisation 視覺化
- explainable artificial intelligence (XAI) 可解釋人工智慧

3.套件的安裝與載入

套件

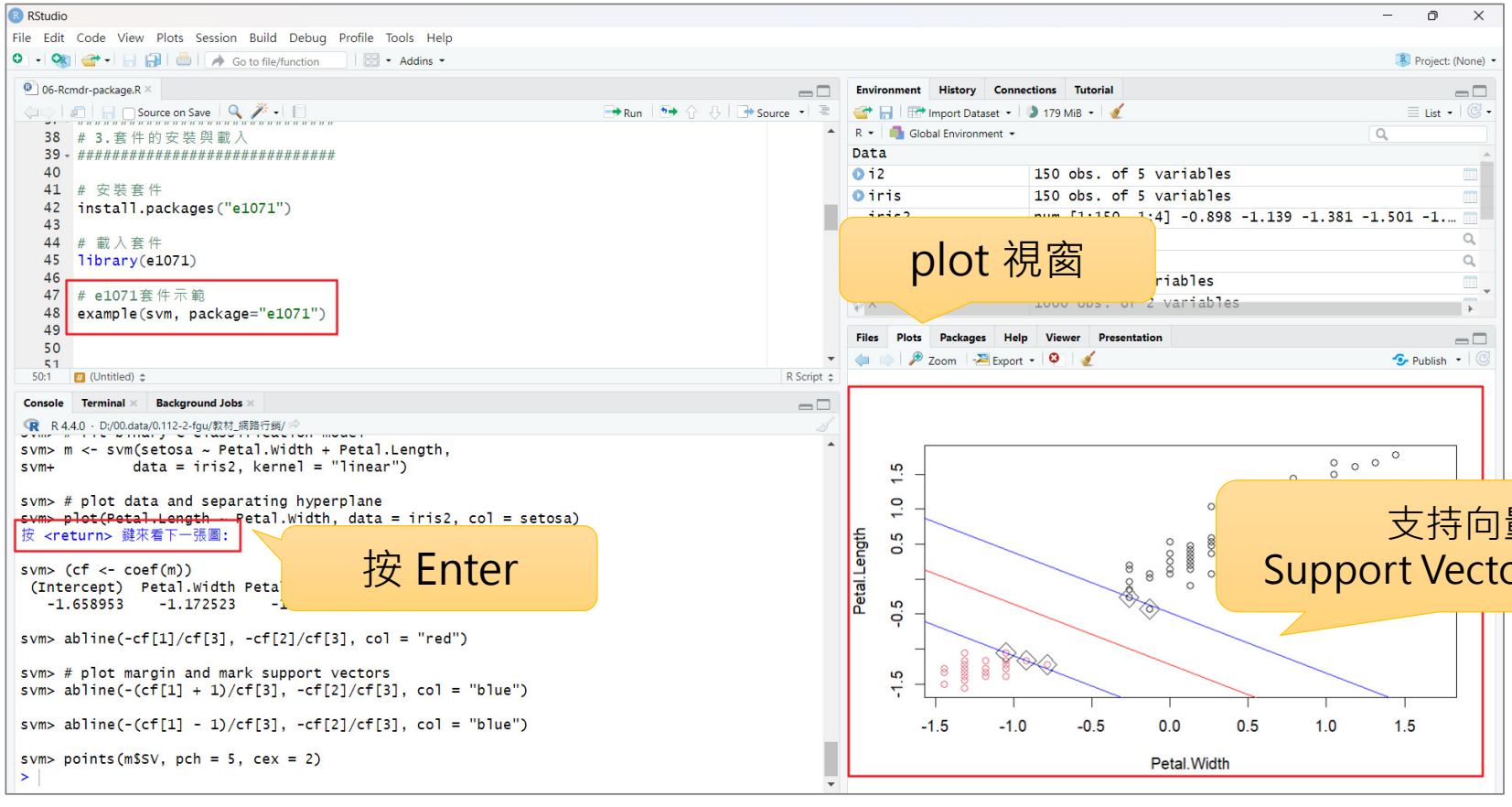
- 使用套件兩部曲 - 先安裝, 再載入套件
  - install.packages("套件名稱")　　# 安裝套件(一生一次)
  - library(套件名稱)　　# 載入套件(每次使用)
- 範例: 新增與載入 e1071套件(machine learning)

```
> install.packages("e1071")
WARNING: Rtools is required to build R packages but is not currently installed.
Please download and install the appropriate version of Rtools before proceeding:

https://cran.rstudio.com/bin/w
將程式套件安載入 'C:/Users/asus/
(因為 'lib' 沒有被指定)
嘗試 URL 'https://cran.rstudio                                    71_1.7-14.zip'
Content type 'application/zip' length 671361 bytes (655 KB)
downloaded 655 KB

程式套件 'e1071' 開啟成功，MD5 和檢查也透過

下載的二進位程式套件在
        C:\Users\asus\AppData\Local\Temp\RtmpOisEoA\downloaded_packages 裡
> # 載入套件
> library(e1071)
>
```

記得安裝 Rtools

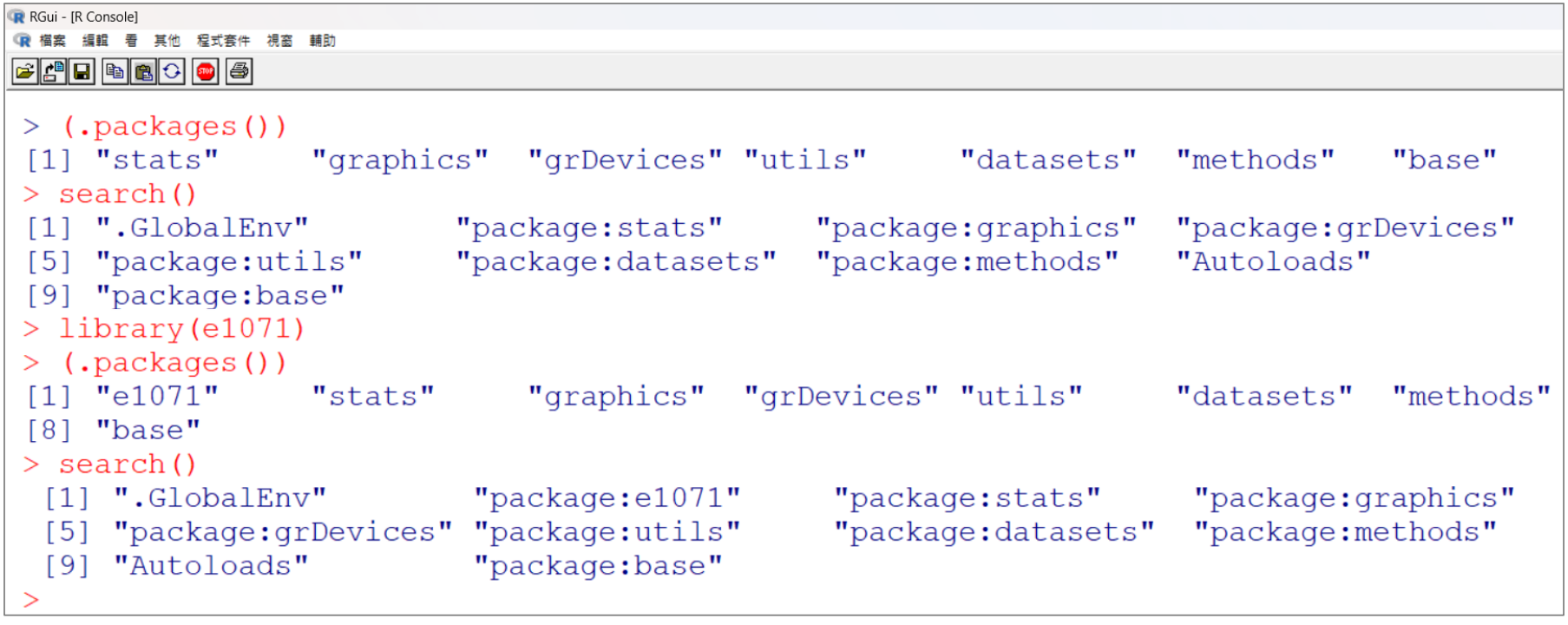
e1071套件示範

- example(svm, package="e1071")



R顯示已經載入之套件,預設載入7個套件

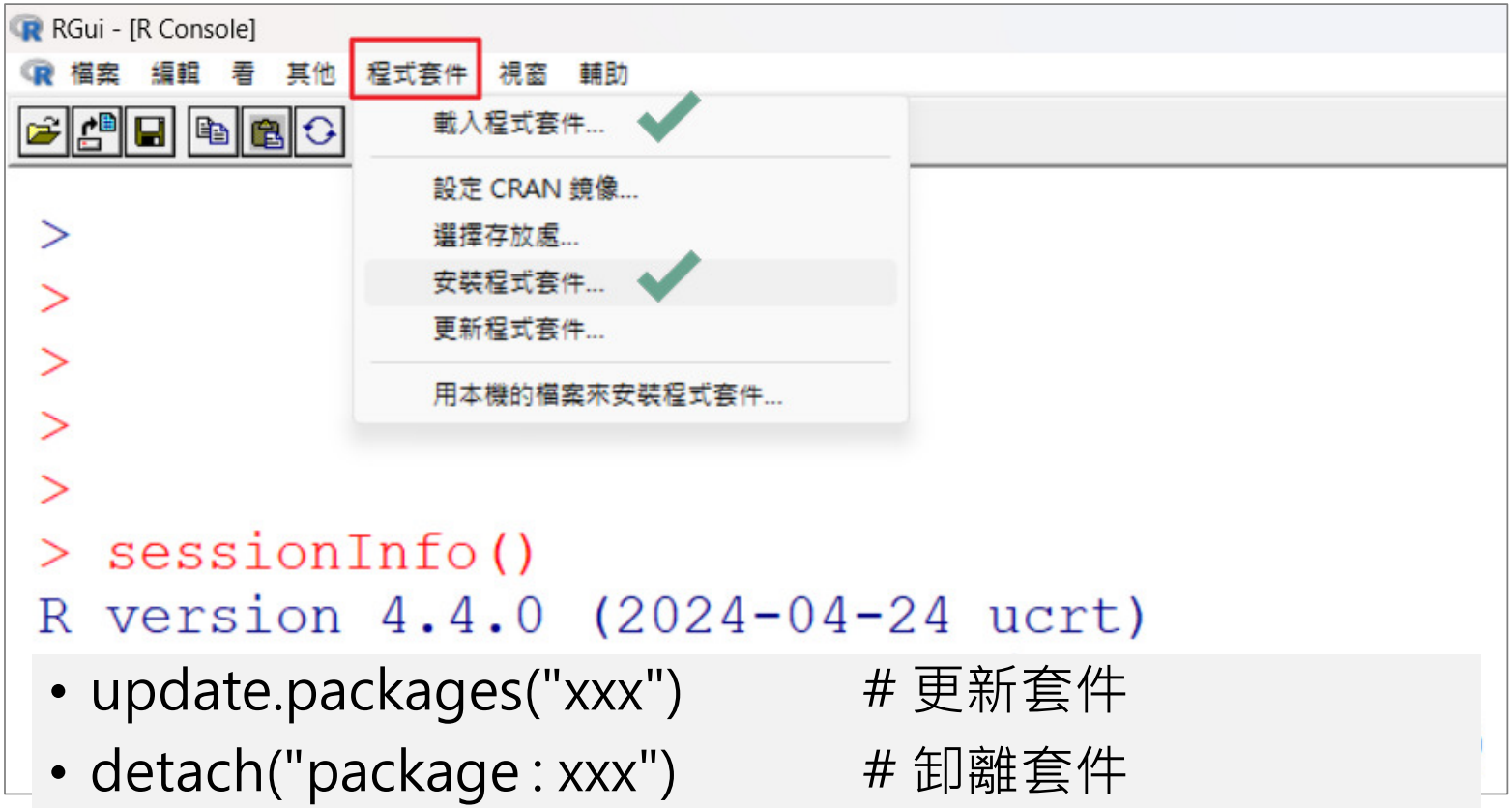
- (.packages())
- search()



RStudio 顯示已經載入之套件

```
> # 顯示已經載入之套件,預設載入7個套件
> # "stats" "graphics" "grDevices" "utils" "datasets" "methods" "base"
> (.packages())
[1] "stats"     "graphics"  "grDevices" "utils"     "datasets"  "methods"   "base"
> # 顯示已經載入之套件,功能與 (.packages()) 類似, RStudio會新增額外套件.
> search()
 [1] ".GlobalEnv"        "tools:rstudio"     "package:stats"     "package:graphics"
 [5] "package:grDevices" "package:utils"     "package:datasets"  "package:methods"
 [9] "Autoloads"         "package:base"
> # 載入 e1071 套件
> library(e1071)
>
> (.packages())
[1] "e1071"     "stats"     "graphics"  "grDevices" "utils"     "datasets"  "methods"
[8] "base"
> search()
 [1] ".GlobalEnv"        "package:e1071"     "tools:rstudio"     "package:stats"
 [5] "package:graphics"  "package:grDevices" "package:utils"     "package:datasets"
 [9] "package:methods"   "Autoloads"         "package:base"
>
```

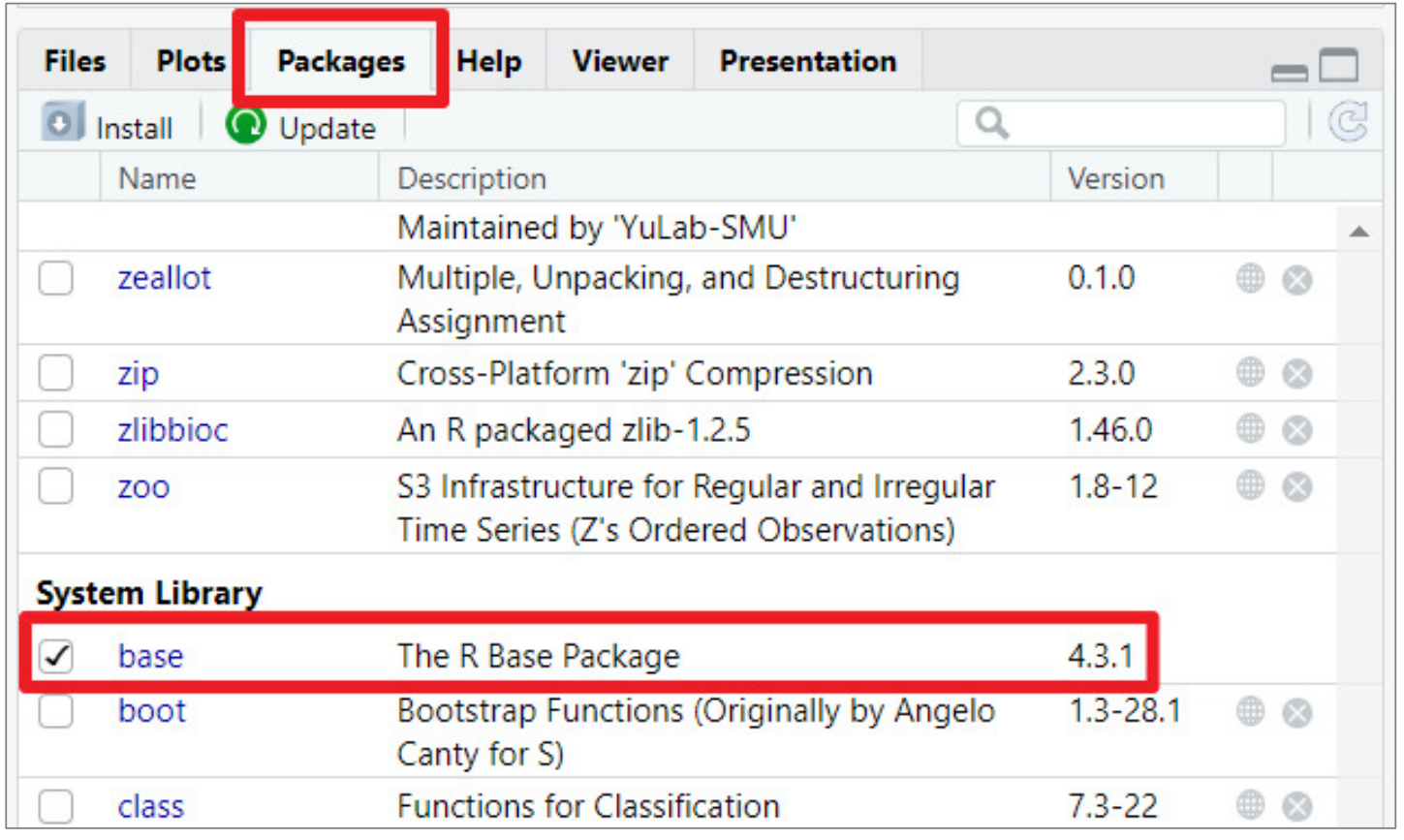
R 套件選單



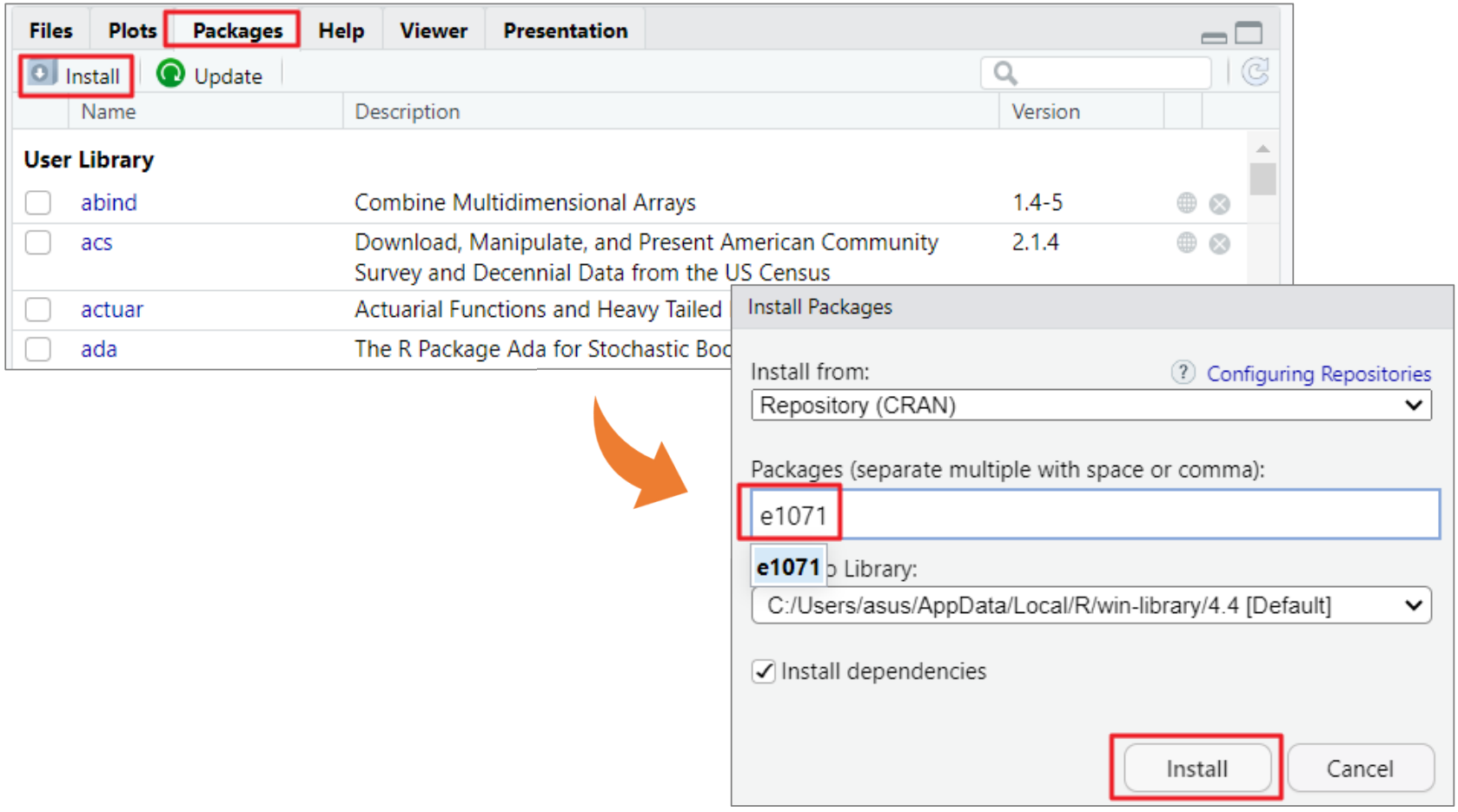
- update.packages("xxx") # 更新套件
- detach("package : xxx") # 卸離套件
- remove.packages("xxx") # 移除已安裝套件
- 上述指令大部份可在 R / RStudio 執行

RStudio 套件管理

打勾表示已經
載入套件



RStudio 套件安裝



R對話資訊

- sessionInfo() →理解R安裝訊息: R版本, 作業系統, 載入套件

```
> sessionInfo()
R version 4.3.1 (2023-06-16 ucrt)
Platform: x86_64-w64-mingw32/x64 (64-bit)
Running under: Windows 11 x64 (build 22621)

Matrix products: default


locale:
[1] LC_COLLATE=Chinese (Traditional)_Taiwan.utf8  LC_CTYPE=Chinese (Traditional)_Taiwan.utf8
[3] LC_MONETARY=Chinese (Traditional)_Taiwan.utf8 LC_NUMERIC=C
[5] LC_TIME=Chinese (Traditional)_Taiwan.utf8

time zone: Asia/Taipei
tzcode source: internal

attached base packages:
[1] stats     graphics  grDevices utils     datasets  methods   base

loaded via a namespace (and not attached):
[1] compiler_4.3.1    cli_3.6.1         rsconnect_1.0.2   tools_4.3.1       rstudioapi_0.15.0
[6] lifecycle_1.0.3   rlang_1.1.1
>
```

套件安裝目錄

- .Library

```
> # 預設套件安裝目錄
> .Library
[1] "C:/PROGRA~1/R/R-43~1.1/library"
```

- .libPaths()

- 可能全部安裝在 R \ library

```
> # 套件安裝目錄
> .libPaths()
[1] "C:/Users/asus/AppData/Local/R/win-library/4.3"
[2] "C:/Program Files/R/R-4.3.1/library"
```

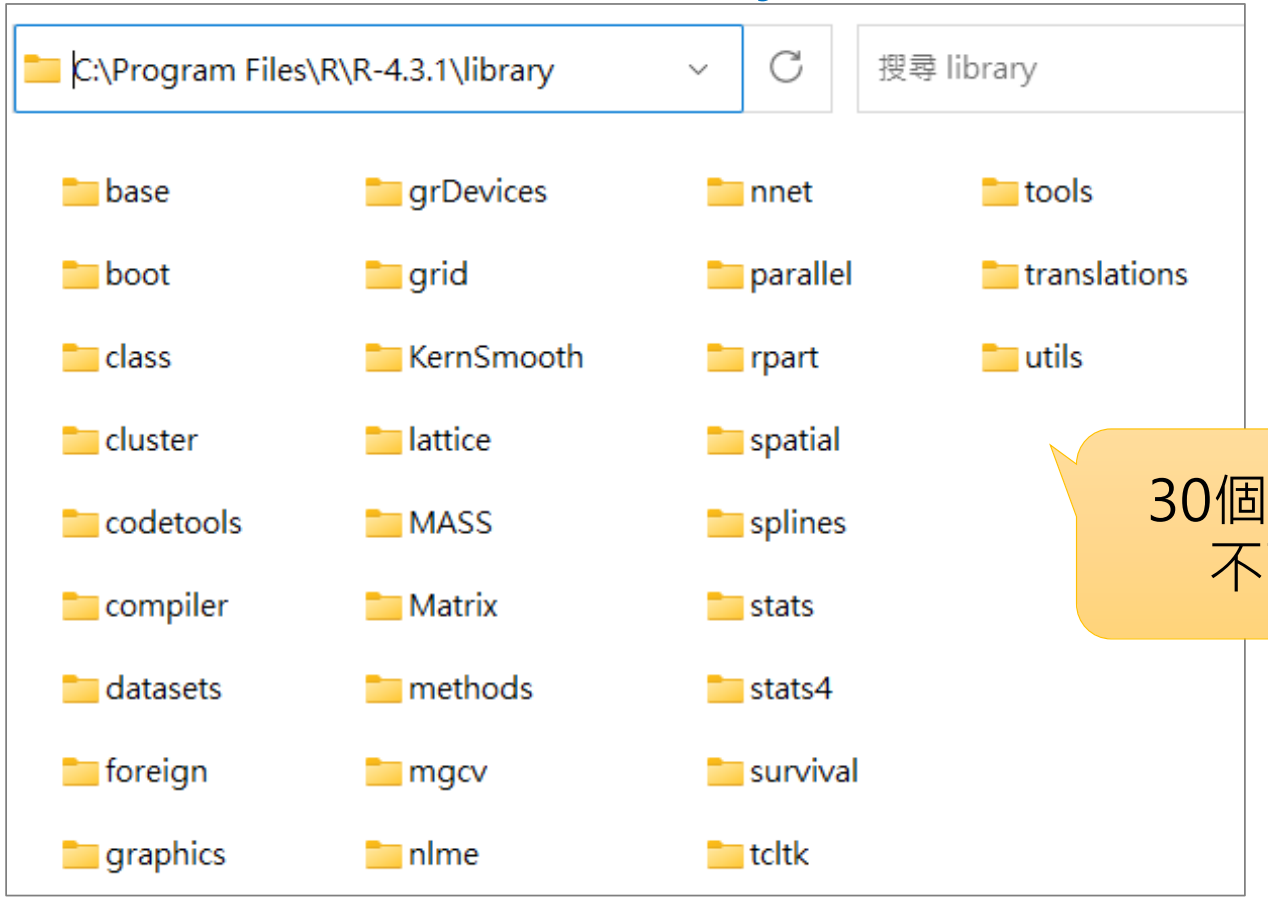
已安裝套件

```
> # 已安裝套件
> myinstalled <- installed.packages()
> class(myinstalled)  # "matrix" "array"
[1] "matrix" "array"
> dim(myinstalled)    # 626*16
[1] 719  16
> mypackage <- myinstalled[, 1] # matrix[列, 行]
> mypackage[1:10]
          abind      addinslist            ade4             AER            affy
        "abind"    "addinslist"          "ade4"           "AER"          "affy"
      affydata           affyio       agricolae           airGR   airGRteaching
    "affydata"         "affyio"     "agricolae"         "airGR" "airGRteaching"
```

```
library() # same as installed.packages()
```

套件安裝目錄1

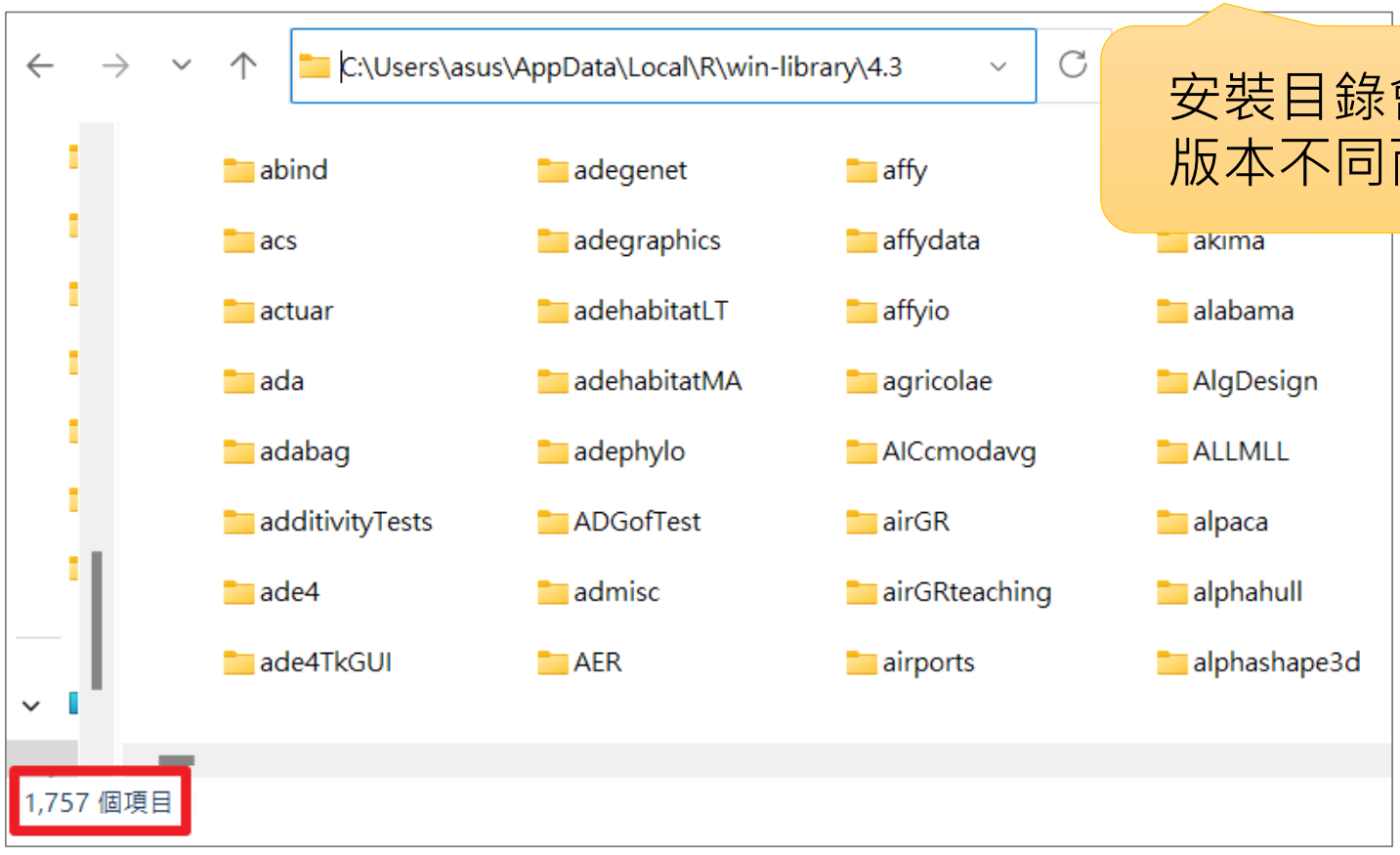
- C:/Program Files/R/R-4.3.1/library



30個基礎套件,
不可刪除.

套件安裝目錄2

- C:/Users/asus/AppData/Local/R/win-library/4.3



安裝目錄會隨著
版本不同而改變

4.內建安裝 lattice 套件簡介

- 找出 CRAN lattice 網頁
- 學習 lattice 應用

lattice 套件範例

- 套件名稱為 lattice, Google 輸入 r cran lattice
- https://cran.r-project.org/web/packages/lattice/index.html
- CRAN lattice 包括以下五大元素：
  1. lattice: Trellis Graphics for R — lattice套件簡單說明
  2. Documentation: — 參考文件
  3. Downloads: —下載
  4. Reverse dependencies: —反向相依套件【有哪些套件引用此套件】
  5. Linking: —連結

1.lattice: Trellis Graphics for R

lattice: Trellis Graphics for R

A powerful and elegant high-level data visualization system inspired by Trellis graphics, with an emphasis on multivariate data. Lattice is sufficient for typical graphics needs, and is also flexible enough to handle most nonstandard requirements. See ?Lattice for an introduction.

Version:	0.22-6
Priority:	recommended
Depends:	R (≥ 4.0.0)
Imports:	grid, grDevices, graphics, stats, utils
Suggests:	KernSmooth, MASS, latticeExtra, colorspace
Enhances:	chron, zoo
Published:	2024-03-20
Author:	Deepayan Sarkar [aut, cre], Felix Andrews [ctb], Kevin Wright [ctb] (documentation), Neil Klepeis [ctb], Johan Larsson [ctb] (miscellaneous improvements), Zhijian (Jason) Wen [cph] (filled contour code), Paul Murrell [ctb], Stefan Eng [ctb] (violin plot improvements), Achim Zeileis [ctb] (modern colors), Alexandre Courtiol [ctb] (generics for larrows, lpolygon, lrect and lsegments)
Maintainer:	Deepayan Sarkar <deepayan.sarkar at r-project.org>
BugReports:	https://github.com/deepayan/lattice/issues
License:	GPL-2 | GPL-3 [expanded from: GPL (≥ 2)]
URL:	https://lattice.r-forge.r-project.org/
NeedsCompilation:	yes
Citation:	lattice citation info
Materials:	README NEWS ChangeLog
CRAN checks:	lattice results

URL：學習套件

2. Documentation

3. Downloads

Downloads:

Package source:	lattice_0.22-6.tar.gz
Windows binaries:	r-devel: lattice_0.22-6.zip, r-release: lattice_0.22-6.zip, r-oldrel: lattice_0.22-6.zip
macOS binaries:	r-release (arm64): lattice_0.22-6.tgz, r-oldrel (arm64): lattice_0.22-6.tgz, r-release (x86_64): lattice_0.22-6.tgz, r-oldrel (x86_64): lattice_0.22-6.tgz
Old sources:	lattice archive

4. Reverse dependencies

Reverse dependencies:

Reverse depends: abd, addScales, ALDEx2, ASMap, assist, backtest, barcode, BayesGPfit, BayesianMediationA, bc3net, bgmm, biclust, BigVAR, Blendstat, BoutrosLab.plotting.general, BRAIN, BSDA, cardidates, caret, cem, clippda, clusterCons, ClusterJudge, coalescentMCMC, ConvergenceConcepts, Cubist, cvTools, DCL, designmatch, Devore7, DoseFinding, EBarrays, eHOF, ELT, EngrExpt, equivalence, erboost, EstCRM, evidence, FAwR, flare, flexclust, flexmix, flowViz, gammSlice, geneplotter, generalCorr, geoelectrics, growthrates, gsbDesign, hett, HH, HilbertVis, hotspots, hyperSpec, ICEinfer, iClick, iGasso, ILS, InvasionCorrection, kergp, kzs, latticeExtra, lfstat, loa, maCorrPlot, Maeswrap, MALDIrppa, mapStats, MCPMod, memisc, mirt, mixexp, mixOmics, mixture, MPV, mritc, msme, msqc1, nFactors, NU.Learning, PairedData, PASWR, PASWR2, pems.utils, pencopulaCond, pendensity, phenmod, plink, portfolio, ProTrackR, qra, randomLCA, rasterVis, RcmdrPlugin.temis, REPPlab, Rmisc, robfilter, robustsae, RSA, SALTSampler, SEL, simFrame, simPop, solaR, spectral, spuRs, statnetWeb, stripless, survSNP, SwathXtend, tactile, TDboost, tdr, TestingSimilarity, vegan, waterfall, wskm, xpose4

Reverse imports: adaptTest, ade4TkGUI, adegraphics, adespatial, affycoretools, agriTutorial, AICcmodavg, albatross, aLFQ, AllelicImbalance, ALTopt, ammiBayes, analogue, animalcules, annmap, apc, ape, AppliedPredictiveModeling, aqp, arrayQualityMetrics, asbio, atime, automap, BAMBI, BayesianNetwork, bbmle, BCDAG, bdvis, bestglm, BiBitR, biometryassist, blackbox, brainGraph,

Reverse suggests: acss, actuaRE, ade4, admix, AER, afex, agridat, agriutilities, animint2, asremlPlus, aum, baseline, bayesImageS, BClustLonG, beanplot, betareg, binom, bio3d, BioCro, BiodiversityR, BioQC,

5. Linking

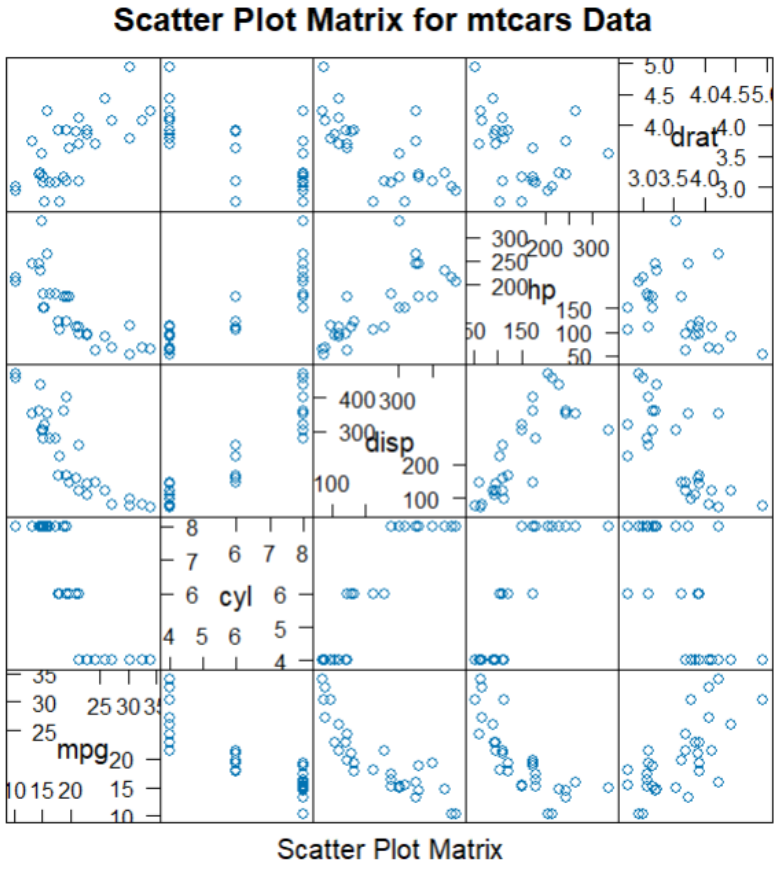
Linking:

Please use the canonical form https://CRAN.R-project.org/package=lattice to link to this page.

lattice 繪圖函數

R指令	功能	中文說明
xyplot()	Scatter plot	散佈圖
splom()	Scatter plot matrix	散佈圖矩陣
cloud()	3D scatter plot	3D散佈圖
stripplot()	strip plots (1-D scatter plots)	條狀圖
bwplot()	Box plot	盒鬚圖
dotplot()	Dot plot	點圖
barchart()	bar chart	長條圖
histogram()	Histogram	直方圖
densityplot()	Kernel density plot	核密度圖
qqmath()	Theoretical quantile plot	QQ圖(百分位數圖)
qq()	Two-sample quantile plot	二樣本QQ圖
contourplot()	3D contour plot of surfaces	3D等高線圖
levelplot()	False color level plot of surfaces	水平圖
parallel()	Parallel coordinates plot	平行座標圖

scatter plot matrix 散佈圖矩陣

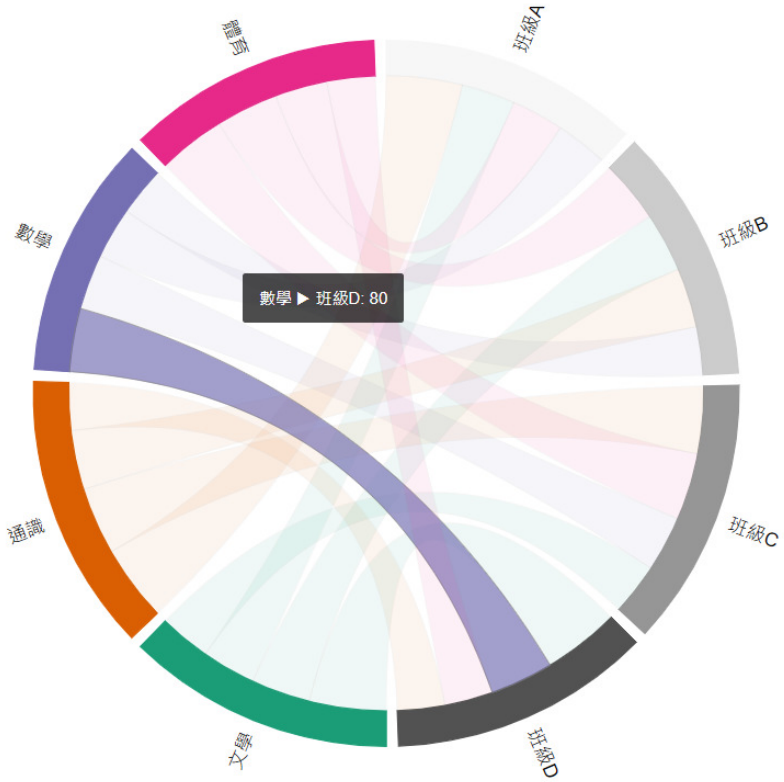


R demo

5.自行安裝套件 chords

資料視覺化於相關性分析-弦圖 (Chord Diagram)

- https://rwepa.blogspot.com/2019/10/chord-diagram.html



R demo

謝謝您的聆聽

Q & A

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https://rwepa.blogspot.tw/