介紹R與R基本操作

2017/9/21

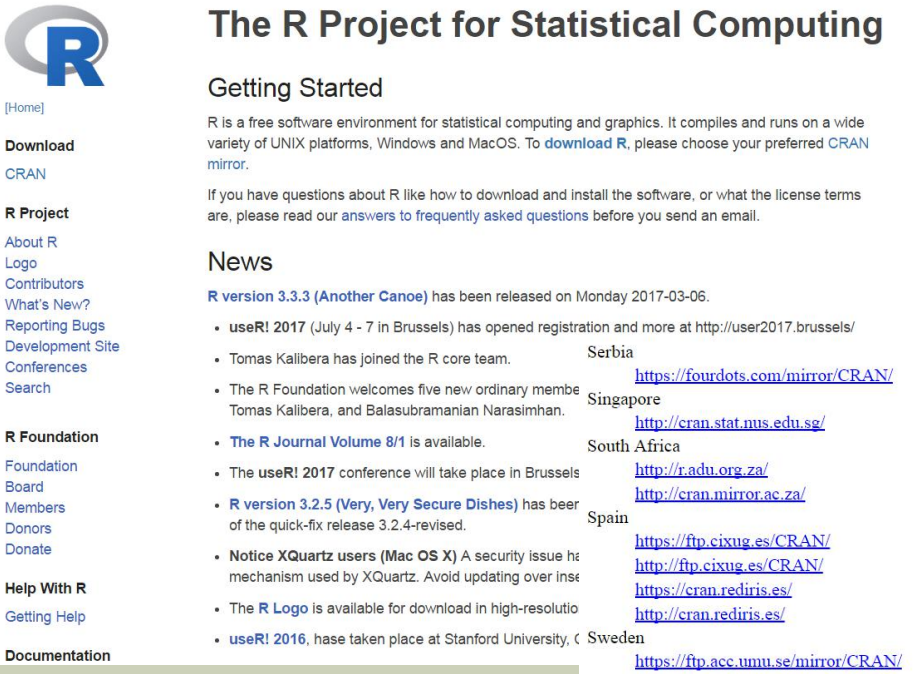
為什麼要用R

- 免費、開源
- 專門為統計和資料分析開發的語言，各種功能和函數琳琅滿目
- 安裝程式只有50Mb左右，因為體積輕便，運行起來系統負擔也小
- 各種OS的相容性好
- 因為用的人越來越多，又是開源，有很多“套件程式”為其錦上添花
- 有R GUI和RStudio兩種風格選擇
- 漂亮又靈活的圖

想挖出 BIG DATA 的秘密，這 10 個程式語言你不能不懂

- 若要列出所有程式語言，你能忘記其他的沒關係，但最不能忘的就是 R。從 1997 年悄悄地出現，最大的優勢就是它免費，為昂貴的統計軟體像是 Matlab 或 SAS 的另一種選擇。
- 但是在過去幾年來，它的身價大翻轉，變成了資料科學界眼中的寶。不只是木訥的統計學家熟知它，包括 Wall Street 交易員、生物學家，以及矽谷開發者，他們都相當熟悉 R。多元化的公司像是 Google、Facebook、美國銀行以及 New York Times 通通都使用 R，它的商業效用持續提高。
- R 的好處在於它簡單易上手，透過 R，你可以從複雜的資料集中篩選你要的資料，從複雜的模型函數中操作資料，建立井然有序的圖表來呈現數字，這些都只需要幾行程式碼就可以了，打個比方，它就像是好動版本的 Excel。
- R 最棒的資產就是活躍的動態系統，R 社群持續地增加新的軟件包，還有以內建豐富的功能集為特點 。目前估計已有超過 200 萬人使用 R，最近的調查顯示，R 在資料科學界裡，到目前為止最受歡迎的語言，佔了回覆者的 61%（緊追在後的是 39% 的 Python）。
- 它也吸引了 Wall Street 的注目。傳統而言，證券分析師在 Excel 檔從白天看到晚上，但現在 R 在財務建模的使用率逐漸增加，特別是視覺化工具，美國銀行的副總裁 Niall O'Conno 說，「R 讓我們俗氣的表格變得突出」。

安装R



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The R Project for Statistical Computing

Getting Started

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To **download R**, please choose your preferred CRAN mirror.

If you have questions about R like how to download and install the software, or what the license terms are, please read our answers to frequently asked questions before you send an email.

News

R version 3.3.3 (Another Canoe) has been released on Monday 2017-03-06.

- **useR! 2017** (July 4 - 7 in Brussels) has opened registration and more at http://user2017.brussels/
- Tomas Kalibera has joined the R core team.
- The R Foundation welcomes five new ordinary membe
  Tomas Kalibera, and Balasubramanian Narasimhan.
- **The R Journal Volume 8/1** is available.
- The **useR! 2017** conference will take place in Brussels
- **R version 3.2.5 (Very, Very Secure Dishes)** has beer
  of the quick-fix release 3.2.4-revised.
- **Notice XQuartz users (Mac OS X)** A security issue ha
  mechanism used by XQuartz. Avoid updating over inse
- The **R Logo** is available for download in high-resolutio
- **useR! 2016**, hase taken place at Stanford University, C

Serbia		
	https://fourdots.com/mirror/CRAN/	Four Dots
Singapore		
	http://cran.stat.nus.edu.sg/	National University of Singapore, Singapore
South Africa		
	http://r.adu.org.za/	University of Cape Town
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Spain		
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	http://cran.rediris.es/	Spanish National Research Network, Madrid
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	http://cran.ncc.metu.edu.tr/	Middle East Technical University Northern Cyprus Campus, Mersin

The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- Download R for Linux
- Download R for (Mac) OS X
- Download R for Windows

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (Monday 2017-03-06, Another Canoe) R-3.3.3.tar.gz, read what's new in the latest version.

R for Windows

Subdirectories:

base — Binaries for base distribution (managed by Duncan Murdoch). This is what you want to **install R for the first time**.

contrib — Binaries of contributed CRAN packages (for R >= 2.11.x; managed by Uwe Ligges). There is also information on third party software available for CRAN Windows services and corresponding environment and make variables.

old contrib

Rtools

R-3.3.3 for Windows (32/64 bit)

Download R 3.3.3 for Windows (71 megabytes, 32/64 bit)

Installation and other instructions
New features in this version

If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can compare the md5sum of the .exe to the fingerprint on the master server. You will need a version of md5sum for windows: both graphical and command line versions are available.

Frequently asked questions

- Does R run under my version of Windows?
- How do I update packages in my previous version of R?
- Should I run 32-bit or 64-bit R?

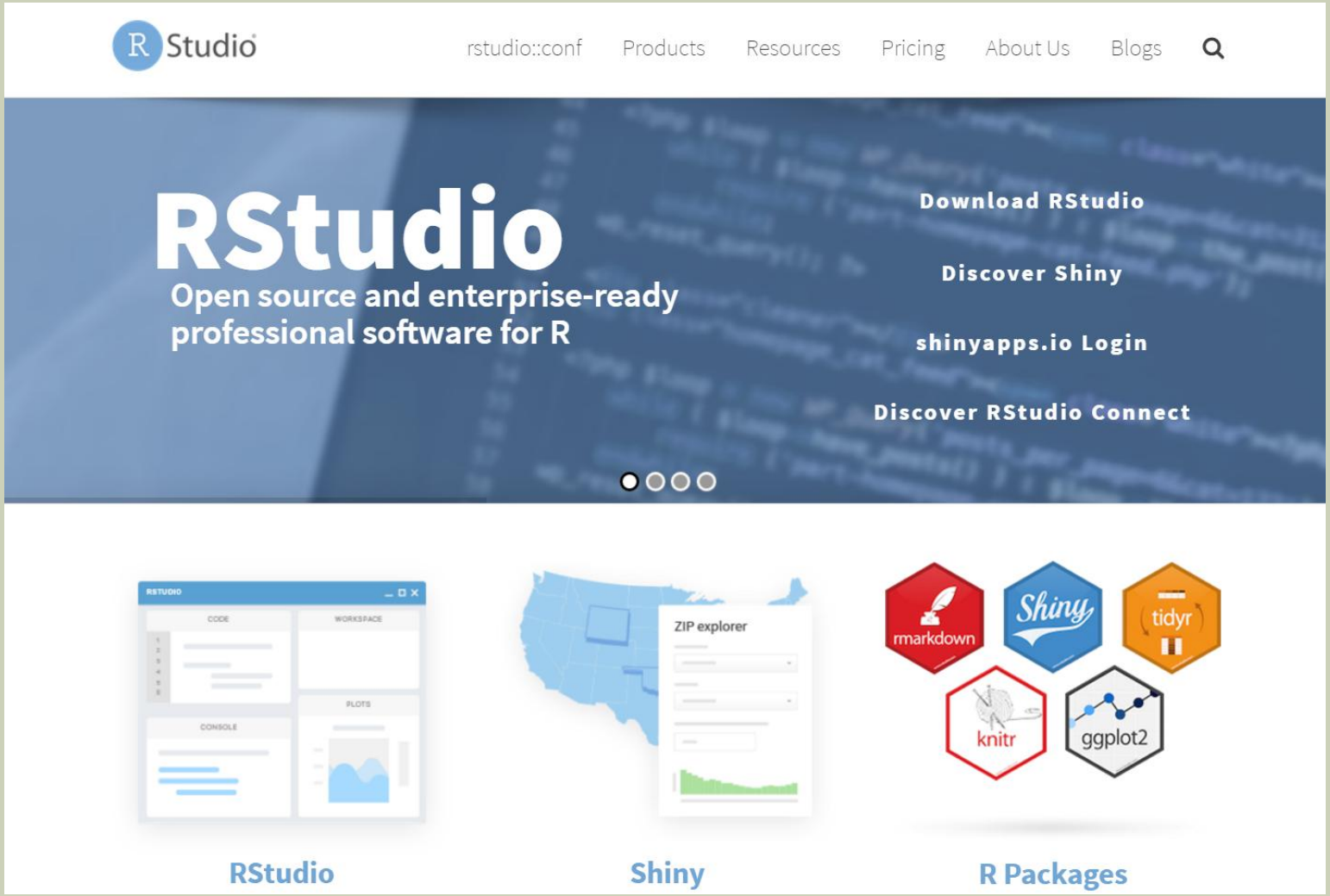
Please see the R FAQ for general information about R and the R Windows FAQ for Windows-specific information.

Other builds

- Patches to this release are incorporated in the r-patched snapshot build.
- A build of the development version (which will eventually become the next major release of R) is available in the r-devel snapshot build.
- Previous releases

Note to webmasters: A stable link which will redirect to the current Windows binary release is <CRAN MIRROR>/bin/windows/base/release.htm.

RStudio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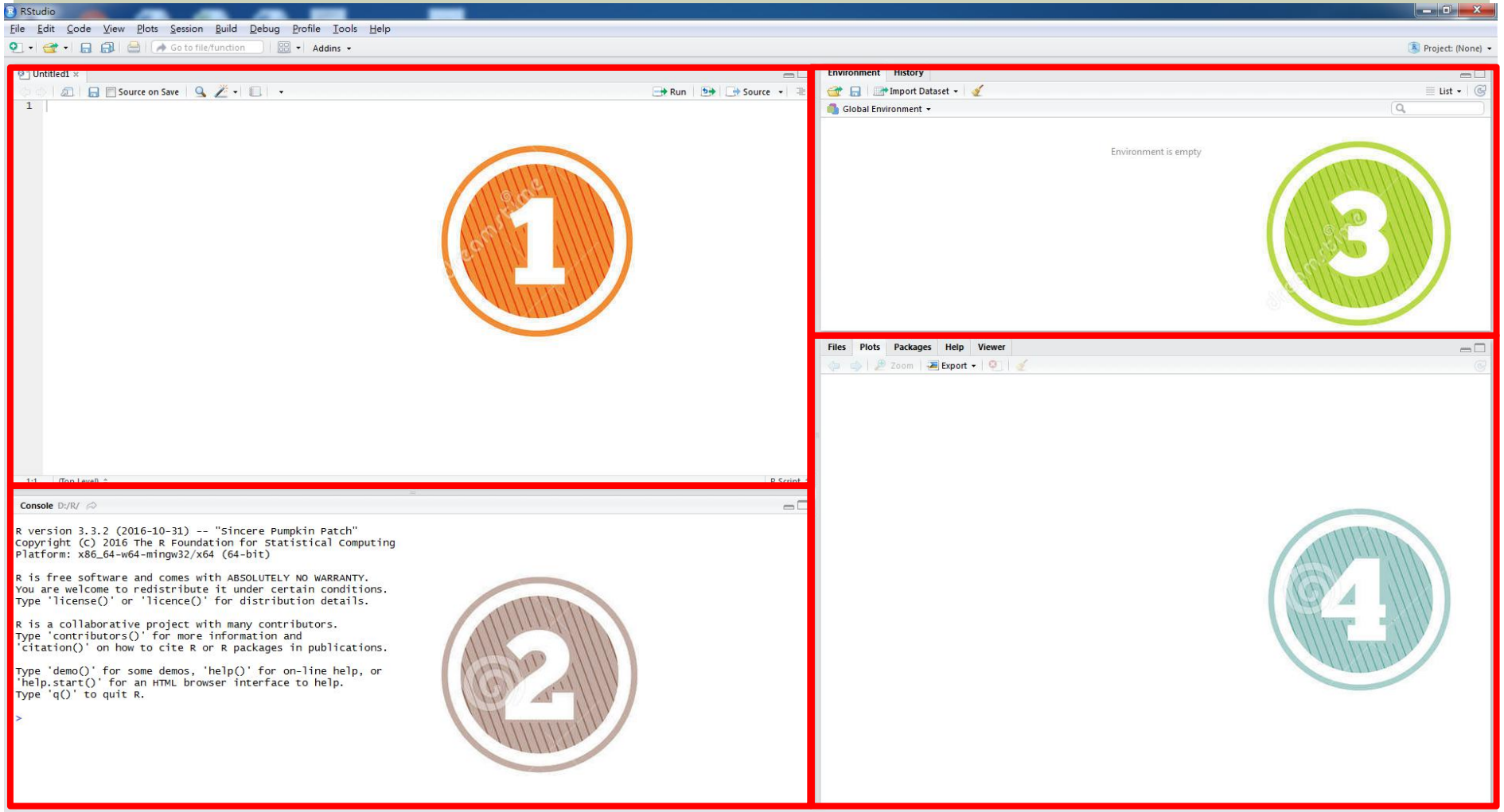
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Import Dataset
List
Global Environment
Environment is empty
3
Files Plots Packages Help Viewer
Zoom
Export
Console D:/R/
R version 3.3.2 (2016-10-31) -- "Sincere Pumpkin Patch"
Copyright (C) 2016 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' 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.
>
2
4

你可以把R當作計算機

```
> 6+6
[1] 12
> 6-3
[1] 3
> 6*6
[1] 36
> 6/3
[1] 2
```

```
> 2^10
[1] 1024
> 9487%%10
[1] 7
> 9487%/%10
[1] 948
```

變數定義與邏輯判斷

令x等於1，可以有三種寫法

```
> x = 1
> x <- 1
> 1 -> x
```

列印x可以有兩種方法

```
> print(x)
[1] 1
> x
[1] 1
```

邏輯判斷，R會回應TRUE或是FALSE

```
> x>0
[1] TRUE
> X>0
Error: object 'X' not found
```

向量

```
> x = c(1,2,3,4,5)
> x
[1] 1 2 3 4 5
> y = c(1,3,5,7,9)
> x+y
[1] 2 5 8 11 14
```

○常用的向量函數

seq 產生連續序列

```
> seq(1,10)
> seq(1,20,by=2)
> seq(1,20,length.out
=2)
```

rep 產生重複序列

```
> rep(1,10)
```

rev 反序

```
> rev(1:10)
```

休息一下，換你動手做

- 產生一個yuntech向量，該向量為
  8,7,6,5,7,6,5,4,6,5,4,3,5,4,3,2,4,3,2,1
- 產生一個ma308向量，該向量為
  3,7,11,15,19,23,27,31,35,39,43

```
yuntech <- rev(c(seq(1,4),seq(2,5),seq(3,6),seq(4,7),seq(5,8)))
Ma308 <- seq(3,43,by=4)
```

向量合併與矩陣

```
> x = c(1,2,3,4,5)
> y = c(1,3,5,7,9)
#  行合併 (cbind)
> cbind(x,y)
     x y
[1,] 1 1
[2,] 2 3
[3,] 3 5
[4,] 4 7
[5,] 5 9
# 列合併 (rbind)
> rbind(x,y)
  [,1] [,2] [,3] [,4] [,5]
x    1    2    3    4    5
y    1    3    5    7    9
```

- 產生矩陣

```
> d <- seq(1,25,1)
> matrix(d, nrow=5, ncol=5, byrow=T)

>
matrix(c(x,y),nrow=2,ncol=5,byrow=T)
```

資料篩選(1)

- 一個向量中，如果只想要某些數值或元素

```
> x <- sample(1:100,20)  #從1-100之中隨機抽取20個數字
> x
[1] 90 42 43 20 13 8 4 68 6 80 97 14 51 9 79 39 33 40 50 62
> x[x>20]
[1] 90 42 43 68 80 97 51 79 39 33 40 50 62
# 如果抽出來的數字只要奇數呢
> x[x%%2==1]
[1] 43 13 97 51 9 79 39 3
```

資料篩選(2) – 矩陣中的資料篩選

```
> d <- seq(1,25,1)
> y <- matrix(d, nrow=5, ncol=5, byrow=T)

> y[1,1]
> y[1,]
> y[,5]
> y[3,-1]
```