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Tech Training Series

Exclusive for



R Introduction Workshop

(2023/2024)

Basic syntax | Reading Data | Charts | Packages | Statistics Features

by

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Day 1 (3 hours)

- Hands on R Studio
- Basic R Syntax
- Variables
- Data Types
- Using Comments
- Operators
- Strings
- Vectors
- Lists
- Matrices
- Array
- Data Frames
- Condition
- Loops
- Functions

Day 2 (3 hours)

- Built-in sample datasets
- Reading Data
 - CSV
 - Excel
 - JSON
- Using Colors
- Data Visualization
- 3rd Party Packages
- Clean Up
- Handling Complex Codes
 - Piping Commands
- R Markdown
- Statistics Features
 - Mean, Median
 - Regression
- Useful Resources

R

- R is NOT a general-purpose programming language
- R is specialized for statistical analysis, graphics representation and reporting
- R are very popular among non-developer

Required Tools

- We need **BOTH** of these two software

1. **R** (<https://www.r-project.org/>)

2. **R Studio** (<https://rstudio.com/>)

1. Download & Install R

■ For Windows

- <https://cran.r-project.org/bin/windows/base/>

[Download R 4.0.3 for Windows](#) (85 megabytes, 32/64 bit)

[Installation and other instructions](#)

[New features in this version](#)

■ For Mac

- <https://cran.r-project.org/bin/macosx/>

[R-4.0.3.pkg](#) (notarized and signed)

SHA1-hash: 8402f586aef1fdb12c6e34c73b286f87318fb1be
(ca. 85MB)

2. Download & Install R Studio

Make sure you download the **FREE** version of **R Studio Desktop**

■ For Windows

- <https://rstudio.com/products/rstudio/download/#download>

■ For Mac

- <https://rstudio.com/products/rstudio/download/#download>

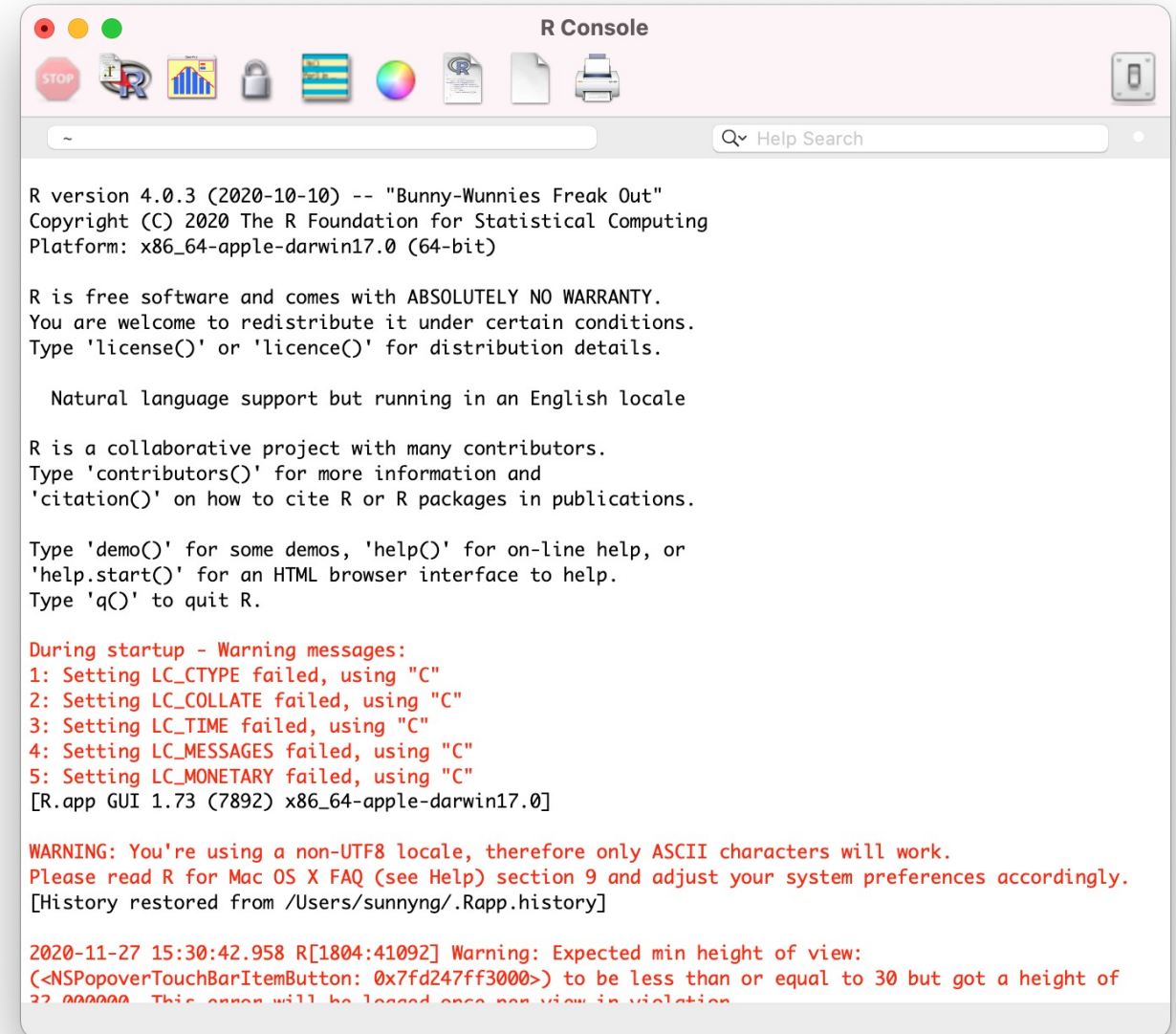


All Installers

Linux users may need to [import RStudio's public code-signing key](#) prior to installation. RStudio requires a 64-bit operating system. If you are on a 32 bit system, you can use a

OS	Download
Windows 10/8/7	RStudio-1.3.1093.exe
macOS 10.13+	RStudio-1.3.1093.dmg
Ubuntu 16	rstudio-1.3.1093-amd64.deb
Ubuntu 18/Debian 10	rstudio-1.3.1093-amd64.deb
Fedora 19/Red Hat 7	rstudio-1.3.1093-x86_64.rpm
Fedora 28/Red Hat 8	rstudio-1.3.1093-x86_64.rpm
Debian 9	rstudio-1.3.1093-amd64.deb
SLES/OpenSUSE 12	rstudio-1.3.1093-x86_64.rpm
OpenSUSE 15	rstudio-1.3.1093-x86_64.rpm

R interface



```
R version 4.0.3 (2020-10-10) -- "Bunny-Wunnies Freak Out"
Copyright (C) 2020 The R Foundation for Statistical Computing
Platform: x86_64-apple-darwin17.0 (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.

Natural language support but running in an English locale

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.

During startup - Warning messages:
1: Setting LC_CTYPE failed, using "C"
2: Setting LC_COLLATE failed, using "C"
3: Setting LC_TIME failed, using "C"
4: Setting LC_MESSAGES failed, using "C"
5: Setting LC_MONETARY failed, using "C"
[R.app GUI 1.73 (7892) x86_64-apple-darwin17.0]

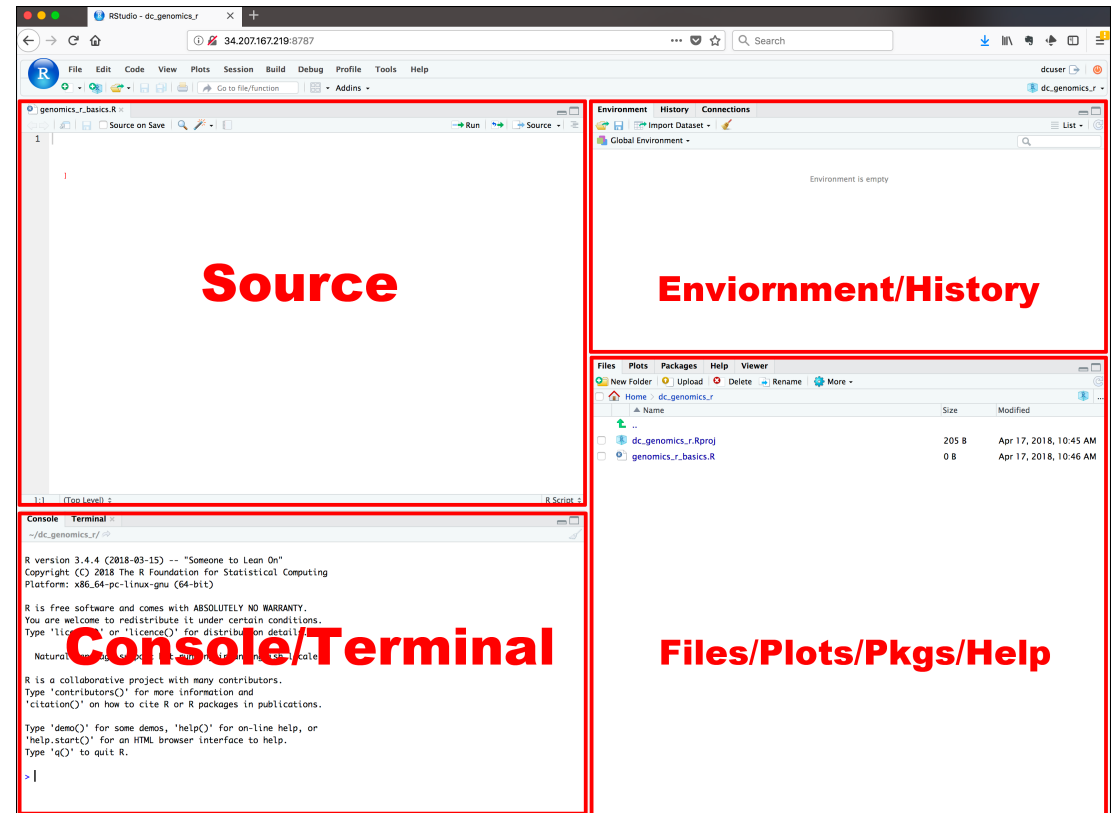
WARNING: You're using a non-UTF8 locale, therefore only ASCII characters will work.
Please read R for Mac OS X FAQ (see Help) section 9 and adjust your system preferences accordingly.
[History restored from /Users/sunnyng/.Rapp.history]

2020-11-27 15:30:42.958 R[1804:41092] Warning: Expected min height of view:
(<NSPopoverTouchBarItemButton: 0x7fd247ff3000>) to be less than or equal to 30 but got a height of
?? 000000. This error will be logged once per view in violation.
```

R Studio

- Running on top of R
- RStudio is an **I**ntegrated **D**evelopment **E**nvironment (IDE) for R.
- It includes a **console**, **syntax-highlighting editor** that supports **direct code execution**, as well as tools for **plotting**, **history**, **debugging** and **workspace management**.

R Studio interface



Built-in library

- Come with default R installation
- A core part of R
- Often referred as **R Base**
- E.g.
 - datasets
 - By default it's not load. It consumes memory when you load it.
 - To load, type command `library(datasets)`

16725 contributed packages

- Packages let you add more power to your R programming
- Make your programming easier
- Go to
 - <https://cran.r-project.org/>
 - Choose “**Packages**” from the left menu

Wide range of contributed package

<https://cran.r-project.org/web/views/>

Topics

Bayesian	Bayesian 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
ExperimentalDesign	Design of Experiments (DoE) & Analysis of Experimental Data
ExtremeValue	Extreme Value Analysis
Finance	Empirical Finance
FunctionalData	Functional Data Analysis
Genetics	Statistical Genetics
Graphics	Graphic Displays & Dynamic Graphics & Graphic Devices & Visualization
HighPerformanceComputing	High-Performance and Parallel Computing with R
Hydrology	Hydrological Data and Modeling
MachineLearning	Machine Learning & Statistical Learning

Some popular packages

- **pacman** (package manager)
- **rio** (R Input/Output)
- **tidyverse** (for tidying data)

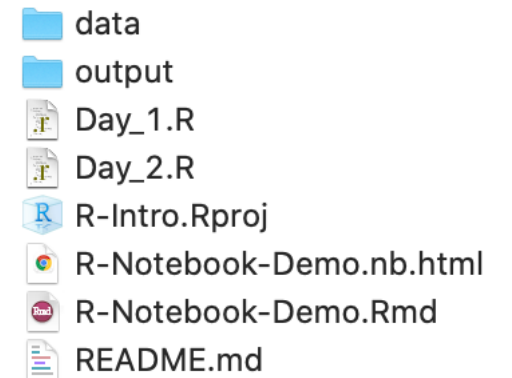
Source Codes Download

<https://bit.ly/3huBmGo>

Download R Project to Start

- <https://github.com/ngsanluk/R-Intro>
- Download and unzip the file
- Open RStudio (**NOT R**)
- Choose **File** -> **Open Project**
 - Reach out to the unzip folder
 - You will find both two day's source codes in the project

After unzip



Further Learning

Datasets, Tools & Suggested Books

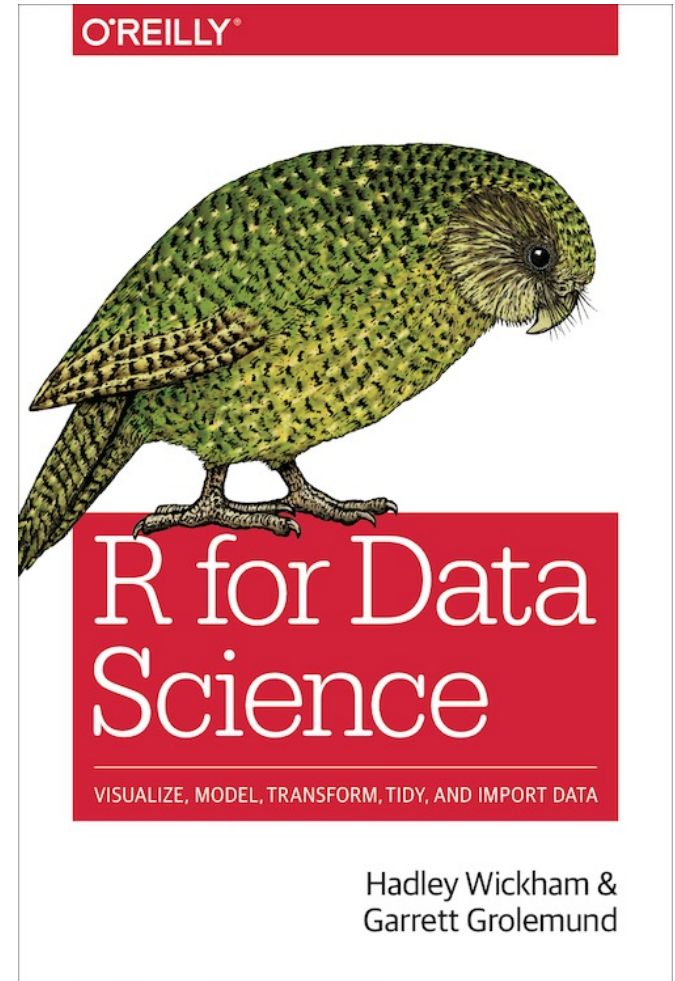
Open / Free Dataset

- HK Gov Open Data
 - <https://data.gov.hk/en/>
- HKMA Open API
 - <https://apidocs.hkma.gov.hk/>
- Free Datasets
 - <https://r-dir.com/reference/datasets.html>

Book - 1

Contributed R Package: Tidyverse

- R for Data Science
- <https://r4ds.had.co.nz/>



Book - 2

Data Visualization | Chart Design | Infographics Design

- The Wall Street Journal – Guide to Information Graphics
- 最简单的图形与最复杂的信息
- <http://search.dangdang.com/?key=%D7%EE%BC%F2%B5%A5%B5%C4%CD%BC%D0%CE%D3%EB%D7%EE%B8%B4%D4%D3%B5%C4%D0%C5%CF%A2&act=input>



Book - 3

Data Visualization | Chart Design | Infographics Design

- The Infographic Bible
- https://www.amazon.com/Infographic-Bible-Cloth-over-Board/dp/0310453984/ref=sr_1_1?crid=FYDZ0VP3WTZG&dchild=1&keywords=infographic+bible&qid=1606572025&sprefix=infogra%2Caps%2C415&sr=8-1

