



notebooks are awesome.
They are almost interactive!

```
# read data ----
wfiles <- dir(pattern="\\d.*")
names(wfiles) <- sub("\\.txt$", "", wfiles)
weather <- pblapply(wfiles, read.table, header=TRUE)
str(weather)

# select one dataframe, format month of year:
clim <- weather$`3987_Potsdam`
clim$month <- as.Date(clim$month)
clim$m <- as.numeric(format(clim$month, "%m"))
summary(clim)
mcol <- c(seqPal(7,T),seqPal(5)) # blue: winter, yellow: summer
```

Run the current line
or selection
(Ctrl+Enter)



统计软件: R 语言 101

安装, 第一行代码, Rmarkdown

助教联系方式及课程群



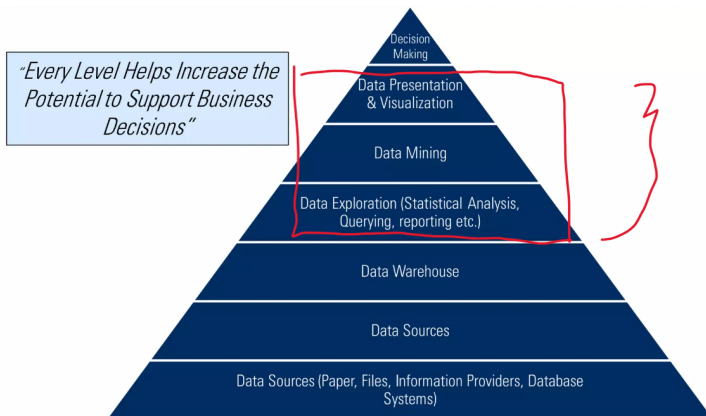
群组：统计软件25 春

- ▶ 姓名：姜博恩
- ▶ 邮箱：
bejiang24@m.fudan.edu.cn
- ▶ 答疑时间：上机课后.



此QR Code在7天内(2月27日前)有效, 重新进入将更新。

为什么要学统计软件: 多层模型



使用的工具

- ▶ R: 至少使用 3.6.0 版本以上, 目前最新版本为 4.4.2.



- ▶ Rstudio: R 的集成开发环境 (IDE), 你可以用它更方便地写 R, Python 等代码.



- ▶ 建议安装: Rtools, Rtools 是 R 的一个工具包, 用于编译 R 的包.

在 Windows x64 平台安装 R 和 Rtools

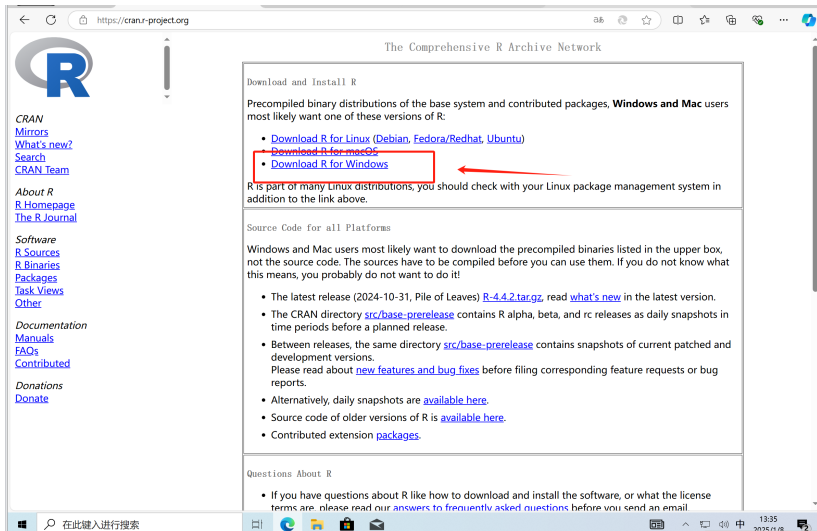
演示环境:

- ▶ Windows 10 x64,
- ▶ Mac 和 Linux 用户的安装方式也是类似的,
- ▶ Windows on ARM 需要至少 R 4.4.0 版本. 但是 Rstudio 目前不支持 ARM 平台.

CRAN(Comprehensive R Archive Network)

- ▶ 包含最新和以前版本的 R 发行版, 文档和 R 包的存档,
- ▶ CRAN 由 Kurt Hornik 和 Friedrich Leisch 于 1997 年创建,
- ▶ <https://cran.r-project.org/>.
- ▶ 也可以通过 Rstudio 跳转到 CRAN, 注意在使用搜索引擎时注意下载的是否是广告, 可以使用 Bing 国际版等搜索引擎.

CRAN: 下载 R



The screenshot shows the CRAN website at <https://cran.r-project.org>. The page title is "The Comprehensive R Archive Network". The main content area is titled "Download and Install R" and contains the following text:

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 \(Debian, Fedora/Redhat, Ubuntu\)](#)
- [Download R for macOS](#)
- [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 (2024-10-31, Pile of Leaves) [R-4.4.2.tar.gz](#), read [what's new](#) in the latest version.
- The CRAN directory [src/base-prerelease](#) contains R alpha, beta, and rc releases as daily snapshots in time periods before a planned release.
- Between releases, the same directory [src/base-prerelease](#) contains snapshots of current patched and development versions. Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Alternatively, daily snapshots are [available here](#).
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#).

Questions About R

- 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.

The left sidebar contains the following links:

- CRAN
- Mirrors
- What's new?
- Search
- CRAN Team
- About R
- R Homepage
- The R Journal
- Software
- R Sources
- R Binaries
- Packages
- Task Views
- Other
- Documentation
- Manuals
- FAQs
- Contributed
- Donations
- Donate

The Windows taskbar at the bottom shows the search bar with the text "在此键入进行搜索" and the system clock displaying 13:35 on 2025/11/18.

CRAN: 下载 R



CRAN
[Mirrors](#)
[What's new?](#)
[Search](#)
[CRAN Team](#)

About R
[R Homepage](#)
[The R Journal](#)

Software
[R Sources](#)
[R Binaries](#)

R for Windows

Subdirectories:

[base](#)
[contrib](#)
[old_contrib](#)
[Rtools](#)

Binaries for base distribution. This is what you want to [install R for the first time.](#)

Binaries of contributed CRAN packages (for R $\geq$ 4.0.x)

Binaries of contributed CRAN packages for outdated versions of R (for R < 4.0.x).

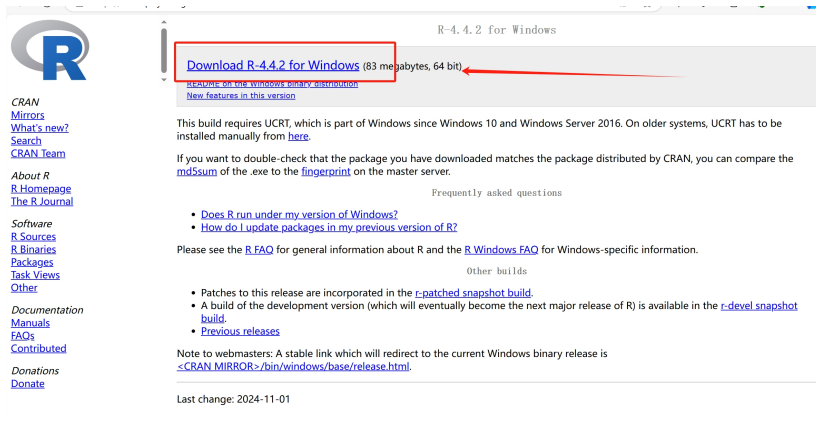
Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the [R FAQ](#) and [R for Windows FAQ](#).

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

CRAN: 下载 R





CRAN
[Mirrors](#)
[What's new?](#)
[Search](#)
[CRAN Team](#)

About R
[R Homepage](#)
[The R Journal](#)

Software
[R Sources](#)
[R Binaries](#)
[Packages](#)
[Task Views](#)
[Other](#)

Documentation
[Manuals](#)
[FAQs](#)
[Contributed](#)

Donations
[Donate](#)

R-4.4.2 for Windows

[Download R-4.4.2 for Windows](#) (83 megabytes, 64 bit)
[README on the Windows binary distribution](#)
[New features in this version](#)

This build requires UCRT, which is part of Windows since Windows 10 and Windows Server 2016. On older systems, UCRT has to be installed manually from [here](#).

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.

Frequently asked questions

- [Does R run under my version of Windows?](#)
- [How do I update packages in my previous version of R?](#)

Please see the [R FAQ](#) for general information about R and the [R Windows FAQ](#) for Windows-specific information.

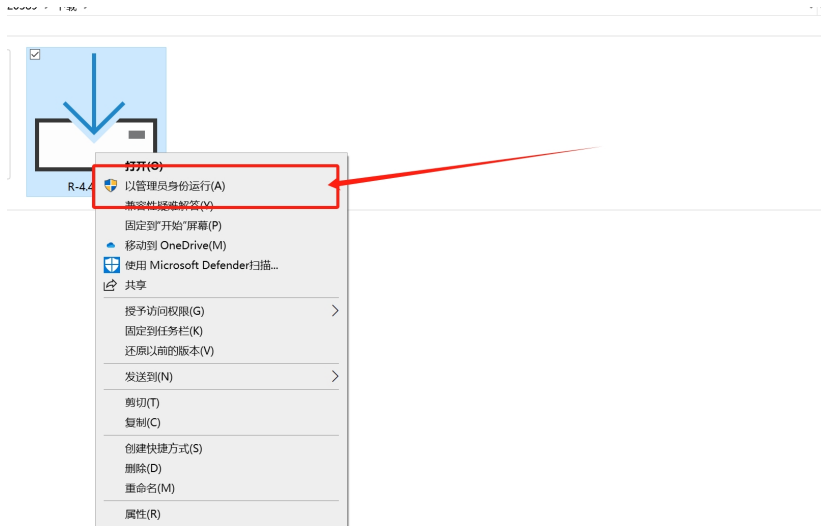
Other builds

- 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.html](#).

Last change: 2024-11-01

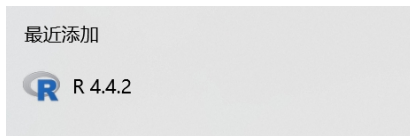
安装 R 4.4.2



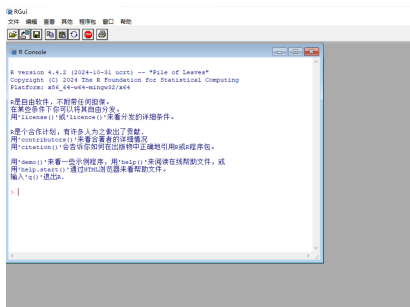
接下来是标准的软件安装流程，一路下一步即可。安装路径可以自己按照喜好选择。

运行 R 4.4.2

安装好后可以发现:

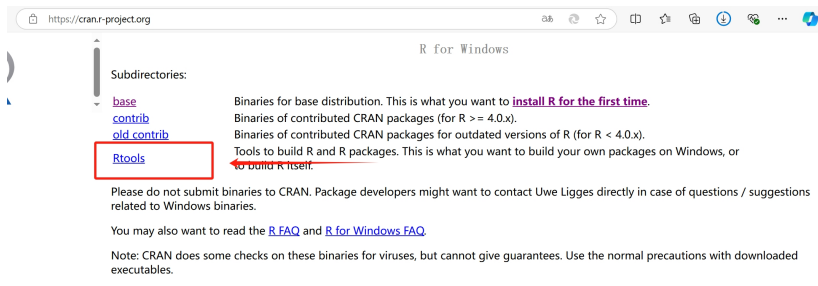


我们运行 R, 会看到如下界面:



就安装好了 R 语言本体.

CRAN: 下载 Rtools



The screenshot shows the CRAN website for Windows binaries. The URL in the browser is <https://cran.r-project.org>. The page title is "R for Windows". Under the "Subdirectories:" section, there are five links: [base](#), [contrib](#), [old contrib](#), [Rtools](#), and [to build R itself](#). The [Rtools](#) link is highlighted with a red box. A red arrow points from the text "选择自己合适的版本" (Choose your own version) at the bottom of the slide to the [Rtools](#) link. Below the subdirectories, there is a paragraph of text: "Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries." followed by "You may also want to read the [R FAQ](#) and [R for Windows FAQ](#)." and a note: "Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables."

Subdirectories:

- [base](#): Binaries for base distribution. This is what you want to **install R for the first time**.
- [contrib](#): Binaries of contributed CRAN packages (for R $\geq$ 4.0.x).
- [old contrib](#): Binaries of contributed CRAN packages for outdated versions of R (for R $<$ 4.0.x).
- [Rtools](#): Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.
- [to build R itself](#)

Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the [R FAQ](#) and [R for Windows FAQ](#).

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

RTools: Toolchains for building R and R packages from source on Windows

Choose your version of Rtools:

- | | |
|--|---|
| RTools 4.4 | for R versions from 4.4.0 (R-release and R-devel) |
| RTools 4.3 | for R versions 4.3.x (R-oldrelease) |
| RTools 4.2 | for R versions 4.2.x |
| RTools 4.0 | for R from version 4.0.0 to 4.1.3 |
| old versions of RTools | for R versions prior to 4.0.0 |

选择自己合适的版本

CRAN: 下载 Rtools

Rtools44 for Windows

Rtools is a toolchain bundle used for building R packages from source (those that need compilation of C/C++ or Fortran code) and for building R itself. Rtools44 is currently used for R 4.4 and R-devel, the development version of R, to become R 4.5.0.

Rtools44 consists of Msys2 build tools, GCC 13/MinGW-w64 compiler toolchain, libraries built using the toolchain, and QPDF. Rtools44 supports 64-bit Windows and UCRT as the C runtime.

Compared to Rtools43, Rtools44 for 64-bit Intel machines has newer versions of three core components: GCC, MinGW-w64, and binutils. It is therefore recommended to re-compile all code with the new toolchain to avoid problems. The code compiled by Rtools older than Rtools42 is incompatible due to use of MSVCRT and has to be recompiled with Rtools44 for use in R packages.

Rtools44 is also available for 64-bit ARM machines (aarch64): it includes Msys2 build tools (64-bit Intel builds running via emulation) and aarch64 builds of LLVM 17/MinGW-w64 compiler toolchain, libraries built using the toolchain, and again QPDF. The 64-bit ARM version of Rtools44 is experimental: a number of CRAN packages don't work with it and the Fortran compiler (flang-new) is not yet able to compile Fortran code of all CRAN packages. A number of CRAN packages doesn't work because they require not-yet-available 64-bit ARM versions of external software.

Installing Rtools44

Rtools is only needed for installation of R packages from source (those that need compilation of C/C++ or Fortran code) or building R from source. R can be installed from the R binary installer and by default will install binary versions of CRAN packages, which does not require Rtools44.

Moreover, online build services are available to check and build R packages for Windows, for which again one does not need to install Rtools44 locally. The [Winbuilder](#) check service uses identical setup as the CRAN incoming packages checks and has already all CRAN and Bioconductor packages pre-installed.

Rtools44 may be installed from the [Rtools44 installer](#) or [64-bit ARM Rtools44 installer](#). It is recommended to use the defaults, including the default installation location of `C:\rtools44`.

When using R installed by the installer, no further setup is necessary after installing Rtools44 to build R packages from source. When using the default installation location, R and Rtools44 may be installed in any order and Rtools44 may be installed when R is already running.

On ARM, binary versions of packages are currently not available from CRAN, so Rtools44 is required to install any package that needs compilation.

安装 Rtools



接下来是标准的软件安装流程，一路下一步即可。安装路径可以自己按照喜好选择。

Posit: 下载 Rstudio

- ▶ Rstudio 在 2022 年将公司名从 Rstudio Inc. 改为 Posit PBC.
- ▶ 下载 Rstudio desktop:
<https://posit.co/download/rstudio-desktop/>



New Name,
Same DNA

RStudio is now Posit.

下载 Rstudio



Want to learn about core or advanced workflows in RStudio? Explore the [RStudio User Guide](#) or the [Getting Started](#) section.

1: Install R

RStudio requires R 3.6.0+. Choose a version of R that matches your computer's operating system.

R is not a Posit product. By clicking on the link below to download and install R, you are leaving the Posit website. Posit disclaims any obligations and all liability with respect to R and the R website.

DOWNLOAD AND INSTALL R

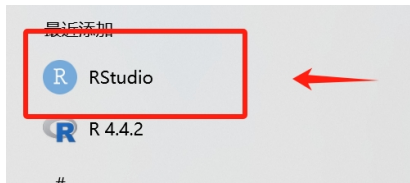
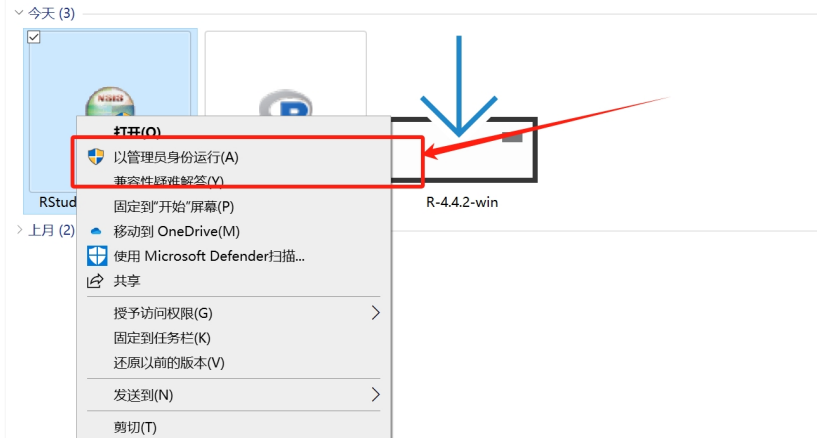
2: Install RStudio

DOWNLOAD RSTUDIO DESKTOP FOR WINDOWS

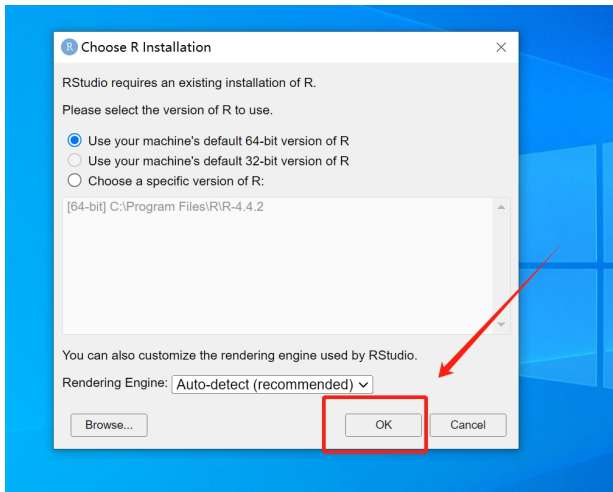
Size: 265.27 MB | [SHA-256: 5EFCDD188](#) | Version: 2024.12.0+467 | Released: 2024-12-16

可以看到之前我们已经完成了第一步, 这里我们直接下载 Rstudio Desktop 即可。

安装 Rstudio

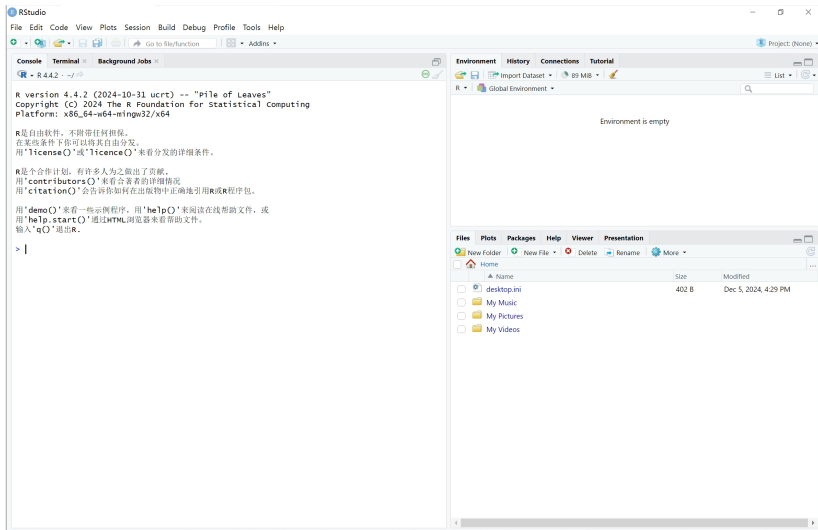


运行 Rstudio



安装部分至此结束.

Rstudio 界面



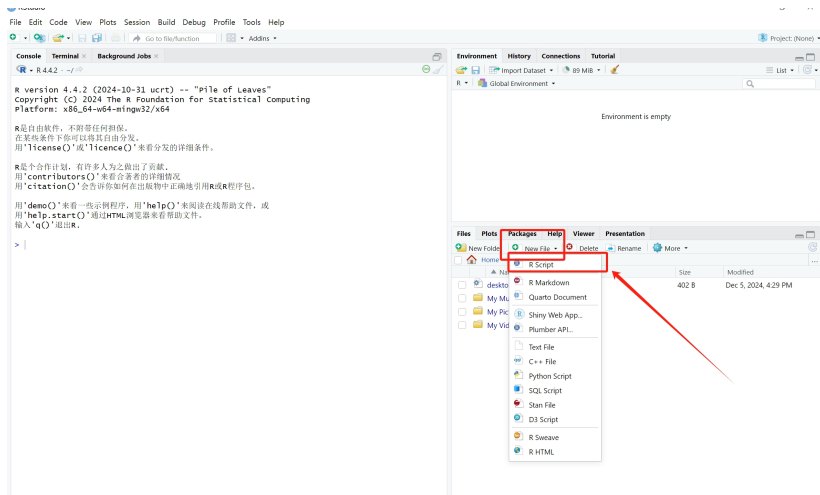
- ▶ "Pile of Leaves": R 语言的版本昵称 (nickname).
- ▶ 这个昵称没有规律: 来源于 Peanuts cartoon.

Rstudio 界面

常用的几个区域:

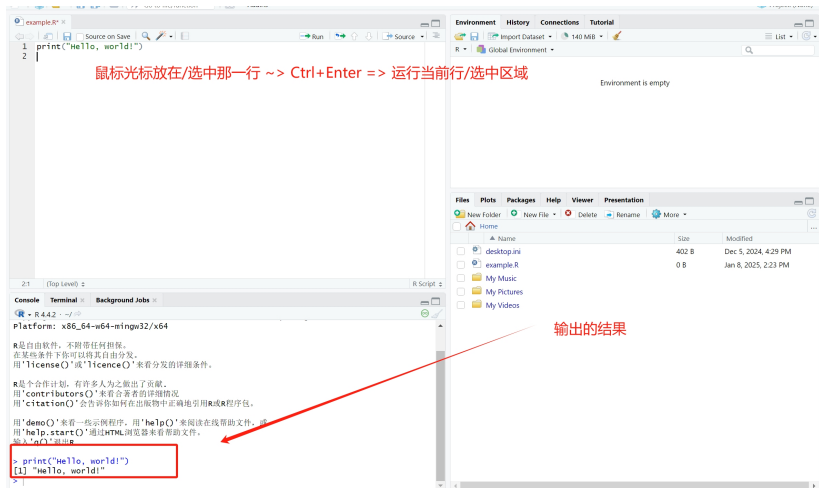
- ▶ Console: 控制台. 交互式界面, 可以直接输入 R 代码.
- ▶ Terminal: 终端. 可以直接输入系统命令, 等同于 windows 的 cmd.
- ▶ Environment: 环境. 显示当前环境的变量, 函数等.
- ▶ Files: 文件. 显示当前工作目录的文件.
- ▶ Plots: 图形. 显示绘制的图形.
- ▶ Packages: 包. 显示已经安装的包.

创建一个 R 语言脚本



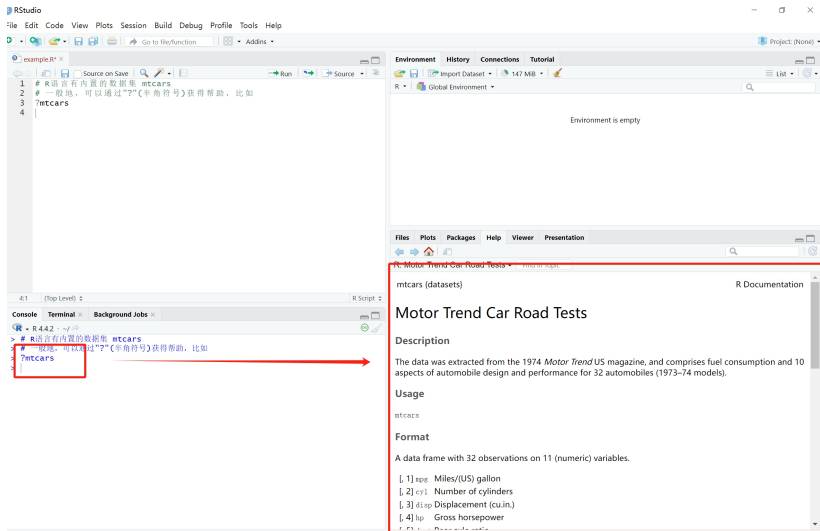
- ▶ 可以看到, 除了 R 脚本, 还有 Rmarkdown, Python, SQL, C++ 等.

Hello, World!



- ▶ 能不能直接在 console 里面输入? 试试看.
- ▶ R 语言是大小写敏感的. 试试看 `print("Hello, World!")` 和 `Print("Hello, World!")` 有什么区别?

如何获得帮助



- ▶ 可以看到 # 号后面的内容是注释，不会被执行。
- ▶ 试一试 `help(mtcars)`, `help.search(mtcars)`, `help.search("mtcars")`, `? "mtcars"` 哪些可以执行?

如何获得帮助

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

```
1 # R语言有内置的数据集 mtcars
2 # 一般地, 可以通过"?"(半角符号)获得帮助, 比如
3 ?mtcars
4 # 也可以问号一个函数, 比如
5 ?lm()
6
```

Environment History Connections Tutorial

161 MiB

Environment is empty

Files Plots Packages Help Viewer Presentation

R: Fitting Linear Models Find in Topic

lm (stats) 函数名(来源于哪个包)

Fitting Linear Models

函数的目的: 这里就是拟合线性模型

Description

lm is used to fit linear models, including multivariate ones. It can be used to carry out regression, single stratum analysis of variance and analysis of covariance (although [aov](#) may provide a more convenient interface for these).

Usage

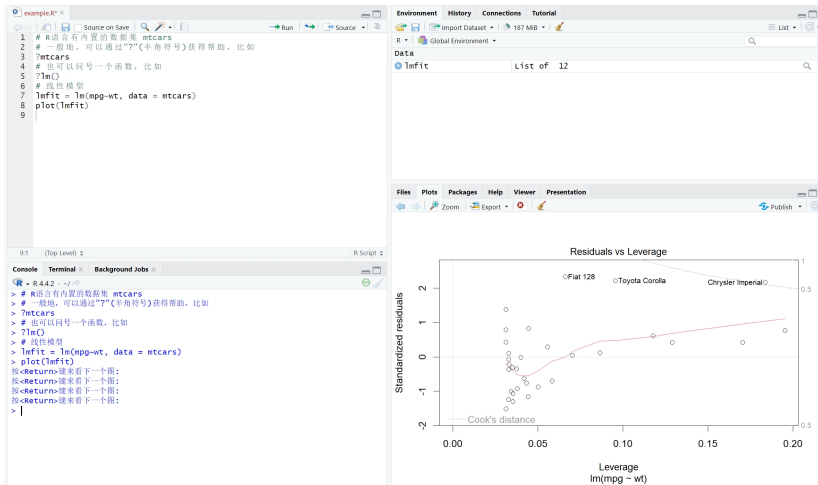
```
lm(formula, data, subset, weights, na.action,
  method = "qr", model = TRUE, x = FALSE, y = FALSE, qr = TRUE,
  singular.ok = TRUE, contrasts = NULL, offset, ...)
```

```
## S3 method for class 'lm'
print(x, digits = max(3L, getOption("digits") - 3L), ...)
```

Arguments

- ▶ 试试看不加括号.
- ▶ 要善于使用 Tab 键自动补全.

一个线性模型



- ▶ 试试看把 “=” 改成 “<”, 能不能运行?
- ▶ 试试 `lm(mpg wt, data = mtcars) -> lmfit`, 能运行吗?

使用一个包

- ▶ 类似于 Python 的 `pip install` 和 `from import`.
- ▶ 试试看 `install.packages("vcd")`, 然后 `library(vcd)`.
- ▶ `install.packages(vcd)` 可以吗? `library("vcd")` 可以吗?

```
10
11 install.packages("vcd")
12 library(vcd)
13
```

13.1 (Top Level) R Script

Console Terminal Background Jobs

R - R 4.4.2 - ~/R

downloaded 2.3 MB

试开URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/lmtest_0.9-40.zip'
content type 'application/zip' length 411806 bytes (402 KB)
downloaded 402 KB

试开URL 'https://cran.rstudio.com/bin/windows/contrib/4.4/vcd_1.4-13.zip'
content type 'application/zip' length 1306265 bytes (1.2 MB)
downloaded 1.2 MB

程序包 'zoo' 打开成功, MD5 和检查也通过
程序包 'colorspace' 打开成功, MD5 和检查也通过
程序包 'lmtest' 打开成功, MD5 和检查也通过
程序包 'vcd' 打开成功, MD5 和检查也通过

下载的二进制程序包在
c:\Users\20389\AppData\Local\Temp\Rtmpes7uwc\downloaded_packages 里

```
> library(vcd)
载入需要的程序包: grid
>
```

使用包中的数据

```
8 plot(lmfit)
9
10
11 install.packages("vcd")
12 library(vcd)
13 # 使用包中的数据
14 help("Arthritis")
15
```

15:1 (Top Level) 2 R Script

Console Terminal Background Jobs

```
R • R 4.4.2 • ~/
URL: https://cran.rstudio.com/bin/windows/contrib/4.4/vcd_1.4-13.zip
Content type 'application/zip' length 411806 bytes (402 KB)
downloaded 402 KB
```

```
试开URL'https://cran.rstudio.com/bin/windows/contrib/4.4/vcd_1.4-13.zip'
Content type 'application/zip' length 1306265 bytes (1.2 MB)
downloaded 1.2 MB
```

```
程序包'zoo'打开成功，MD5和检查也通过
程序包'colorspace'打开成功，MD5和检查也通过
程序包'intest'打开成功，MD5和检查也通过
程序包'vcd'打开成功，MD5和检查也通过
```

```
下载的二进制程序包在
C:\Users\20389\AppData\Local\Temp\Rtmpes7uwc\downloaded_packages里
> library(vcd)
载入需要的程序包: grid
> # 使用包中的数据
> help("Arthritis")
>
```

Files Plots Packages Help Viewer Presentation

R: Arthritis Treatment Data - Find in topic

Arthritis (vcd) R Documentation

Arthritis Treatment Data

Description

Data from Koch & Edwards (1988) from a double-blind clinical trial investigating a new treatment for rheumatoid arthritis.

Usage

```
data("Arthritis")
```

Format

A data frame with 84 observations and 5 variables.

ID	patient ID.	Treatment
----	-------------	-----------

- ▶ 能不能查看一下数据的结构? 试试看 `str(Arthritis)`, `attributes(Arthritis)`.

使用包中的数据

The screenshot displays the RStudio interface with the following components:

- Source Editor:** Contains R code for loading the 'vcd' package and the 'Arthritis' dataset. A red box highlights the line `example("Arthritis")`, and a red arrow points to it from the Environment pane.
- Environment Pane:** Shows the 'Global Environment' with the 'Arthritis' dataset loaded, containing 84 observations and 5 variables. A red box highlights this entry.
- Console:** Shows the execution of the code, including the command `Arthrt <- data("Arthritis")` and the resulting data structure: `Arthrt` is a data frame with 84 observations and 5 variables: `Treatment`, `Improved`, `None`, `Some`, and `Marked`.
- Plots Pane:** Displays a mosaic plot of the 'Arthritis' data. The plot shows the distribution of 'Improved' (None, Some Marked) across 'Treatment' (Placebo, Treated). A red box highlights the plot. To the right of the plot, the Pearson residuals are shown, with a color scale ranging from -1.7 to 1.6. The p-value is 0.009.

- ▶ 试试点击环境中带三角符号的变量, 能发现什么?
- ▶ 试试 Plot 中的 Export 按钮, 有什么用? 能不能拉伸一下图片?

Rmarkdown 介绍

- ▶ Markdown 是一种轻量级标记语言, 经常用于写文档. 几乎没有困难的语法, 你可以将它视为 txt 文档的升级版.



- ▶ Rmarkdown 是 R 语言的一个扩展, 可以在文档中直接运行 R 代码, 类似于 Python 的 Jupyter.

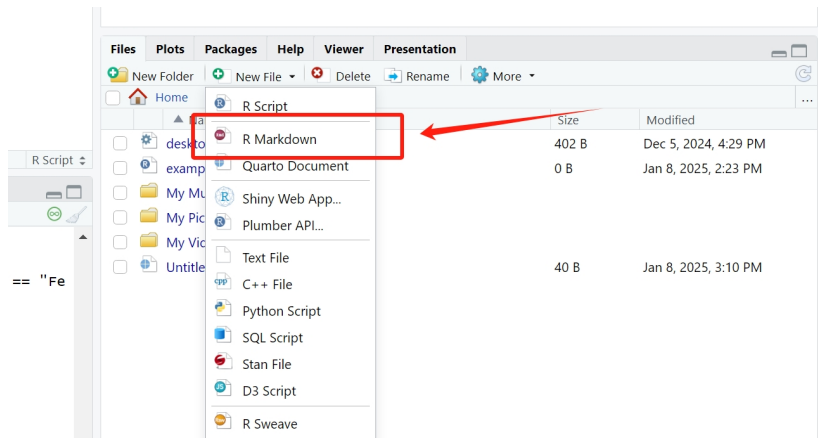


- ▶ 当然, 你甚至可以在 Jupyter 中运行 R 代码. 也可以在 Rmarkdown 中运行 Python 代码!

Rmarkdown

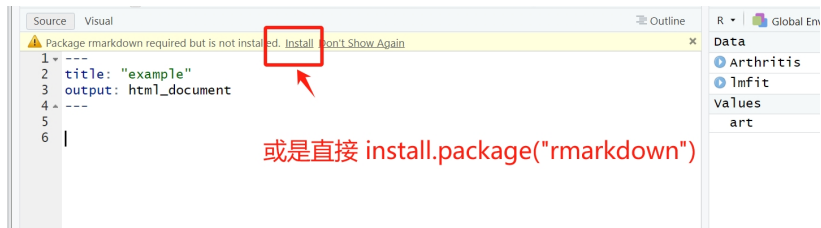


创建 rmd 文件



► 还能在哪里创建？试试看左上角.

安装包



- ▶ `install.packages`
- ▶ 也可以在右下角的 `packages` 栏中进行安装.

Rmarkdown

IRStudio

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Add-ins

Project: (None)

Environment History Connections Tutorial

R Global Environment 317 MB

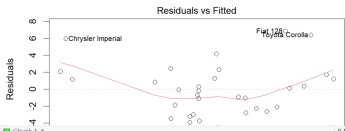
Data

Arthritis	84 obs. of 5 variables
lmfit	List of 12

Values

art	'xtabs' int [1:2, 1:3] 19 6 7 5 6 16
x	int [1:14] -1 0 1 2 3 4 5 6 7 8 ...

```
1 ---
2 title: "example"
3 output: html_document
4 ---
5
6 # 这个是一级标题
7
8 ## 这个二级标题
9
10 ctrl + alt + i 可以插入r语言代码框，按三角号可以运行
11
12 {r}
13 plot(lmfit)
14
```



Residuals vs Fitted

Residuals

Chrysler Imperial

Fiat 128

Ford

Corolla

Console

```
Terminal Background Jobs
```

```
R 4.4.2 ~ /
AT RHEL7 X R / R 2
[1] -1 0 0 0 0 0 1 1 1 1 1 2 2 2

Arthmt> x %>% Inf # now is defined by limit (gave NaN in earlier versions of R)
[1] Inf 0 1 2 3 4 5 6 7 8 9 10 11 12
```

Files Plots Packages Help Viewer Presentation

New Folder New File Delete Rename More

Home

Name	Size	Modified
desktop.ini	402 B	Dec 5, 2024, 4:29 PM
example.R	0 B	Jan 8, 2025, 2:23 PM
example.Rmd	203 B	Jan 8, 2025, 3:16 PM
My Music		
My Pictures		
My Videos		
Untitled.qmd	40 B	Jan 8, 2025, 3:10 PM

- ▶ 最常用的符号就是 # 号, 用于表示标题; * 号改变字体格式; - 号表示列表等.
- ▶ 怎么改变字体的颜色?

Render/Knit

- ▶ 试试看 Knit 按钮, 会发生什么?
- ▶ 试试看 Knit 按钮旁边的下拉菜单, 有什么选项? 选择到 html
- ▶ 是否会有报错? 为什么?

The screenshot shows the RStudio interface with the 'example.Rmd' file open. The 'Knit' button is highlighted with a red box. A dialog box titled 'Install Required Packages' is displayed, asking if the user wants to install the packages 'magnitr', 'stringr', and 'string'. The 'Yes (Y)' button is highlighted with a red box. The background shows the R Markdown document content, including a title 'example', output format 'html_document', and a plot of 'Residuals vs Fitted' values. The console at the bottom shows the R session output, including the command 'plot(lmfit)' and the resulting plot data.

Source Visual

```
1 ---
2 title: "example"
3 output: html_document
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5 # 这个是一级标题
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Environment History Connections Tutorial

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values	
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x	int [1:14] -1 0 1 2 3 4 5 6 7 8 ...

Install Required Packages

Rendering R Markdown documents requires updated versions of the following packages: magnitr, stringr, string.

Do you want to install these packages now?

Yes (Y) No (N)

Presentation

	Size	Modified
example.R	402 B	Dec 5, 2024, 4:29 PM
example.Rmd	0 B	Jan 8, 2025, 2:23 PM
My Music	210 B	Jan 8, 2025, 3:20 PM
My Pictures		
My Videos		
Untitled.qmd	40 B	Jan 8, 2025, 3:10 PM

Residuals vs Fitted

Residuals

Fitted

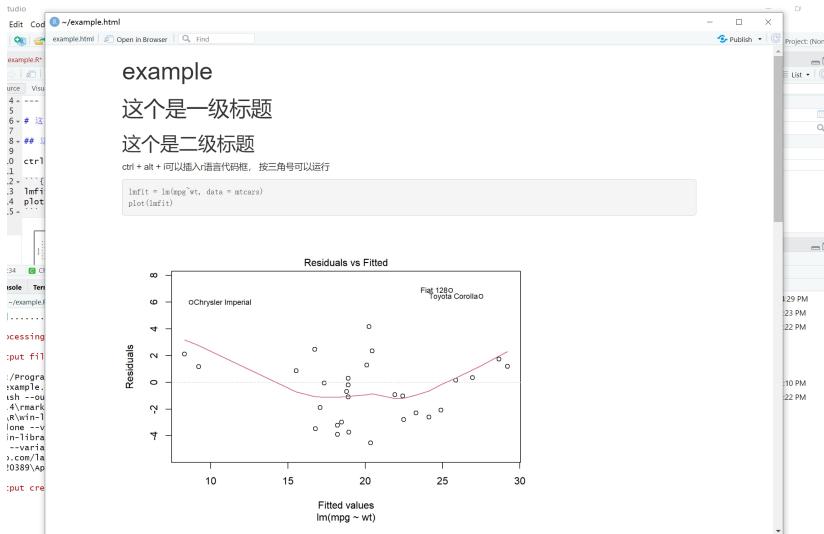
Chrysler Imperial

Ford Corolla

Console

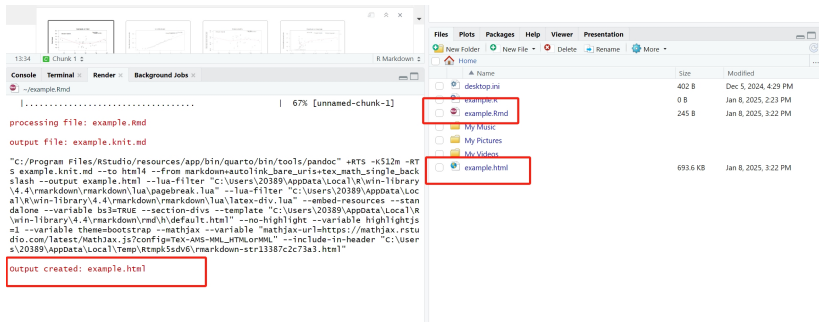
```
R - R 4.4.2 ~/>
AT: libRplot X: 2/20 3
[1] -1 0 0 0 0 0 1 1 1 1 1 2 2 2 2
Arthmt> x %>% Inf # now is defined by limit (gave NaN in earlier versions of R)
[1] Inf 0 1 2 3 4 5 6 7 8 9 10 11 12
```

Render/Knit



- ▶ vignettes: 一般是一个包的使用说明书, 也是 Rmarkdown 的一个应用.

Render/Knit



- ▶ 推荐 render 到 html, 也可以 render 到 pdf, word 等.
- ▶ 试一试 render 到 pdf, 会发生什么?

Rmarkdown 中文乱码问题

1. 本地没有 LaTeX 发行版,
 - ▶ 安装 TinyTeX, 一个精简的 LaTeX 发行版.
 - ▶ `install.packages("tinytex")`
 - ▶ `tinytex::install_tinytex()`
2. 本地已经有 TexLive, MikTeX 等 LaTeX 发行版,
 - ▶ `install.packages("rticles")`
 - ▶ 选择适当的模板, 比如 `ctex template`
3. 多多查找互联网上的解决方案, 比如知乎等平台一定会有相应解决方法分享.
<https://zhuanlan.zhihu.com/p/96993644>

创建 project

- ▶ 注意到, 我们当前的工作路径是 home, 也就是用户目录.
- ▶ 一般来说, 我们不希望这种路径中的文件一团糟, 往往自己会创建一个文件夹, 用于存放项目文件.
- ▶ 另一方面, 创建一个 project, 可以方便的管理文件, 也可以方便分享文件.

The screenshot shows the RStudio interface. The 'Project' dropdown menu is open, showing 'Project: (None)'. The 'Files' pane on the right shows the file structure of the current project, which is 'Home'. The file list includes:

Name	Size	Modified
RData	5.8 KB	Jan 8, 2025, 3:39 PM
Rhistory	568 B	Jan 8, 2025, 3:39 PM
desktop.ini	402 B	Dec 5, 2024, 4:29 PM
example.html	693.6 KB	Jan 8, 2025, 3:22 PM
example.R	336 B	Jan 8, 2025, 3:39 PM
example.Rmd	282 B	Jan 8, 2025, 3:26 PM
example.tex	5.5 KB	Jan 8, 2025, 3:26 PM
My Music		
My Pictures		
My Videos		
test.Rmd	721 B	Jan 8, 2025, 3:40 PM
test.tex	2.8 KB	Jan 8, 2025, 3:28 PM
test_files		

Red arrows point to the 'Project' dropdown menu and the 'Files' pane. Text annotations in Chinese are present:

- “这边也可以” (This side can also) with an arrow pointing to the 'Project' dropdown menu.
- “这边也可以创建文件” (This side can also create files) with an arrow pointing to the 'Files' pane.
- “可以创建项目” (Can create project) with an arrow pointing to the 'Project' dropdown menu.

The console output shows the R version and copyright information:

```
R version 4.4.2 (2024-10-31 ucrt) -- "Pile of Leaves"
Copyright (C) 2024 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64

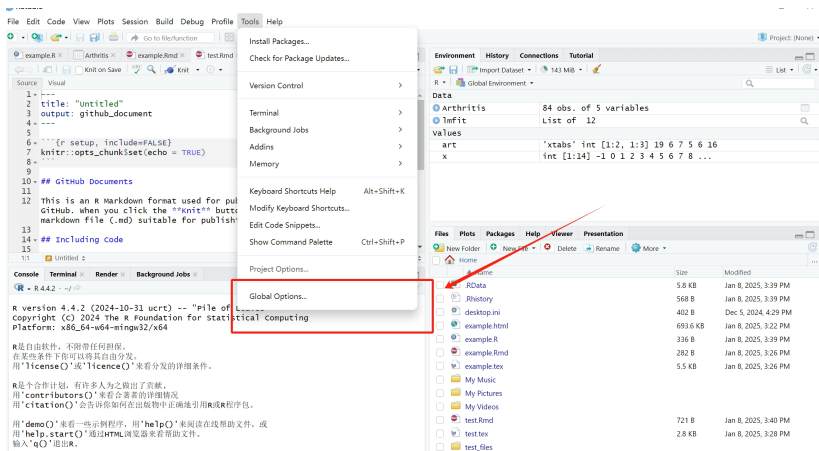
R是自由软件，不附带任何担保。
在某些条件下你可以根据其自由分发。
用 'license()' 或 'licence()' 查看分发的详细条件。

R是个合作计划，有许多人为之做出了贡献。
用 'contributors()' 查看合著者的详细情况
用 'citation()' 会告诉你如何在出版物中正确地引用R或R程序包。

用 'demo()' 查看一些示例程序，用 'help()' 来阅读在线帮助文件，或
用 'help.start()' 通过HTML浏览器来看帮助文件。
输入 'q()' 退出R。

[workspace loaded from ~/RData]
```

设置 Rstudio



- ▶ 把界面设置为不同的主题? 字体大小?
- ▶ 设置代码自动补全? 缩进格式?
- ▶ 选择合适的 CRAN 镜像?

一些公开数据来源

以下公开数据集来源供各位同学完成报告作业时参考, 也可以使用其他来源的数据集, 但请在小组展示的幻灯片和数据分析报告中注明数据源.

- ▶ General Statistical Learning Data
 - ▶ UC Irvine Machine Learning Repository:
<https://archive.ics.uci.edu/ml/index.php>
 - ▶ Kaggle: <https://www.kaggle.com/datasets>
 - ▶ Data collections for psychological science research, by American Psychological Association: <https://www.apa.org/research-practice/conduct-research/data-links>
- ▶ Economics and Finance
 - ▶ Global Financial Development Database by The World Bank:
<https://datacatalog.worldbank.org/search/dataset/0038648>
 - ▶ Yahoo Finance: <https://finance.yahoo.com/>
 - ▶ Finance Data Directory by U.S. Department of The Treasury:
<https://home.treasury.gov/>

一些公开数据来源

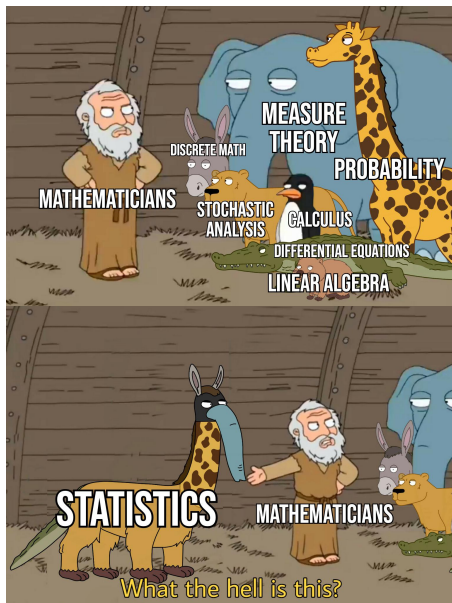
► Biomedical Data

- NIH Data Sharing Repositories: https://www.nlm.nih.gov/NIHbmic/domain_specific_repositories.html
- Gene Expression Omnibus (GEO), a genomics data repository maintained by The National Center for Biotechnology Information (NCBI), U.S.:
<https://www.ncbi.nlm.nih.gov/geo/>
- The Cancer Genome Atlas (TCGA) by National Cancer Institute (NCI), U.S.: <https://www.cancer.gov/ccg/research/genome-sequencing/tcga>

► Governmental Data

- 国家统计局: <https://www.stats.gov.cn/sj/>
- 上海公共数据开放平台: <https://data.sh.gov.cn/>
- U.S. Population Data from U.S. Census Bureau:
<https://www.census.gov/data.html>

学习统计学



总结

看了本教程, 你应该会:

- ▶ 安装 R, Rstudio, Rtools.
- ▶ 创建一个 R 脚本, 运行一些代码.
- ▶ 安装一个包, 使用包中的数据.
- ▶ 创建一个 Rmarkdown, 运行一些代码.
- ▶ 创建一个 project.
- ▶ 设置 Rstudio.

更深入地学习统计学和统计软件, 不但要在课上认真思考, 还要多看书, 多学习别人的代码, 希望大家在学习 R 语言的过程中有所收获.