

Introduction to R, RStudio and RStudio Cloud



Installation ,Packages, Directory, Data Management and Analysis

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updated: 2023-03-02

What we will cover today?

R and RStudio

RStudio Cloud

Installation for R and RStudio

Optional installation for Miktex or Texlive and MacTex

R scripts, R packages, R Taskview

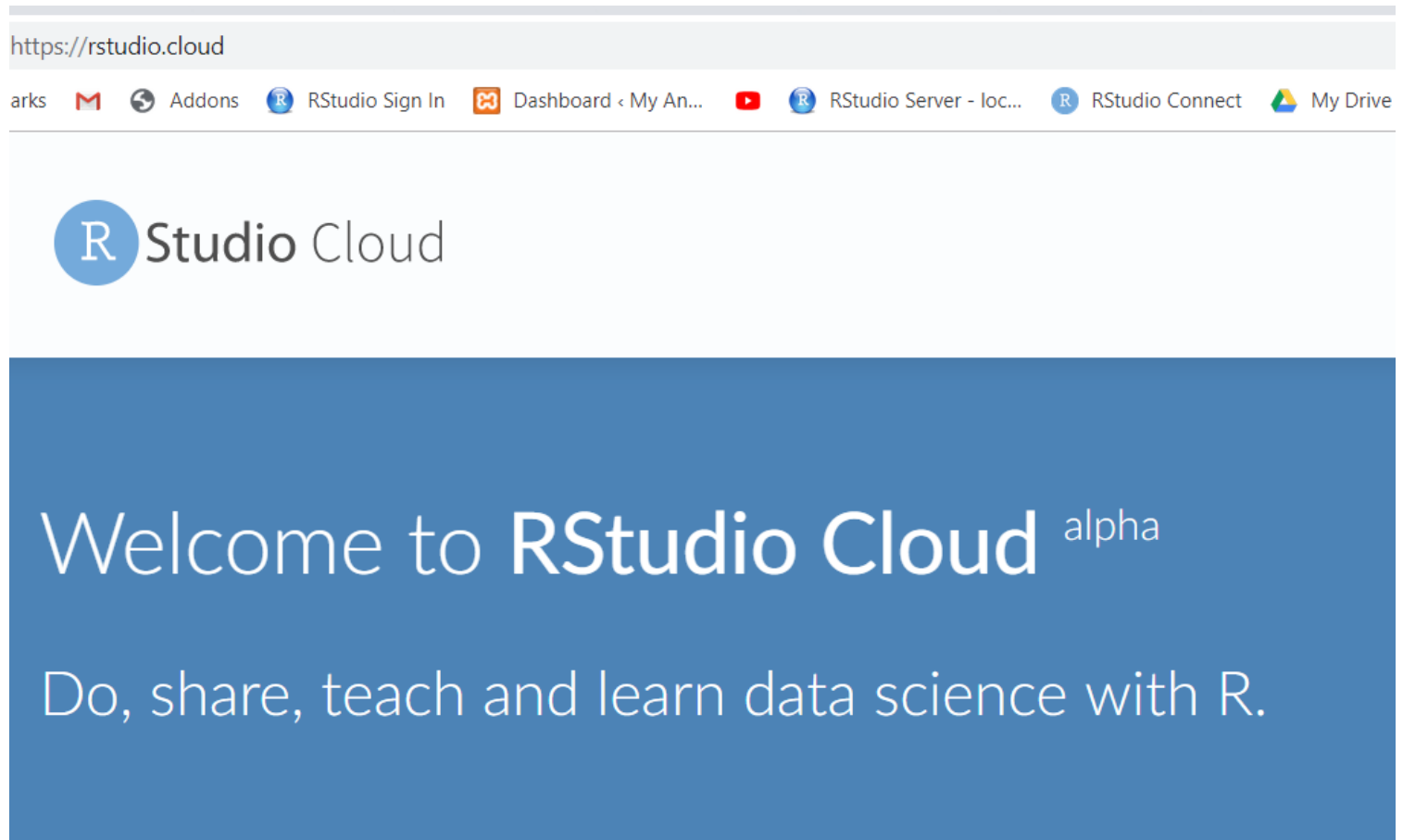
Live-coding (partial)

RStudio Cloud

- Anyone can sign up
- Using RStudio on the cloud
- Perhaps one of the quickest way to learn R
- Do not need to install R on your machine (for this lecture)
- Allows collaboration.
- Facilitate learning. Free for now
- Go here <https://rstudio.cloud/>

RStudio Cloud





Interface



RStudio Cloud

Sign up and Log in (Please Sign Up, Now). This take around 5 mins

https://login.rstudio.cloud/register?redirect=https%3A%2F%2Fclient.login.rstudio.cloud%2Foauth%2Flogin%3Fshow_auth%3D0%26s

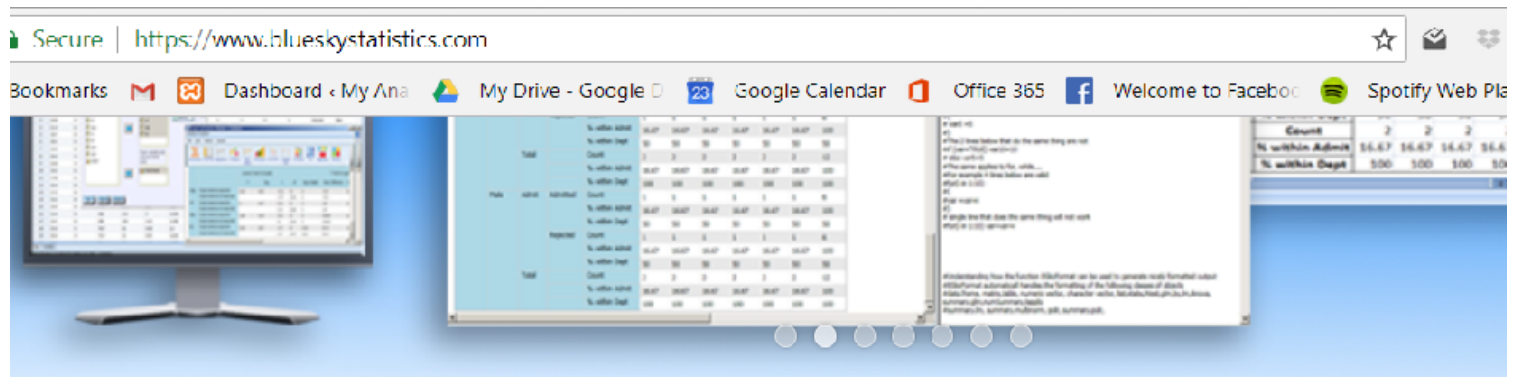
marks   Addons  RStudio Sign In  Dashboard < My An...   RStudio Server - loc...  RStudio Connect  My Drive



Point and click R GUI

A number of SPSS like GUI for R

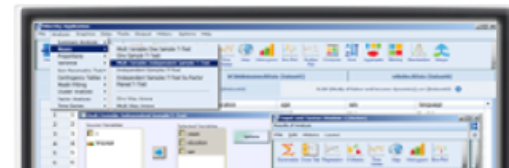
- <https://www.blueskystatistics.com/>



Featured Statistics application and development network built on the open source R project

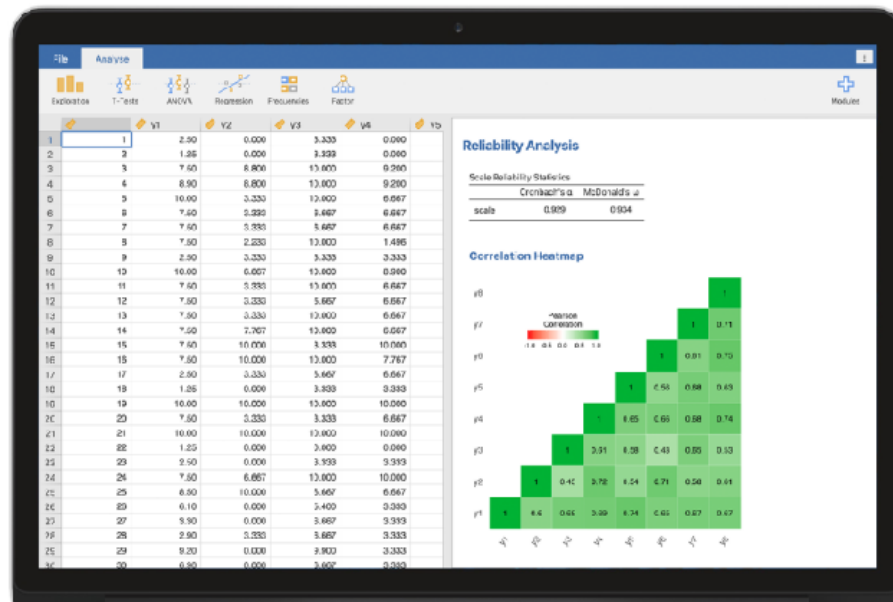
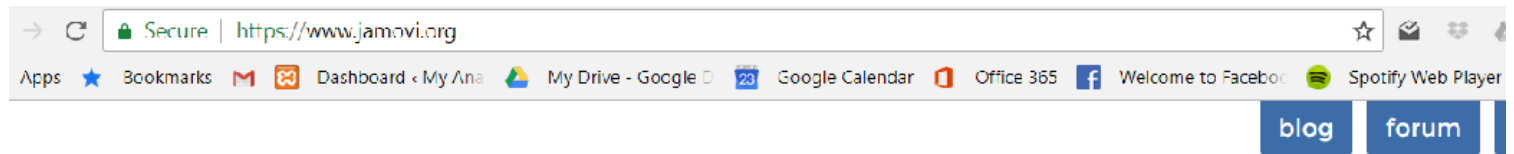
Provides familiar powerful user interface available in stream statistical applications like SPSS, SAS etc.

Checks the power of R for the analyst community by providing a rich GUI and output for several popular statistics, mining, data manipulation and graphics commands, all of the box...



Point and click R GUI

- <https://www.jamovi.org/>



RStudio Server

- You can install R and RStudio on the server
 - RStudio Server
- Doing analysis on the server
- Give a taste of working on BIG DATA
- Two versions of RStudio Server
 - RStudio Server
 - RStudio Server Professional
- For example:
 - <https://healthdata.usm.my/rstudio/auth-sign-in>

Installation

You have to have **Admin Right** to your machine

Installation (Do this at home on your machine)

R

RStudio

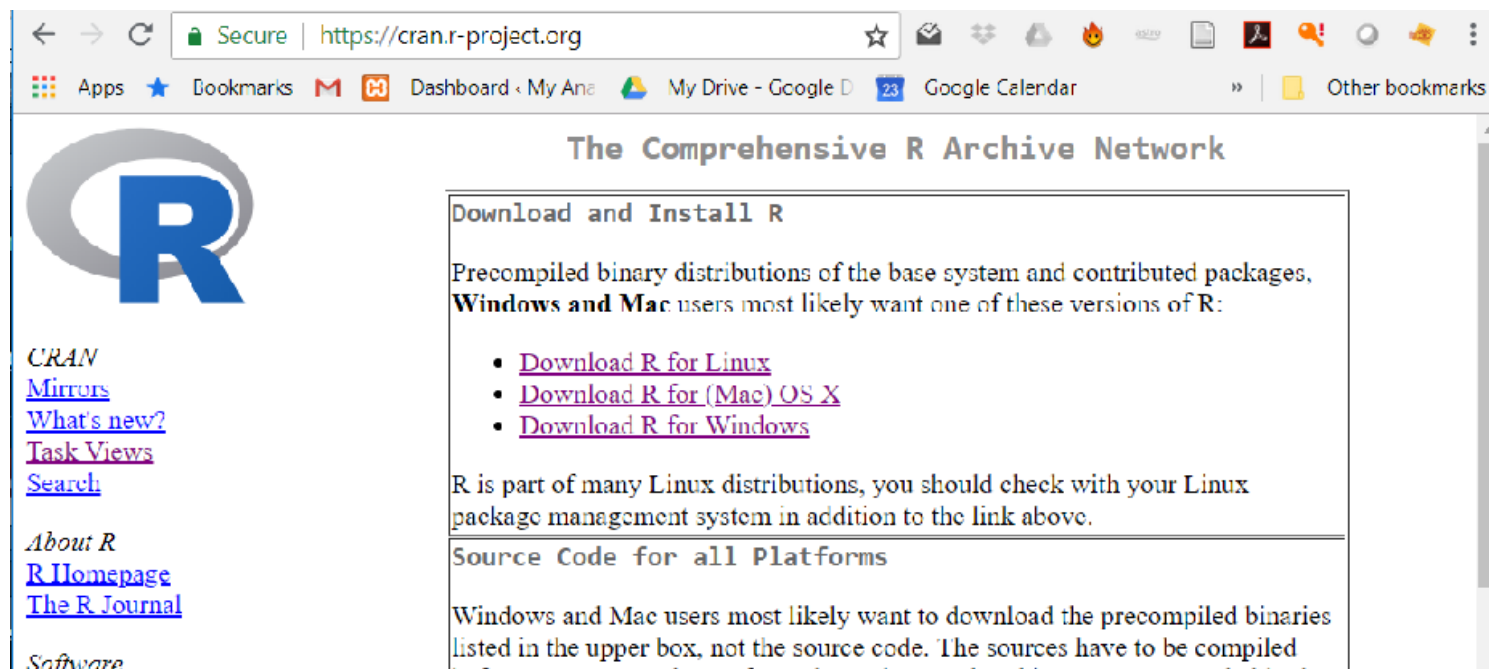
MiKTeX, TeXLive and MacTeX (optional)

Installation for R

We need to install two software (at least)

Install the **R** software from **cran**.

- choose R version for your machine OS
- Windows OS <https://cran.r-project.org/bin/windows/base/R-3.6.1-win.exe>
- Mac OS <https://cran.r-project.org/bin/macosx/R-3.6.1.pkg>
- Linux: then choose your flavour



The screenshot shows a web browser window with the address bar displaying <https://cran.r-project.org>. The browser's toolbar includes navigation buttons, a star icon, and various extension icons. Below the toolbar, the browser's bookmark bar shows links to 'Apps', 'Bookmarks', 'Dashboard', 'My Ana', 'My Drive - Google D', 'Google Calendar', and 'Other bookmarks'. The main content of the page is titled 'The Comprehensive R Archive Network'. On the left side, there is a large blue 'R' logo. Below the logo, there are several links: 'CRAN', 'Mirrors', 'What's new?', 'Task Views', 'Search', 'About R', 'R Homepage', 'The R Journal', and 'Software'. 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:'. Below this text, there are three bullet points: 'Download R for Linux', 'Download R for (Mac) OS X', and 'Download R for Windows'. Further down, there is a section titled 'Source Code for all Platforms' which states: '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'.

CRAN

[Mirrors](#)

[What's new?](#)

[Task Views](#)

[Search](#)

[About R](#)

[R Homepage](#)

[The R Journal](#)

[Software](#)

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](#)

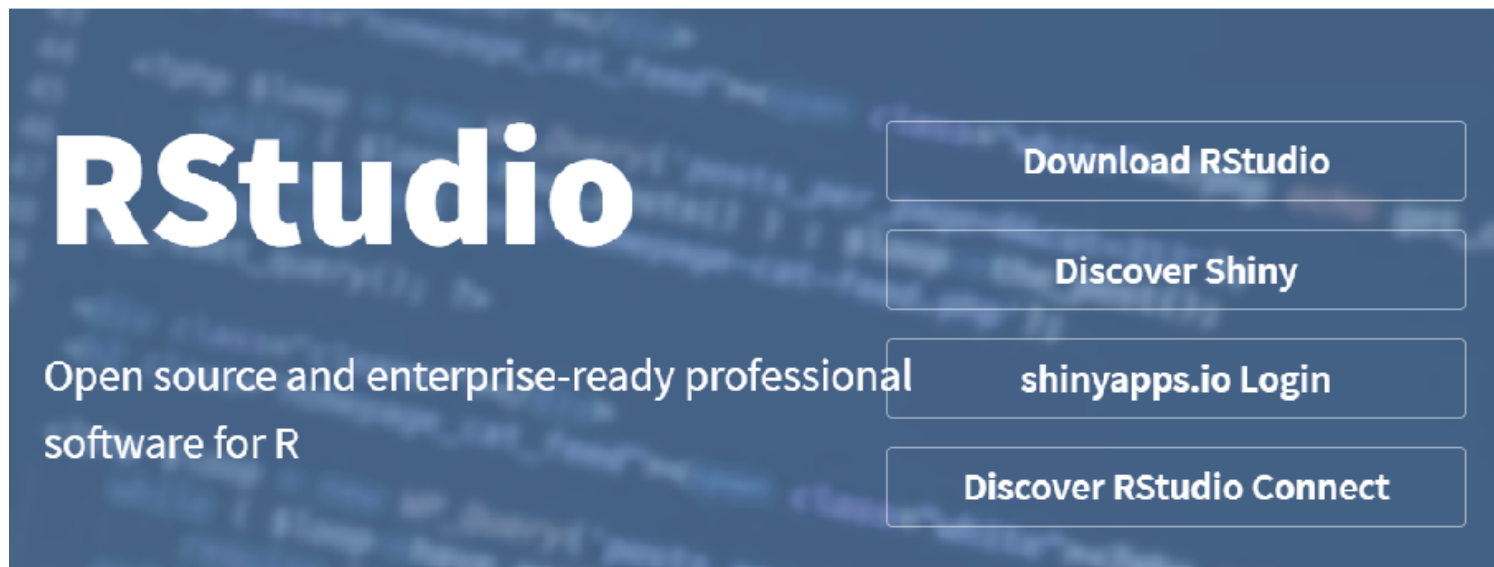
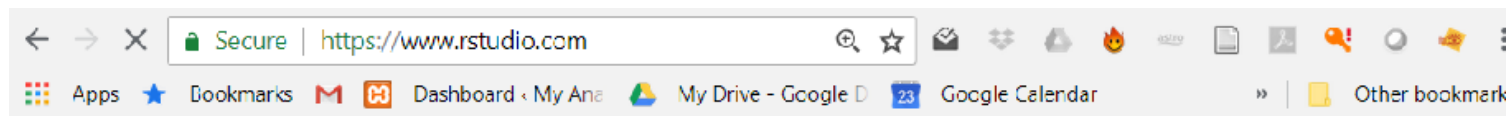
R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

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

Installation for RStudio

- Install RStudio for your OS from here
<https://www.rstudio.com/products/rstudio/download/#download>
- Choose the supported platforms
- size around 70-90 MB



Check R and RStudio on your machine

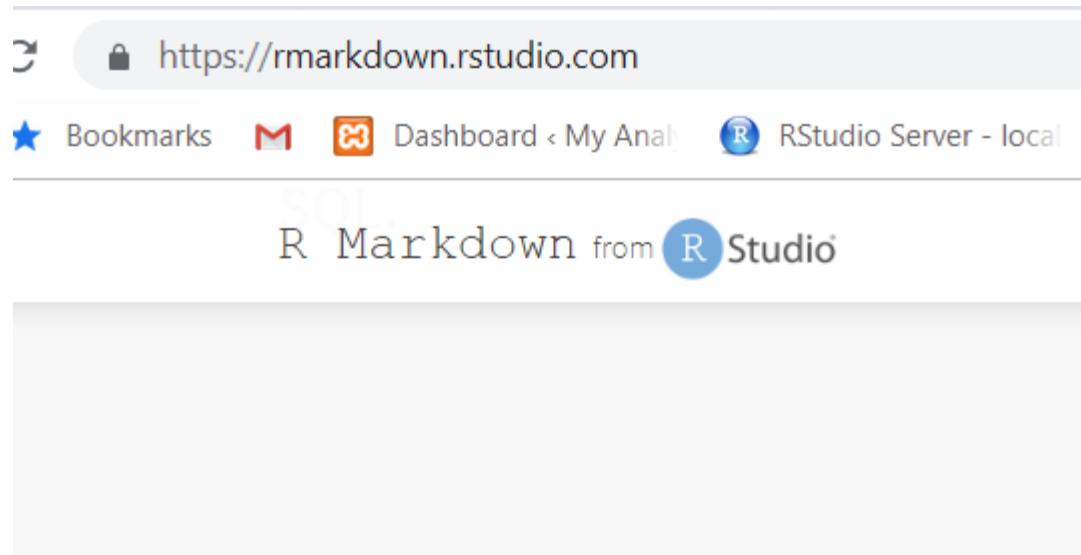
Do you have R? what version?

Do you have RStudio? what version?

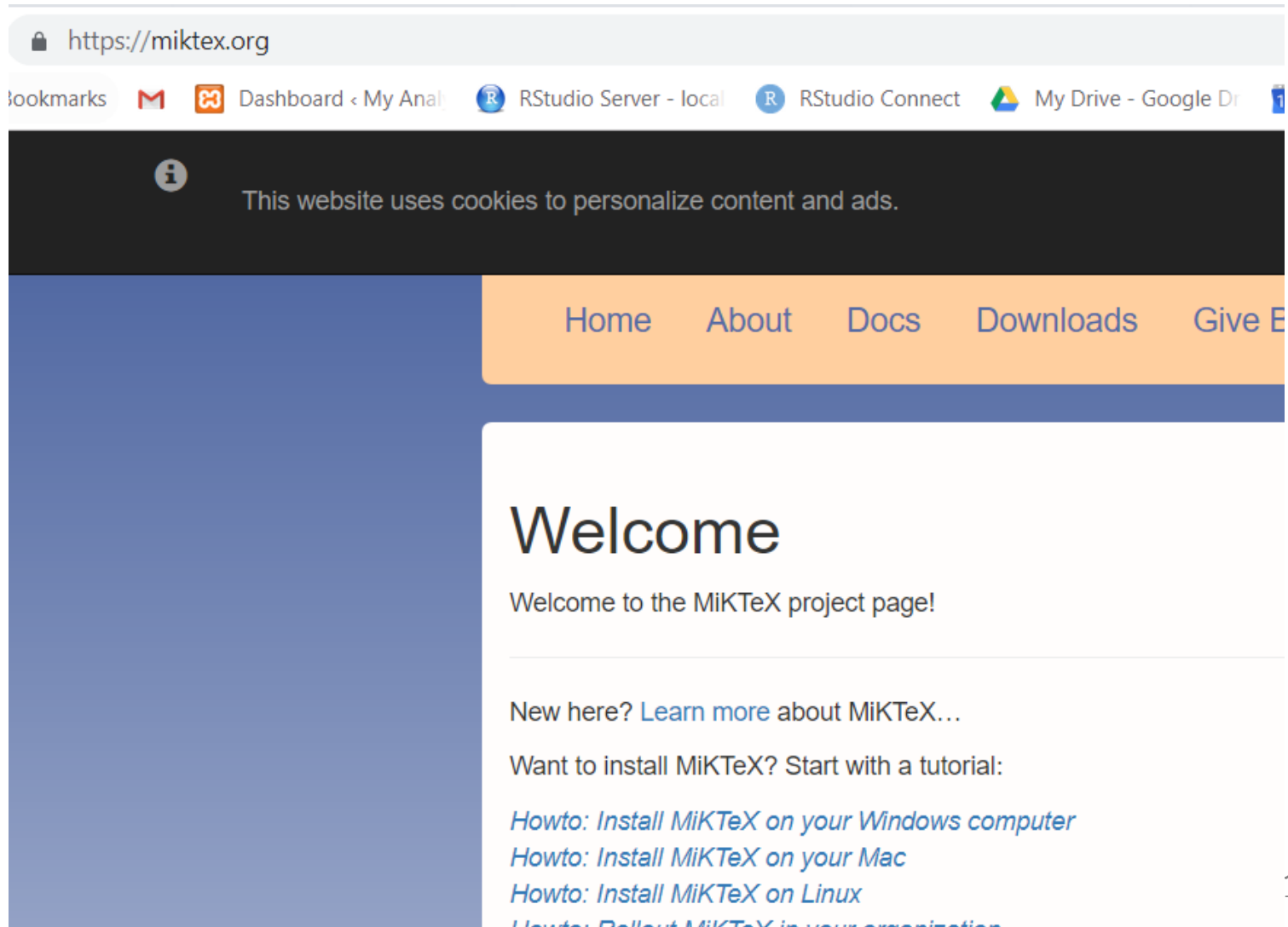
Do you need to update?

Installation of MiKTeX, TeXLive and MacTeX

- necessary to convert the outputs to pdf
- will use this for RMarkdown










MiKTeX, for Window OS



The screenshot shows the MiKTeX website homepage. The browser's address bar displays 'https://miktex.org'. The page features a dark blue sidebar on the left and a light blue header with navigation links: Home, About, Docs, Downloads, and Give E. A black cookie notice banner is present, stating 'This website uses cookies to personalize content and ads.' The main content area has a large 'Welcome' heading, followed by the text 'Welcome to the MiKTeX project page!'. Below this, there are links for new users to 'Learn more about MiKTeX...', a tutorial link 'Want to install MiKTeX? Start with a tutorial:', and three specific installation guides: 'Howto: Install MiKTeX on your Windows computer', 'Howto: Install MiKTeX on your Mac', and 'Howto: Install MiKTeX on Linux'. A fourth link, 'Howto: Rollout MiKTeX in your organization', is partially visible at the bottom.

https://miktex.org

bookmarks   Dashboard < My Anal  RStudio Server - local  RStudio Connect  My Drive - Google Dr 

 This website uses cookies to personalize content and ads.

Home About Docs Downloads Give E

Welcome

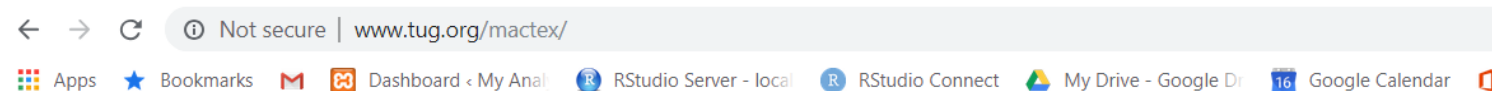
Welcome to the MiKTeX project page!

New here? [Learn more](#) about MiKTeX...

Want to install MiKTeX? Start with a tutorial:

- [Howto: Install MiKTeX on your Windows computer](#)
- [Howto: Install MiKTeX on your Mac](#)
- [Howto: Install MiKTeX on Linux](#)
- [Howto: Rollout MiKTeX in your organization](#)

MacTeX, for Mac OS



[TWG](#) | [MacTeX](#) | [Donate](#) | [FAQ](#) | [Fonts](#) | [Help](#) | [References](#) | [Support](#) | [Acknowledgments](#) | [TUG](#)

The MacTeX-2018 Distribution **Policy on Supported-Systems** **Please Read**

The current distribution is MacTeX-2018
This distribution requires Mac OS 10.10, Yosemite, or higher and runs on Intel processors.

Progress?

R

- R OK?

RStudio

- RStudio OK?

MiKTeX or MacTeX (optional)

- MiKTeX, TeXLive and MacTeX ready?

Hands-On (2 options): Start your RStudio

Login to RStudio Cloud

OR

Start RStudio on your machine

Login to RStudio Cloud

<https://rstudio.cloud>

- username
- password

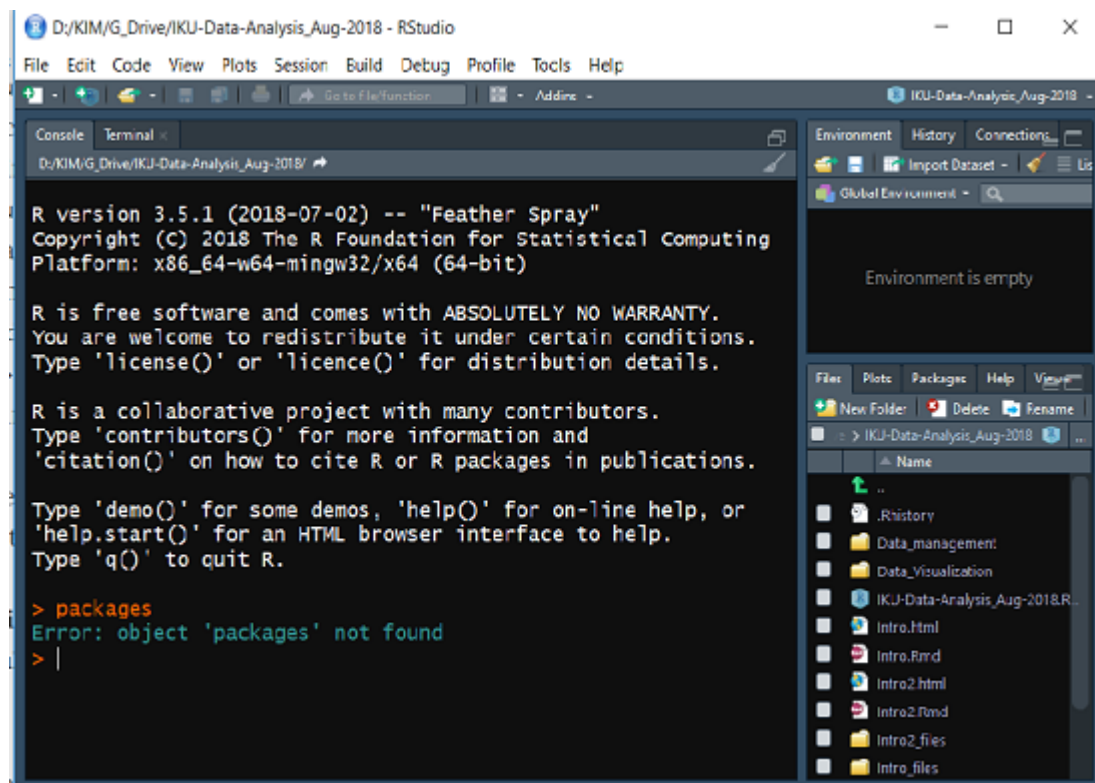
Click this link [https://posit.cloud/spaces/346031/join?
access_code=bXIJZHLLSqvkG-Kuk3K1D8JXiIyErmPsAPTUjC69](https://posit.cloud/spaces/346031/join?access_code=bXIJZHLLSqvkG-Kuk3K1D8JXiIyErmPsAPTUjC69)

Login to Rstudio Cloud

The screenshot displays the RStudio Cloud web interface. The browser's address bar shows the URL `rstudio.cloud/spaces/44275/projects`. The top navigation bar includes links for Apps, Bookmarks, Addons, RStudio Sign In, and a Dashboard. The main header features the RStudio Cloud logo and the title 'ETM5950 - Data Analytics in ...', with tabs for 'Projects' and 'Members'. On the left sidebar, under the 'Spaces' section, 'Your Workspace' is listed, and 'ETM5950 - Data Analytics' is selected and highlighted. Other spaces listed include 'Medical Statistics', 'Multivariable Analysis - DrP', and 'Prof KIM's Legacy', along with a 'New Space' button. The main content area is titled 'Shared Projects' and contains a large grey box with the text 'no projects'.

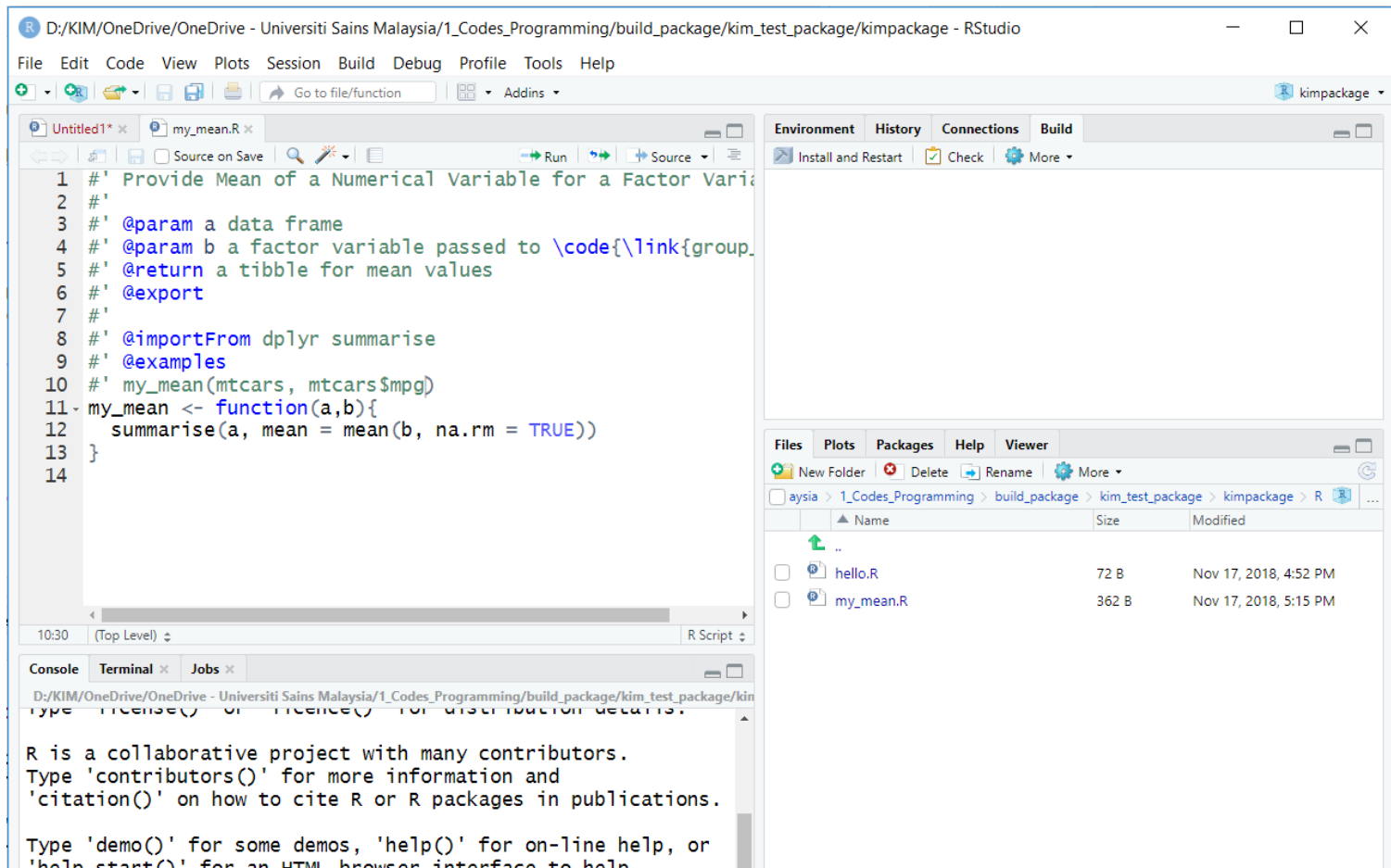
Start R on your machine

- Find Rstudio in your machine



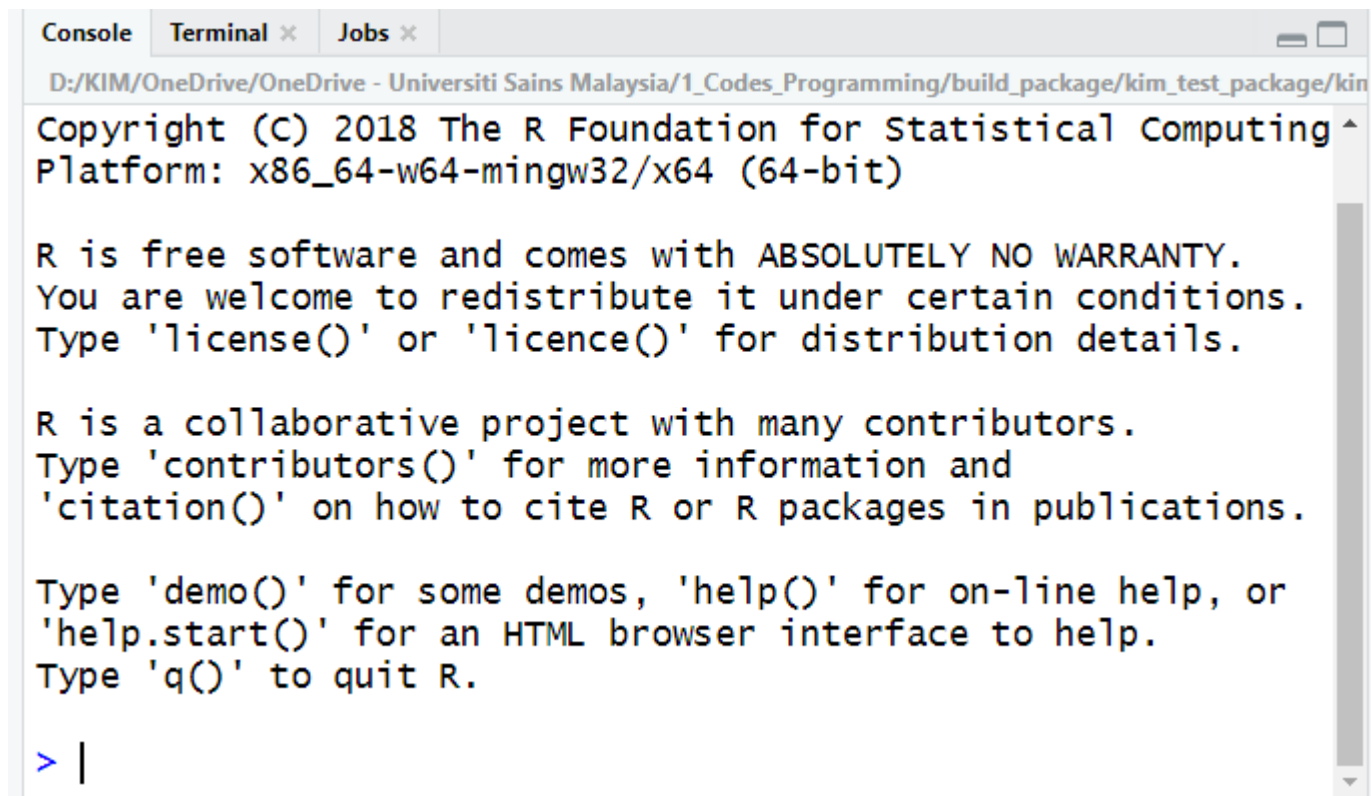
What you see on RStudio

- There will be 3 panes if you start Rstudio for the first time
- 4 panes if you have used RStudio before



Console tab

- this is where we will see most of the results



The screenshot shows the R console window with three tabs: 'Console', 'Terminal', and 'Jobs'. The 'Console' tab is active. The path in the title bar is 'D:/KIM/OneDrive/OneDrive - Universiti Sains Malaysia/1_Codes_Programming/build_package/kim_test_package/kim'. The console output displays the R startup message, including the copyright notice, platform information, and instructions on how to use R and its packages. The prompt '>' is visible at the bottom.

```
Copyright (C) 2018 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.

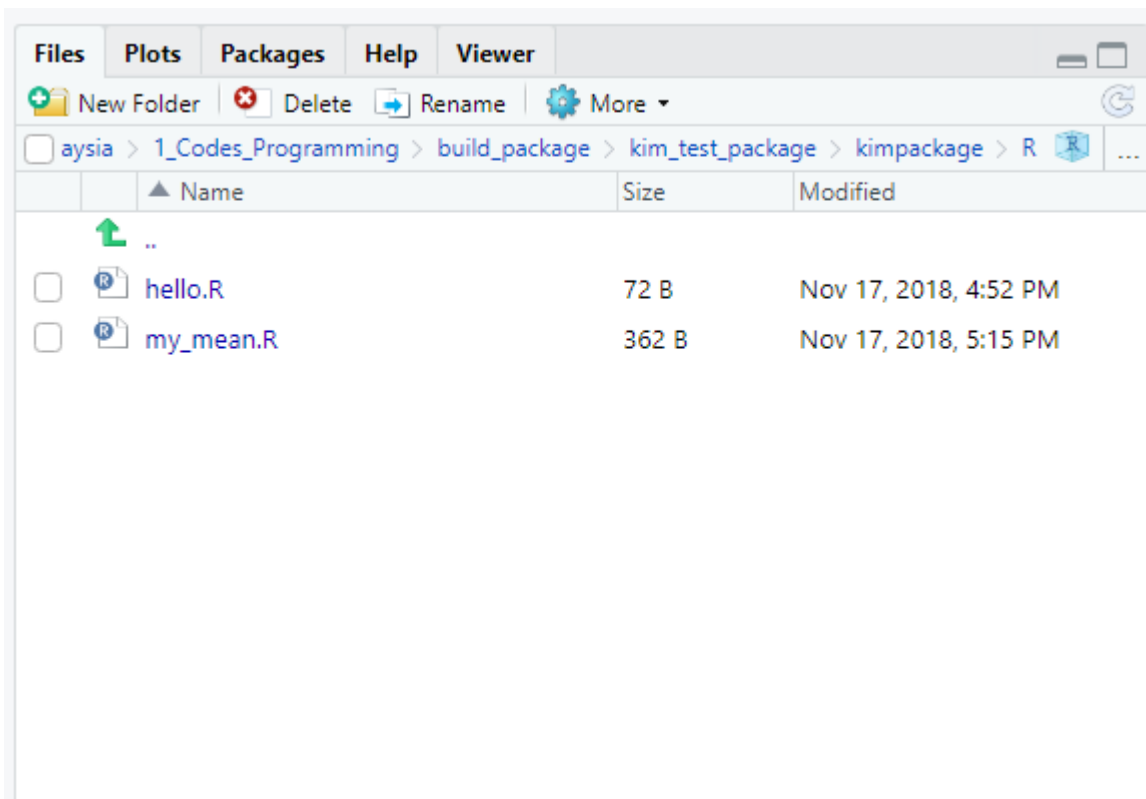
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

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.

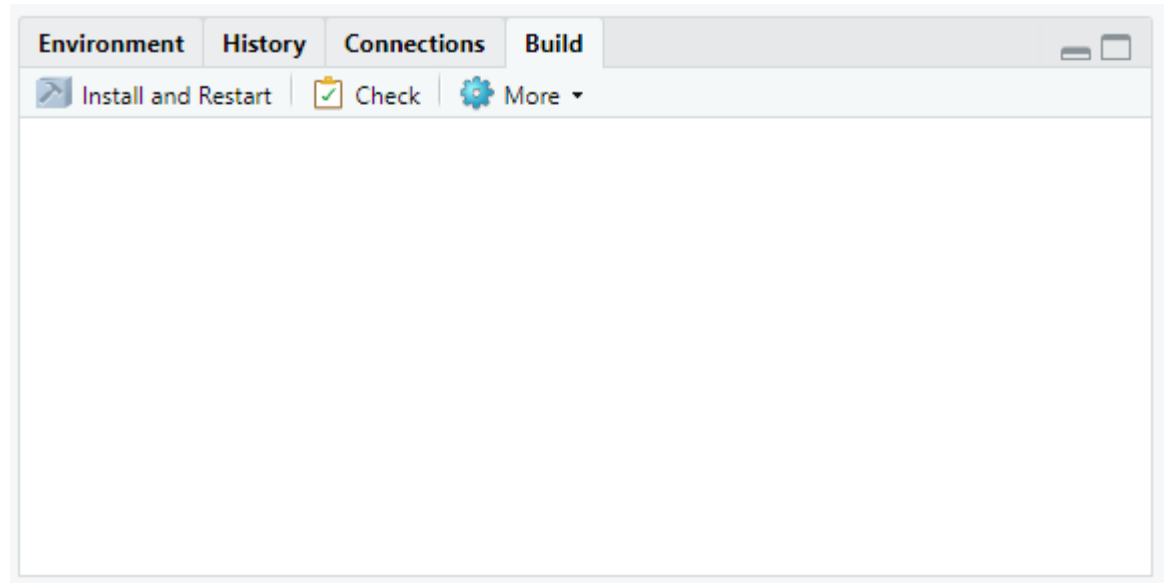
> |
```


Files, Plots, Packages, Help and Viewer Pane

- List of objects
- R files, datasets, tables, list etc

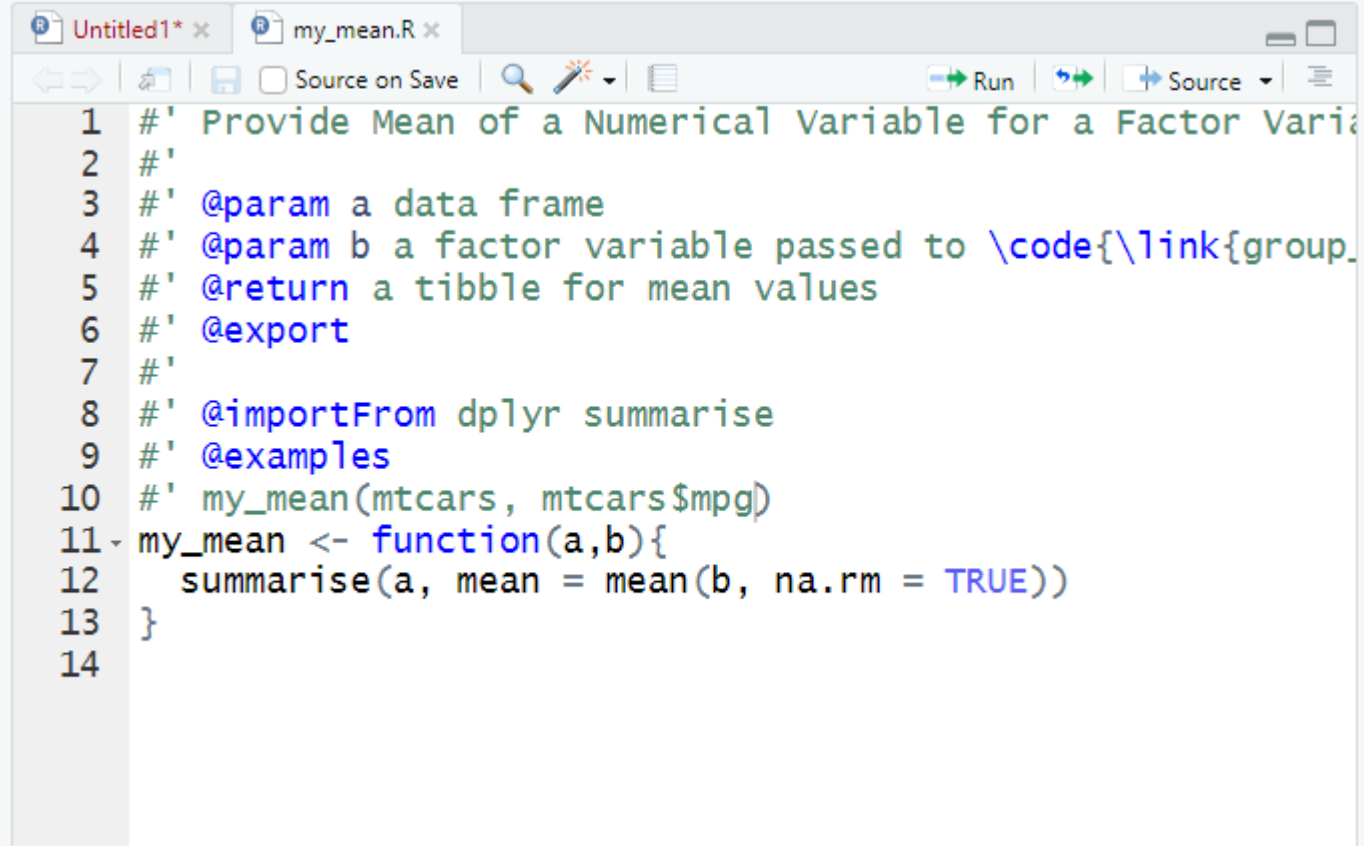


Environment, History, Connection and Build Pane



Source Pane

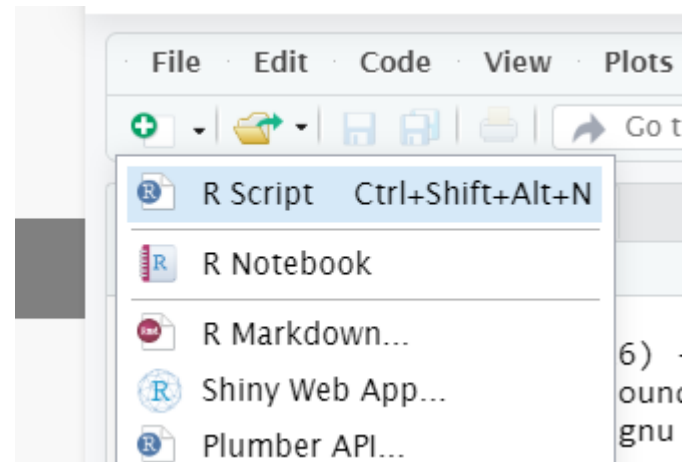
- this is where we will create files and write our codes



```
1 #' Provide Mean of a Numerical Variable for a Factor Variable
2 #'
3 #' @param a data frame
4 #' @param b a factor variable passed to \code{\link{group_by}}
5 #' @return a tibble for mean values
6 #' @export
7 #'
8 #' @importFrom dplyr summarise
9 #' @examples
10 #' my_mean(mtcars, mtcars$mpg)
11 my_mean <- function(a,b){
12   summarise(a, mean = mean(b, na.rm = TRUE))
13 }
14
```

Open a new R script

- File -> R Script
- In Window OS, CTRL-SHIFT-N



Our first R script

First script

- In Line 1, type `2 + 3`
- click CTRL-ENTER or CMD-ENTER
- see the outputs in the Console Pane

```
2 + 3
```

```
## [1] 5
```

Saving R script

For future use

- File ->
- Save As ->
- Choose folder ->
- Name the file

Check version of R

```
version[6:7]
```

```
##           _  
## status  
## major    4
```

The current version for R is , 4

If you lower version, then you want to upgrade. To upgrade

- for Windows, you can use **installr** package
- for Mac OS, you can use some functions

More info here <https://www.linkedin.com/pulse/3-methods-update-r-rstudio-windows-mac-woratana-ngarmtrakulchol/>

function, argument and parameters

```
f <- function(<arguments>) {  
## Do something interesting  
}
```

For example, for the function `lm()` to estimate parameters for linear regression model

```
args(lm)
```

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


For example:

```
lm(weight ~ Time, data = ChickWeight)
```

```
##  
## Call:  
## lm(formula = weight ~ Time, data = ChickWeight)  
##  
## Coefficients:  
## (Intercept)          Time  
##      27.467         8.803
```

Ref:

- <https://www.stat.auckland.ac.nz/~ihaka/downloads/Waikato-WRUG.pdf>
- <https://www.stat.berkeley.edu/~statcur/Workshop2/Presentations/functions.pdf>

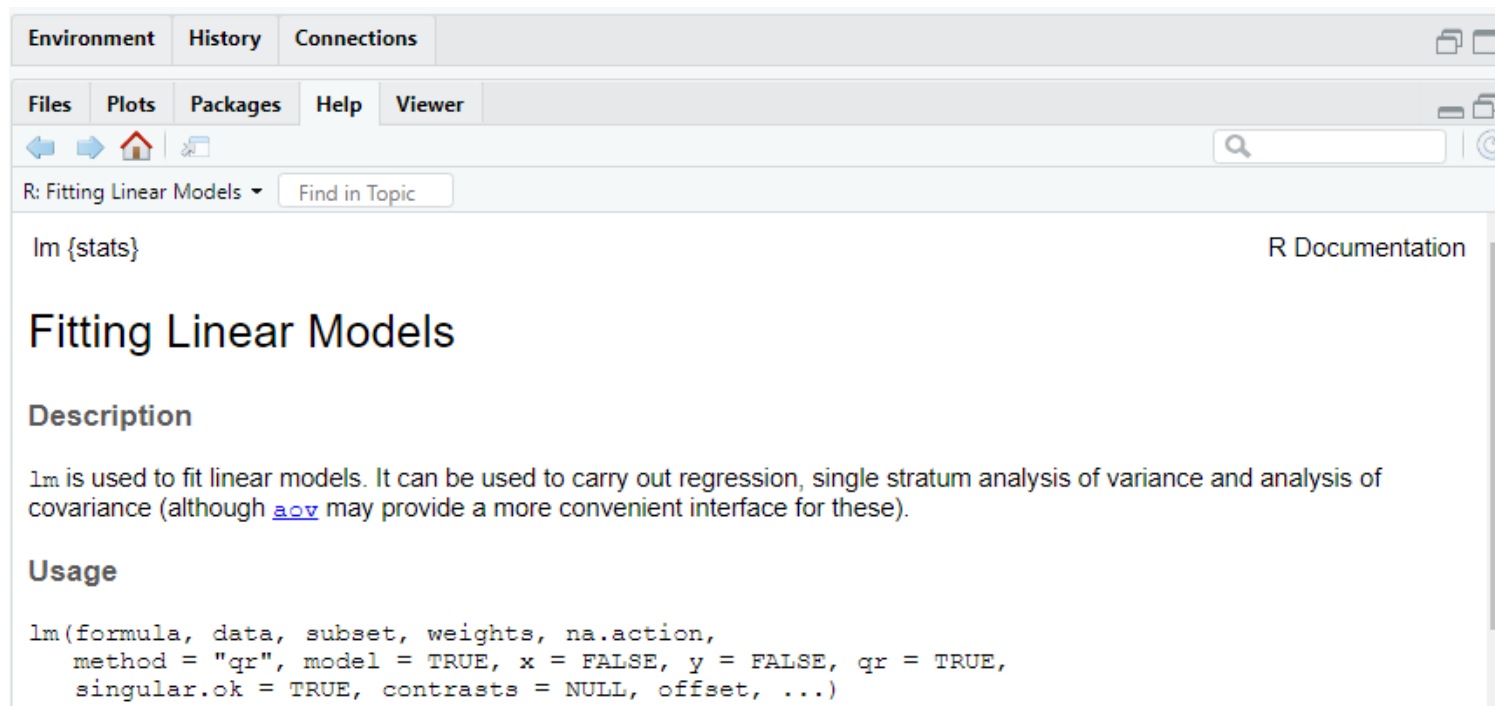
Need more help?

Then type the ? before the function

```
?lm
```

```
## starting httpd help server ... done
```

See what will be displayed in Help Pane



The screenshot shows the RStudio interface with the Help Pane open. The top bar includes tabs for Environment, History, Connections, Files, Plots, Packages, Help, and Viewer. The Help Pane title bar reads "R: Fitting Linear Models" and contains a search box. The main content area displays the documentation for the `lm` function, including its signature `lm {stats}`, the title "Fitting Linear Models", a "Description" section, and a "Usage" section with the function signature.

lm {stats} R Documentation

Fitting Linear Models

Description

`lm` is used to fit linear models. 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

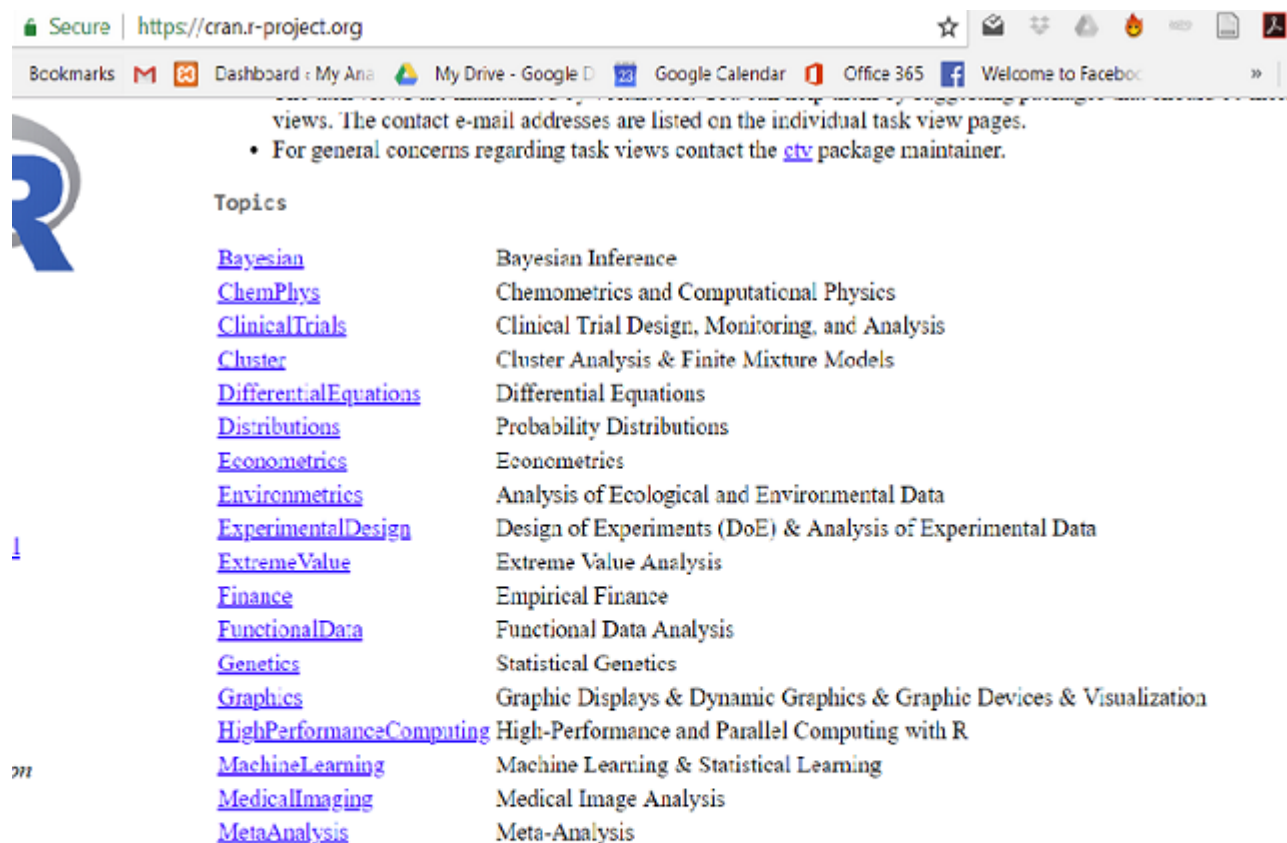
```
lm(formula, data, subset, weights, na.action,  
   method = "qr", model = TRUE, x = FALSE, y = FALSE, qr = TRUE,  
   singular.ok = TRUE, contrasts = NULL, offset, ...)
```

Packages

Packages on CRAN

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

- Currently, the CRAN package repository features 12784 available packages
- Cran Task Views



The screenshot shows the CRAN website interface. At the top, there's a browser address bar with the URL <https://cran.r-project.org/>. Below the address bar, there's a navigation bar with links to 'Bookmarks', 'Dashboard', 'My Drive', 'Google Calendar', 'Office 365', and 'Welcome to Facebook'. The main content area features the CRAN logo on the left and a 'Topics' section on the right. The 'Topics' section lists various task views, each with a link to its page and a brief description. The list includes: Bayesian Inference, Chemometrics and Computational Physics, Clinical Trial Design, Monitoring, and Analysis, Cluster Analysis & Finite Mixture Models, Differential Equations, Probability Distributions, Econometrics, Analysis of Ecological and Environmental Data, Design of Experiments (DoE) & Analysis of Experimental Data, Extreme Value Analysis, Empirical Finance, Functional Data Analysis, Statistical Genetics, Graphic Displays & Dynamic Graphics & Graphic Devices & Visualization, High-Performance and Parallel Computing with R, Machine Learning & Statistical Learning, Medical Image Analysis, and Meta-Analysis.

views. The contact e-mail addresses are listed on the individual task view pages.

- For general concerns regarding task views contact the [ctv](#) package maintainer.

Topics

Bayesian	Bayesian Inference
ChemPhys	Chemometrics and Computational Physics
ClinicalTrials	Clinical Trial Design, Monitoring, and Analysis
Cluster	Cluster Analysis & Finite Mixture Models
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
MachineLearning	Machine Learning & Statistical Learning
MedicalImaging	Medical Image Analysis
MetaAnalysis	Meta-Analysis

Check if the package you need is available in your R library

Type this inside your console

```
library(ggplot2)
```

- You should not receive any error message.
- If you have not installed the package, you will receive an error message. And it tells you that the package is not available in your R.
- the package is stored in the R folder in your My Document or HOME directory

```
.libPaths()
```

```
## [1] "C:/Users/drkim/AppData/Local/R/win-library/4.2"
```

```
## [2] "C:/Program Files/R/R-4.2.2/library"
```

Install an R package

- To install an R package, you can type below (without the # tag)

```
# install.packages(foreign, dependencies = TRUE)
```

- You need to have internet access
- You can install from a zip file (from your machine or USB), from github and other repo

Directory

Directory

This is important. Not knowing your working directory will make you lost

- You must know where your folder is located
- The folder can contain many sub folders
- The folder should contain dataset (if you want to analyze your data)
- It will later store the objects created during R session

```
getwd()
```

```
## [1] "C:/Users/drkim/OneDrive - Universiti Sains Malaysia/1_Codes_Programmi"
```

- You have to know to write file path. It is written differently for Window OS and other OS

Starting your R job

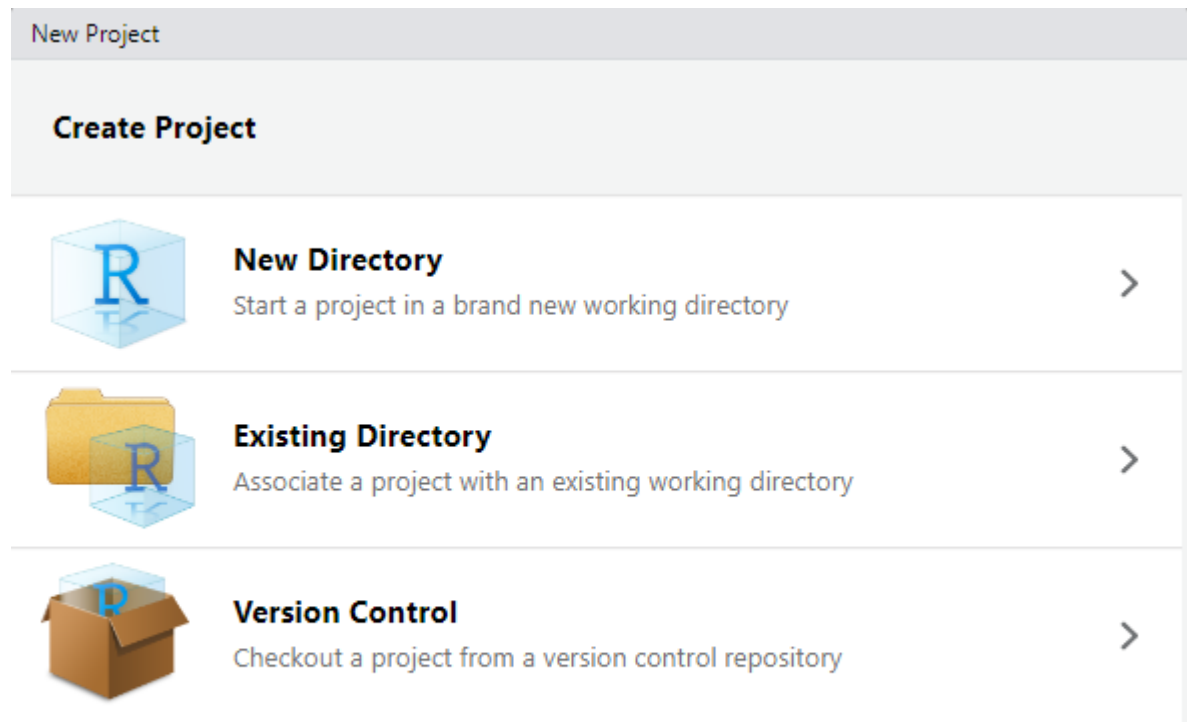
There are 2 ways to start your job

- create a new project (recommended)
- setting your working directory using `setwd()` (not recommended)

Create new project

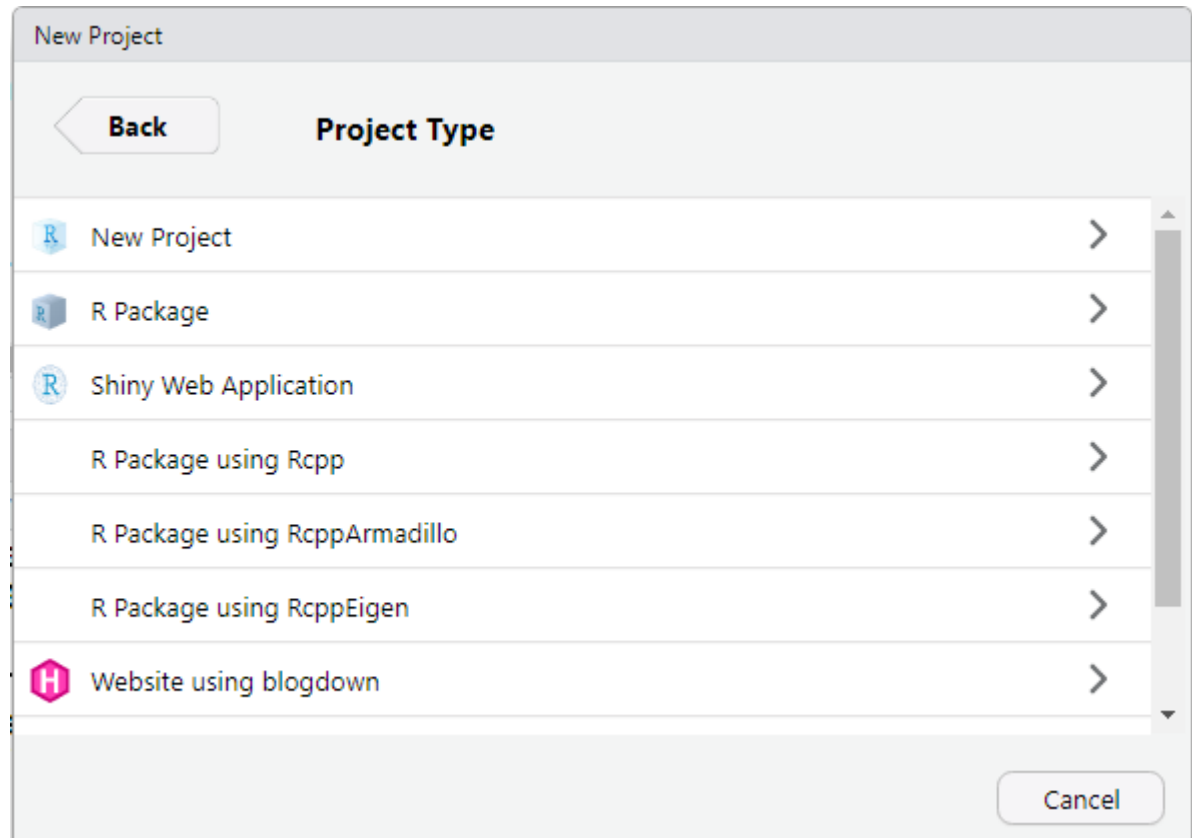
- Always create a new project (This is the recommended way)
- Go to File -> New Project

Directory



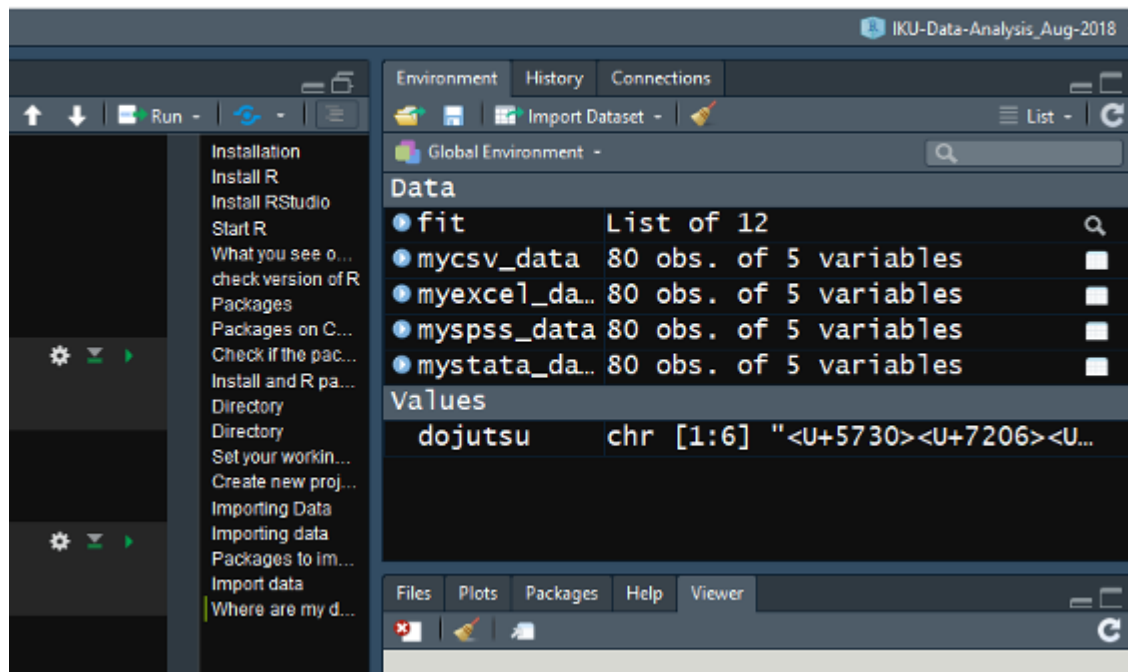
Project type

Click New Project



Where is my data?

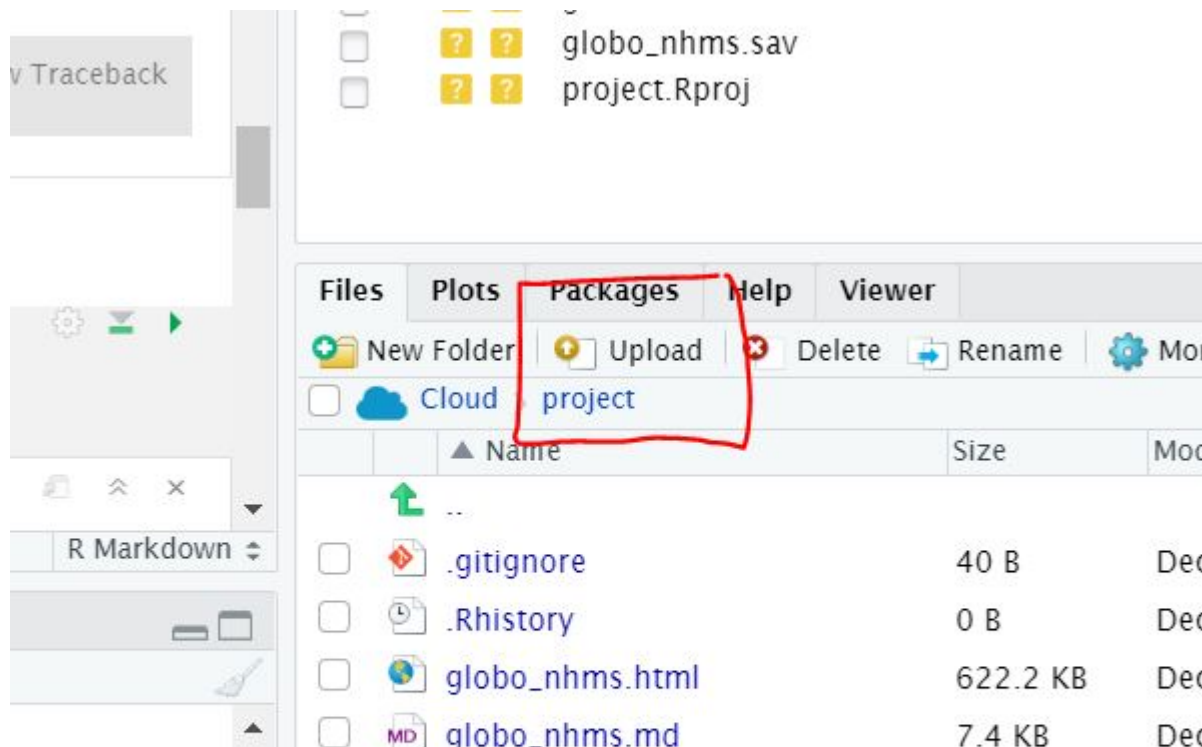
- in (usually) data frame form
- See the environment pane
- Your data is now in memory (RAM)
- How much your RAM for your machine?
- The data will be gone once you close RStudio
- But it will not change your original data (so be happy!)



Upload data to RStudio Cloud

You have to upload data to RStudio Cloud

Or link data to dropbox folder



More resources on RStudio Cloud

YouTube : RStudio Cloud for education

<https://www.youtube.com/watch?v=PviVimazpz8>

YouTube: Working with R in Cloud

<https://www.youtube.com/watch?v=SFpzt21Pavg>

Need help

If you need help you can

- Type a question mark in front of a function

```
?plot
```

- register and join RStudio Community here <https://community.rstudio.com/>
- Ask questions on Stack Overflow <https://stackoverflow.com/>
- Search for mailing list and subscribe to it
- Books on R <https://bookdown.org/>

Bookdown

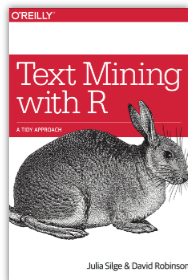
<https://bookdown.org/>

Text Mining with R

by Julia Silge and David Robinson

2018-07-26

Star 509



A guide to text analysis within the tidy data framework, using the tidytext package and other tidy tools [...] This is the website for Text Mining with R! Visit the GitHub repository for this site, find the book at O'Reilly, or buy it on Amazon. This work by Julia Silge and David Robinson is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 United States ... [Read more](#) →

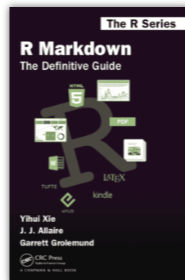
1

R Markdown: The Definitive Guide

by Yihui Xie, J. J. Allaire, Garrett Grolemund

2018-07-24

Star 210



The first official book authored by the core R Markdown developers that provides a comprehensive and accurate reference to the R Markdown ecosystem. With R Markdown, you can easily create reproducible data analysis reports, presentations, dashboards, interactive applications, books, dissertations, websites, and journal articles, while enjoying the simplicity of Markdown and the great power of R and other languages. [Read more](#) →

2

Data Science at the Command Line

by Jeroen Janssens

2018-07-24

Star 1,809



This is the website for Data Science at the

blogdown: Creating Websites with R Mark...

by Yihui Xie, Amber Thomas, Alison Presmanes Hill

2018-06-05

Star 758

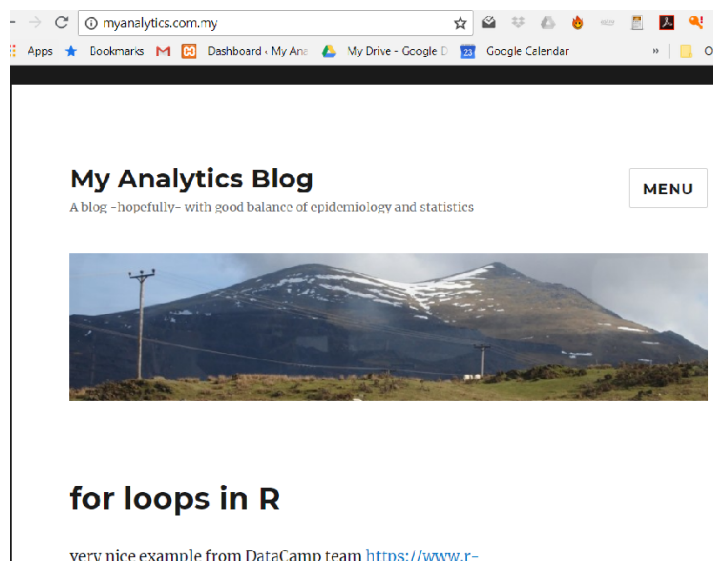


A guide to creating websites with R Markdown

Questions and contacts

Twitter : @kamarul_imran

Email : drki.musa@gmail.com



Enjoy!

Slides created via the R package **xaringan**.