

Introduction to R and RStudio IDE

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Section 1

Why use R?

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.

Source: <https://www.r-project.org/>

R outpaces other statistics software

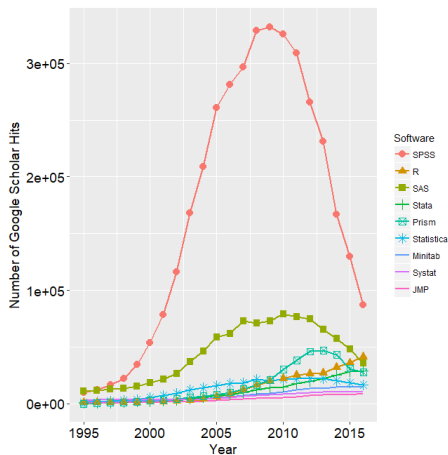


Figure 1: R popularity

Source: <http://r4stats.com/articles/popularity/>

R is getting more popular among academician

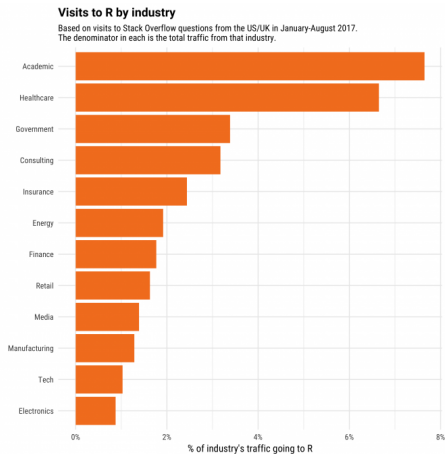
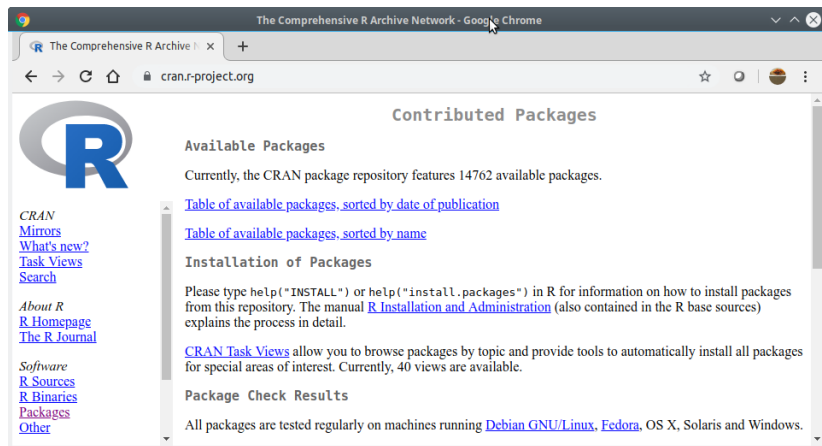


Figure 2: Impressive growth of R

Source: <https://stackoverflow.blog/2017/10/10/impressive-growth-r/>

Availability of R packages



The screenshot shows a web browser window titled "The Comprehensive R Archive Network - Google Chrome" with the URL "cran.r-project.org". The page content includes the R logo, a navigation menu with links like "CRAN Mirrors", "What's new?", "Task Views", "Search", "About R", "R Homepage", "The R Journal", "Software", "R Sources", "R Binaries", "Packages", and "Other". The main heading is "Contributed Packages". Under "Available Packages", it states "Currently, the CRAN package repository features 14762 available packages." and provides two links: "Table of available packages, sorted by date of publication" and "Table of available packages, sorted by name". The "Installation of Packages" section explains how to use help functions and refers to the "R Installation and Administration" manual. It also mentions "CRAN Task Views" for browsing packages by topic. The "Package Check Results" section states that all packages are tested regularly on various operating systems like Debian GNU/Linux, Fedora, OS X, Solaris, and Windows.

Figure 3: CRAN

Source: <https://cloud.r-project.org/web/packages/index.html>, as of 18/8/2019.

Another reason to use R...



Figure 4: ???

Source: Thanks Dr. KIM ;-) Modified comic from duelinganalog.com on PC vs Mac vs Linux.

Section 2

R and RStudio

R Installation

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

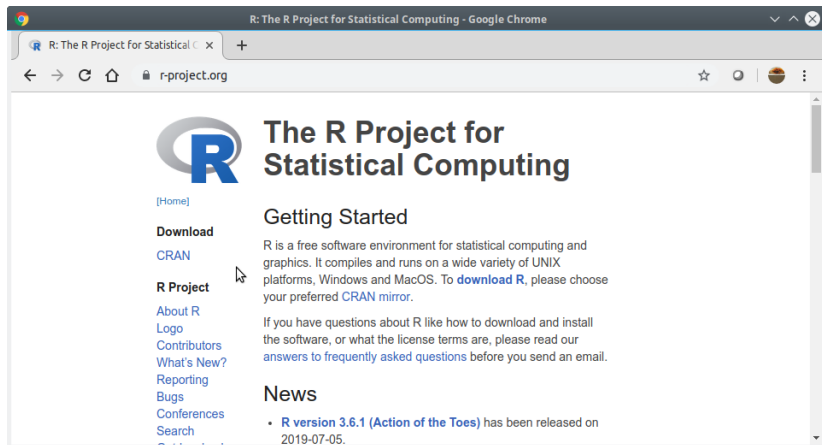
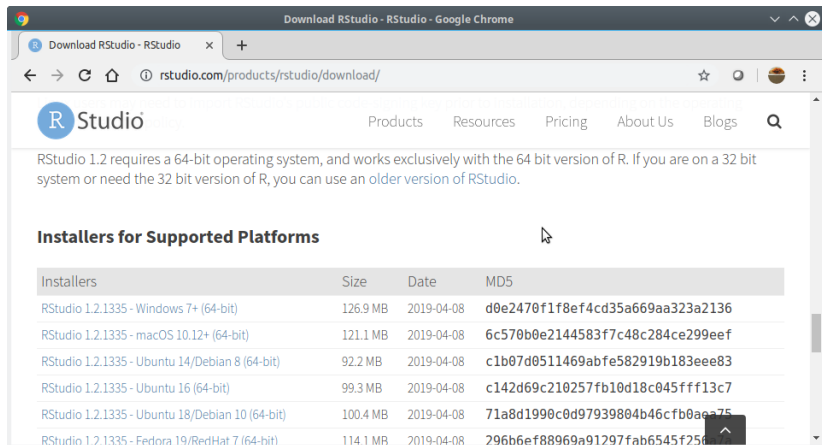


Figure 5: R Project

RStudio Installation

RStudio @ <https://www.rstudio.com/products/rstudio/download/>



Download RStudio - RStudio - Google Chrome

Download RStudio - RStudio

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RStudio 1.2 requires a 64-bit operating system, and works exclusively with the 64 bit version of R. If you are on a 32 bit system or need the 32 bit version of R, you can use an [older version of RStudio](#).

Installers for Supported Platforms

Installers	Size	Date	MD5
RStudio 1.2.1335 - Windows 7+ (64-bit)	126.9 MB	2019-04-08	d0e2470f1f8ef4cd35a669aa323a2136
RStudio 1.2.1335 - macOS 10.12+ (64-bit)	121.1 MB	2019-04-08	6c570b0e2144583f7c48c284ce299eef
RStudio 1.2.1335 - Ubuntu 14/Debian 8 (64-bit)	92.2 MB	2019-04-08	c1b07d0511469abfe582919b183eee83
RStudio 1.2.1335 - Ubuntu 16 (64-bit)	99.3 MB	2019-04-08	c142d69c210257fb10d18c045fff13c7
RStudio 1.2.1335 - Ubuntu 18/Debian 10 (64-bit)	100.4 MB	2019-04-08	71a8d1990c0d97939804b46cfb0aa75
RStudio 1.2.1335 - Fedora 19/RedHat 7 (64-bit)	114.1 MB	2019-04-08	296b6ef88969a91297fab6545f256

Figure 6: RStudio

Alternative: RStudio Cloud

RStudio Cloud @ <https://rstudio.cloud/> (no need to install R)

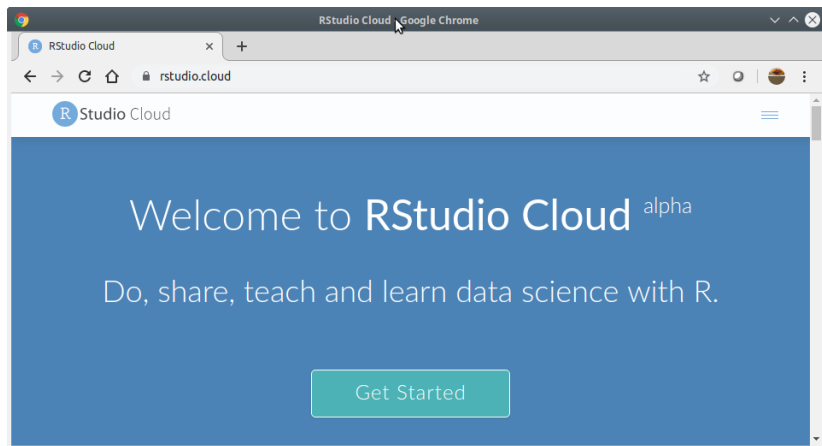
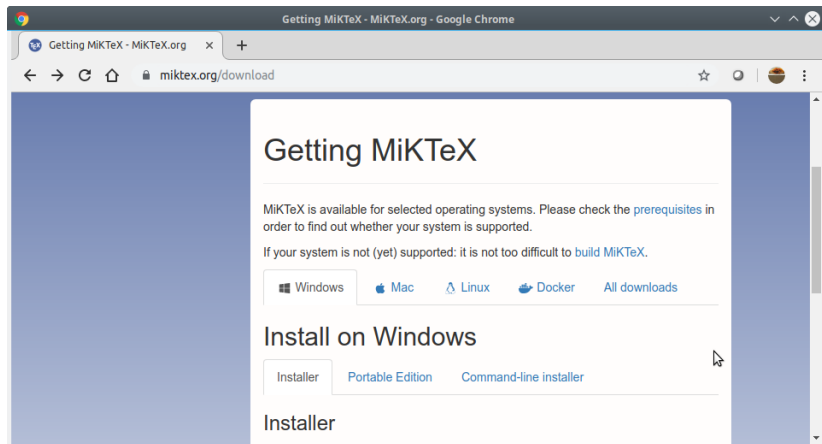


Figure 7: RStudio

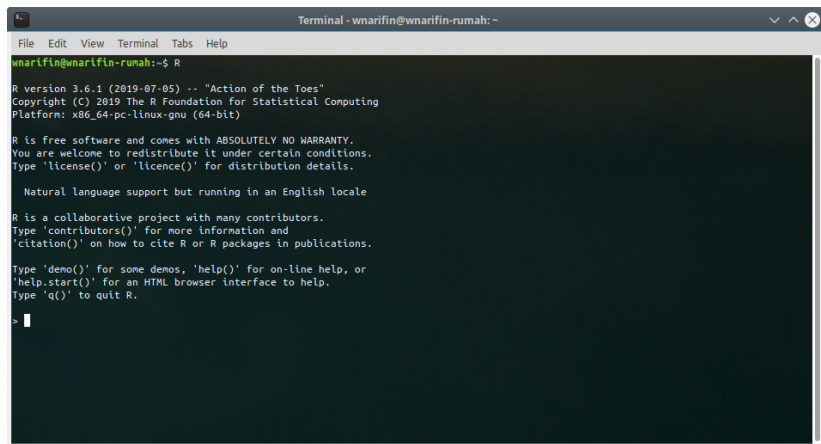
R to PDF Installation

- Windows & MacOS – MikTeX @ <https://miktex.org/download>
- Linux – texlive.

Important for R-markdown session later.



R Interface

A terminal window titled "Terminal - wnarifin@wnarifin-rumah: ~" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows the command "wnarifin@wnarifin-rumah:~\$ R" and the output of the R startup screen. The output includes the R version (3.6.1), copyright information (© 2019 The R Foundation), platform (x86_64-pc-linux-gnu), and a disclaimer: "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." It also mentions "Natural language support but running in an English locale" and "R is a collaborative project with many contributors." The prompt ">" is visible at the bottom of the terminal.

```
wnarifin@wnarifin-rumah:~$ R
R version 3.6.1 (2019-07-05) -- "Action of the Toes"
Copyright (C) 2019 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (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.

> |
```

Figure 9: Plain R

RStudio Interface

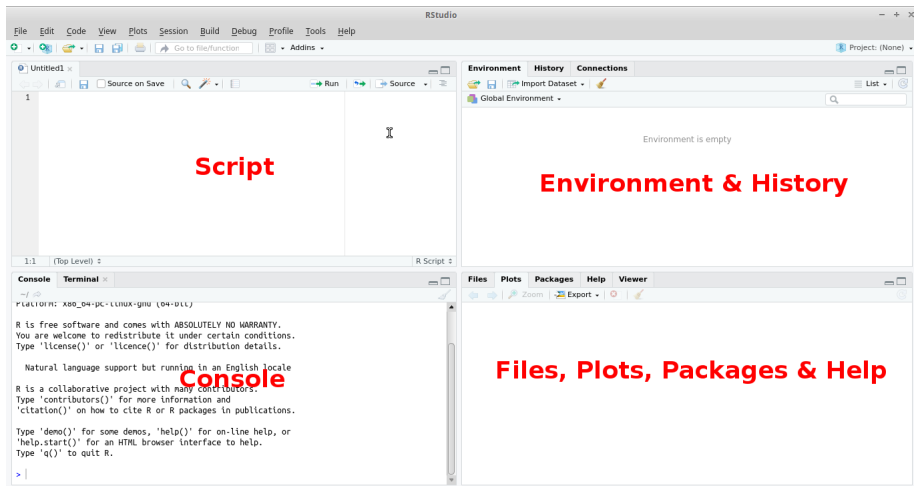


Figure 10: RStudio

RStudio Cloud Interface

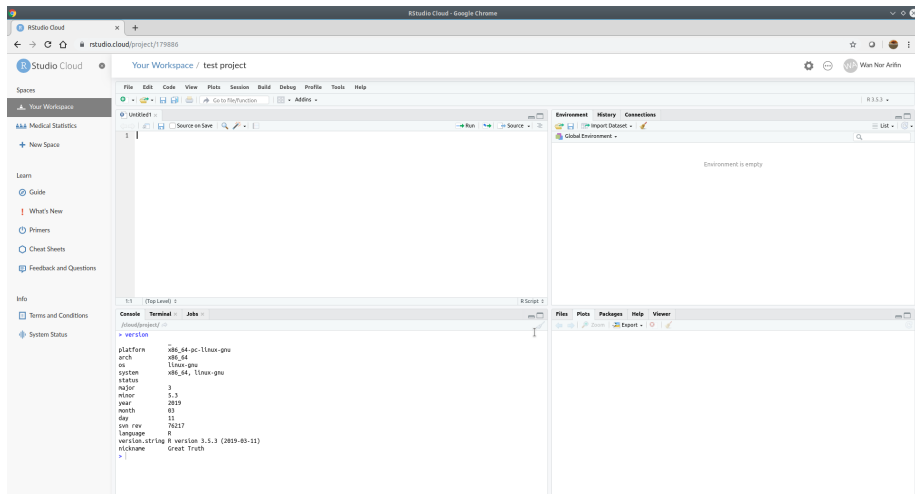


Figure 11: RStudio Cloud

Section 3

R script

File > New file > R script

- type all commands/functions here
- comments, start with “#”
- run all commands by Ctrl+Enter

Section 4

Function and Object

- R function(), think of MS Excel function
- structure

```
function(argument1 = value, argument2 = value)
```

Object

- name assigned on left side of “<-” / “=”
- variable, data (data frame, matrix, list)

```
x <- 1
y = 2
z = x + y
z # type object name, you'll get the value
```

Section 5

R packages

Install packages a.k.a libraries

- Graphically

Packages > Install

- Command

e.g. psych, car

```
install.packages("psych")  
install.packages("car")
```

Load libraries

e.g. load psych and car,

```
library(psych)  
library(car)
```


Section 6

Working directory

Why do we need working directory?

- Systematic workflow.
- Save all R scripts, datasets in the same directory.

Set working directory

- 1 Browse to target directory: **Files Tab > ... > Go To Folder**
- 2 **Files Tab > More > Set As Working Directory**
- 3 **Files Tab > More > Go To Working Directory** to ensure you are at the right place.

Section 7

Help

If you know the name of packages/functions,

```
?psych
```

```
?library
```

Search by keywords,

```
??mean
```

```
??survey
```

Thank you

References

Fox, J., Weisberg, S., & Price, B. (2019). *Car: Companion to applied regression*. Retrieved from <https://CRAN.R-project.org/package=car>

R Core Team. (2018). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from <https://www.R-project.org/>

Revelle, W. (2019). *Psych: Procedures for psychological, psychometric, and personality research*. Retrieved from <https://CRAN.R-project.org/package=psych>