Programming using R

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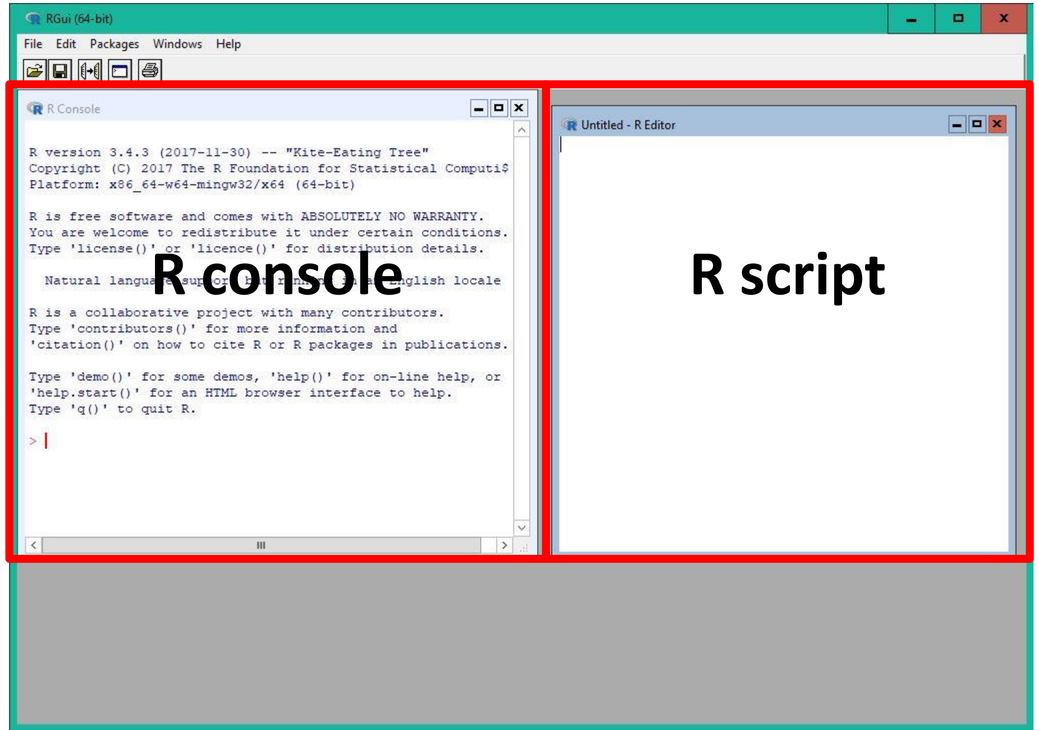
Introduction

- R packet is considered as an application of the programming language S, which is the **basis of S-Plus package**
- Created at **Bell Laboratories**
- R is an open source software developed “**by statisticians for statisticians**”
- A **cross platform** compatible with Linux, MacOS, Windows
- Installation can be done through CRAN mirror (Comprehensive R Archive Network)
- However it is advised to use a newer version **RStudio** which makes the recovery and storing of data and images easier

R vs RStudio

- R is a programming language
- RStudio is an Integrated Development Environment designed for developing programs in R



```
R version 3.4.3 (2017-11-30) -- "Kite-Eating Tree"
Copyright (C) 2017 The R Foundation for Statistical Computi$
Platform: x86_64-w64-mingw32/x64 (64-bit)

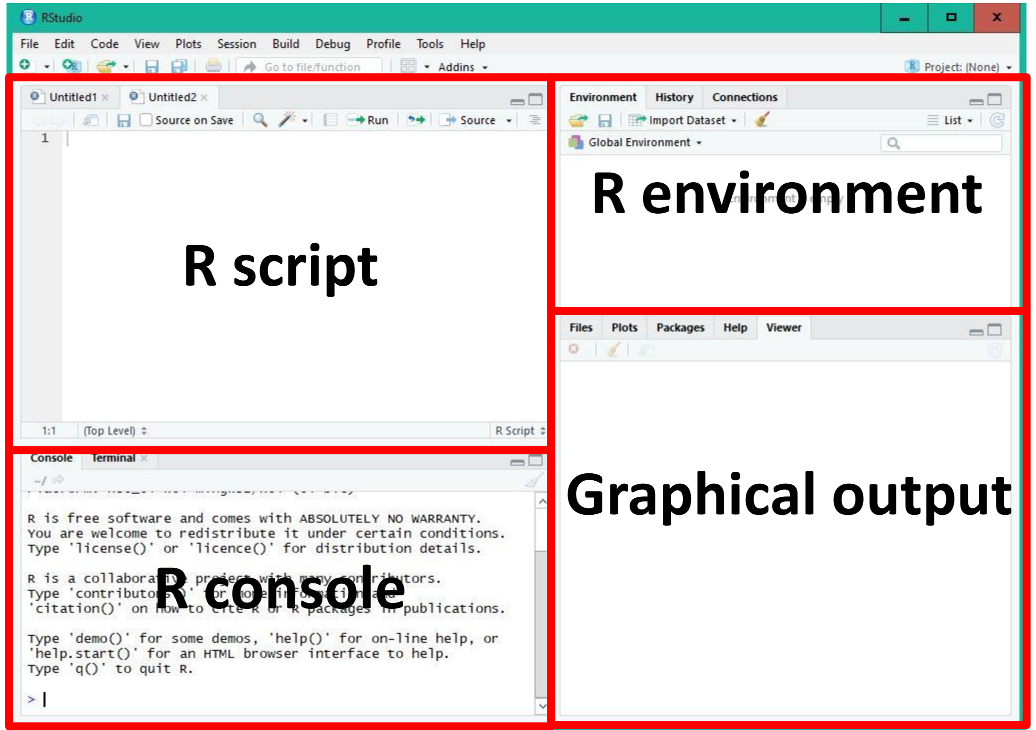
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

  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.

>
```



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>
```

Packages in R

- By simply downloading R, access is provided to **basic packages**
- Use the command **getOption("defaultPackages")** to spot the packages already available to you

```
> getOption("defaultPackages")
[1] "datasets" "utils" "grDevices" "graphics" "stats" "methods"
```

- There are thousands of other packages that can be used, developed by experts in a specific fields.
- In this session we will use some extra packages:

  SPARDA, magick, audio

Installing Packages – Choosing CRAN Mirror

- For installing new packages -> **Tools > Install Packages**

  or

- Use the command `> install.packages(“name of the package”)`

- A CRAN mirror server is a “copy” of the contents of the main server
  - More servers are used to reduce the load of the main server
  - Get faster downloads of packages
- Use **Global (CDN) – RStudio** CRAN mirror (Tools > Global Options > Packages)

Useful Symbols

“**<-**” or “**=**”	passing value
ls()	lists the data sets and functions defined
q()	quit
;	separate commands written in the same line
#	for comments
search()	list the list of attached packages

Getting Help in R

- Help can be achieved through FAQ side in R
- Through the manuals
- Using help commands:

```
> help(“sqrt”)
> ?sqrt
> help.start(browser =
getOption("http://127.0.0.1:31341/doc/html/index.html"))
```

No internet connection is needed for this command.

Reading Data from Files

- We are focused on reading data from **text files** and **generic data files**
- First choose the directory of the file to be read
- **Session > Set Working Directory > Choose Directory**
- Using command: `> setwd(“directory”)`
  - **forward slash** vs **backslash**
- For reading text files: `> read.table()`
- For reading generic data files: `> read.delim()`

SPADAR

- A package for astrostatistics
- **S**pherical **P**rojections of **A**stronomical **DA**ta in **R**
- Used for equatorial, ecliptic and galactic coordinate systems and scatter plots
- Commands to be used:

  -
    ```
    > createAllSkyGridChart(mainGrid = "equatorial", eqDraw = TRUE,
    eclDraw = TRUE, galDraq = TRUE, eqCol = "green", eclCol = "red",
    galCol = rgb(0.6,0,0.5))
    ```

  -
    ```
    > createAllSkyScatterPlotChart()
    ```

magick

- Developed for Advanced Graphics and Image Processing
- Can read many common image formats
- Can save images
- Produce transformations on images and edit the resolution
- Filtering (crop, trim, rotate, blur, scale)
- Produce animation from image frames
- Drawing onto images in a pixel by pixel fashion

magick

- Reading images:
  - `> p1 <- image_read(“name_of_the_image”)`
- Scaling images:
  - `> pic1 <- image_scale(p1, “height x width”)`
- Combining:
  - `> combined <- c(pic1, pic2, pic3, …, picn)`
- Saving images:
  - `> image_write(name, path = “filename.format”, format = “format”)`

Useful Functions

- seq(from, to, by)
  - seq(-5, 5, by = 0.4)
  - seq(-5, 5, length.out = 100)
- c(vector_1, vector_2, …, vector_n)
  - y <- c(1:8, -4, “blue")
- length(vector or an object)
  - length(y) → 10
- floor(scalar or vector) → cuts the decimals and creates an integer
- sapply(vector/scalar or expression, function())

Thank You!!!