

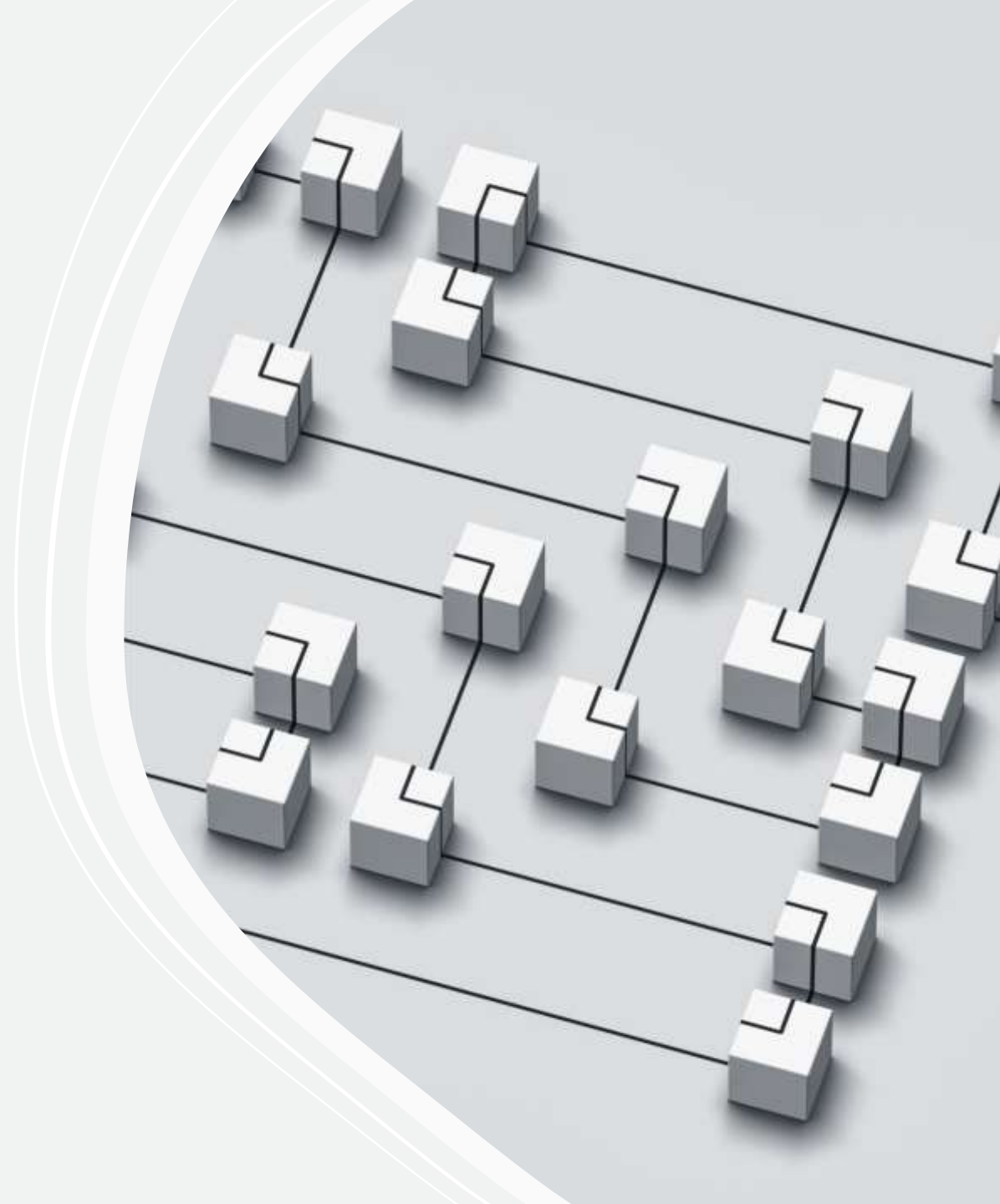
Introduction to R and RStudio

VN-Biostat Pre-Workshop



Outline

- General Overview
- R and RStudio Installation
- RStudio interface
- Import dataset tab
- Setting the working directory
- Packages
- R Basics

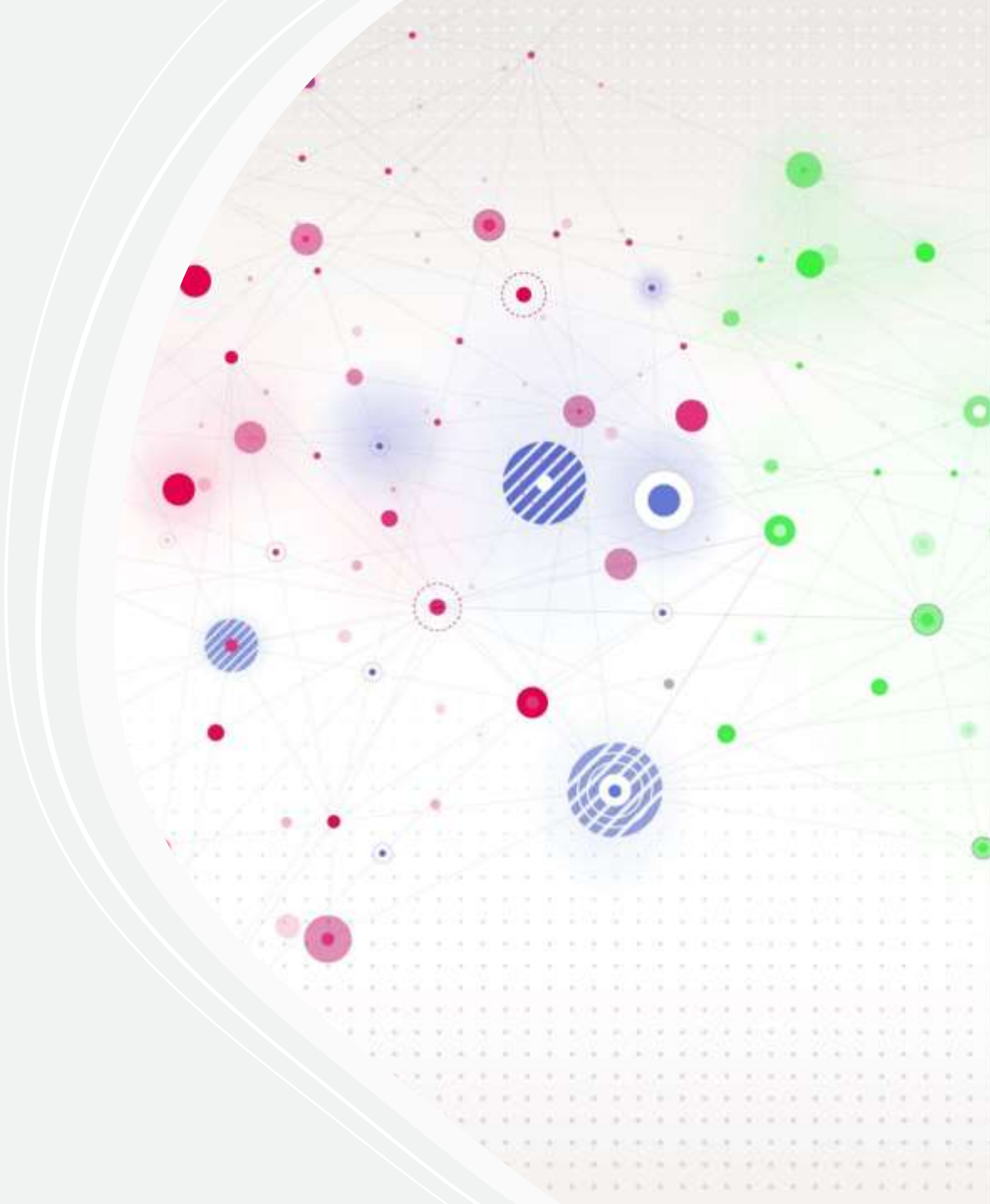


General Overview

R is a well-developed, simple and effective programming language which include conditionals, loops, user-defined recursive functions and input and output facilities.

Rstudio is an integrated development environment for R that allows users to interact more easily with R by integrating different aspects of scripting, from code completion to debugging.

In order to use RStudio, R needs to be installed first.



R and RStudio Installation

□ **Step 1:** Go to the Comprehensive R Archive Network (CRAN) website and

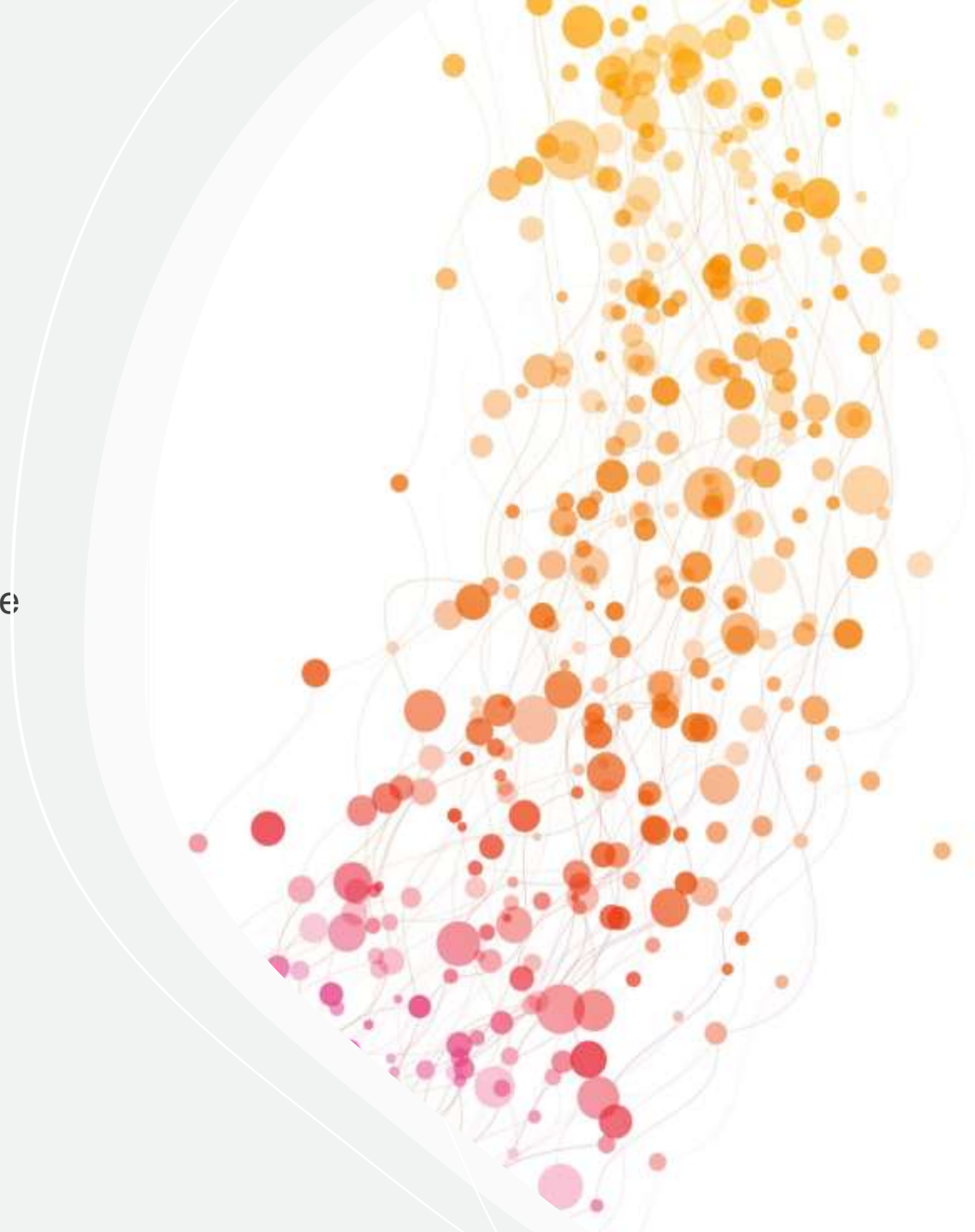
click on “Download R for Windows” (or “*Download R for MacOS*”).

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

□ **Step 2:** Click on the “*base*” subdirectory link (or the package link, *.pkg file*).

□ **Step 3:** Click on “*Download R-4.3.1 for Windows*” (the R version available might be different depending on updates produced after the compilation of this ppt). The link allows downloading an installer extension (*.exe file*).

□ **Step 4:** Run the *.exe* file and step through the installation wizard accepting the default settings.



R and RStudio Installation

Once R is installed, you can then proceed to the installation of RStudio.

- **Step 5:** Go to RStudio download website and click on the “Download RStudio for Windows” button (or the link for the MacOS version).

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

- **Step 6:** Run the .exe file and follow the installation instructions.



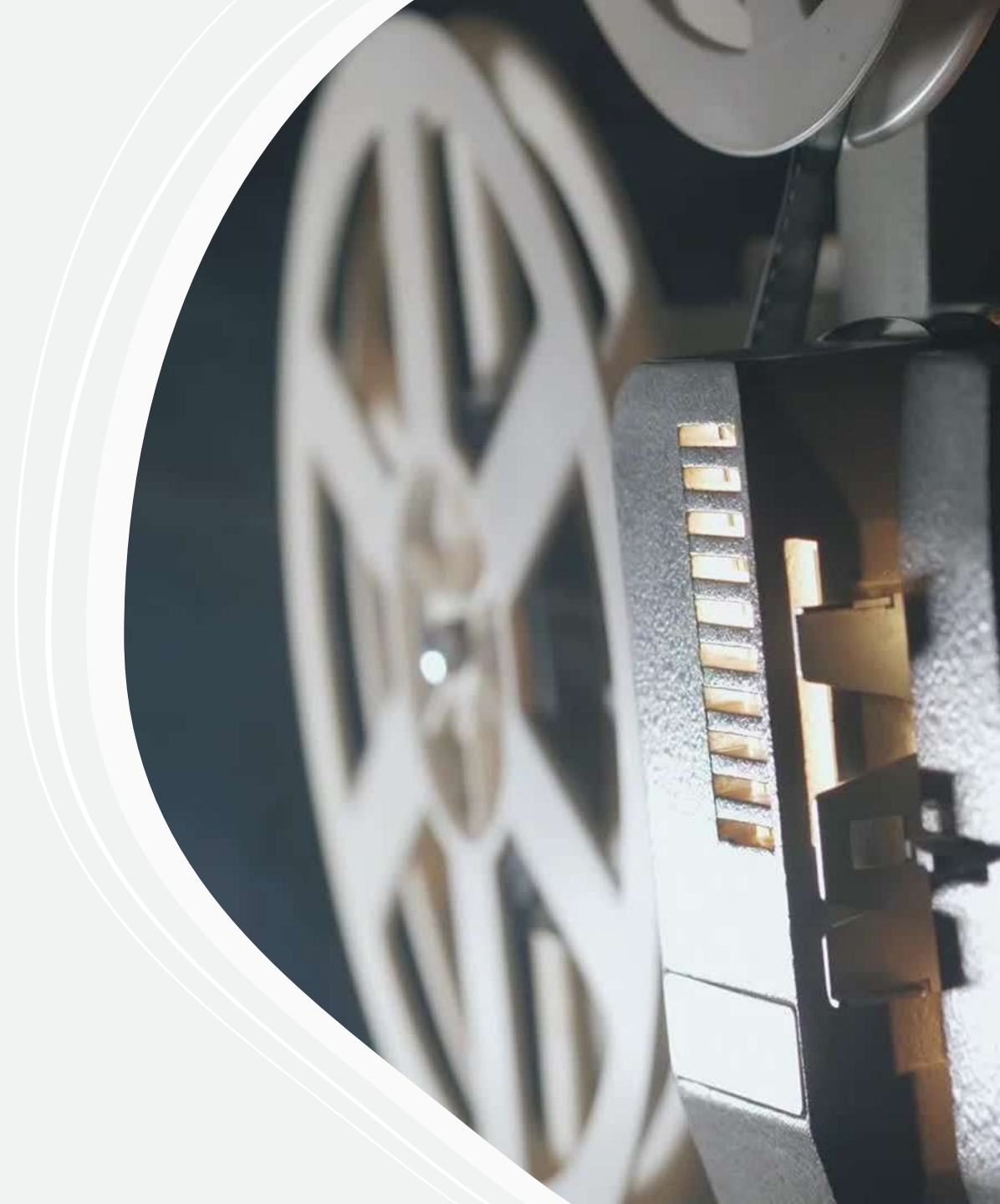
Verify Installation

Once both R and RStudio are installed, you can verify that everything is set up correctly:

- Open RStudio.
- In the RStudio console (usually at the bottom left pane), type:
- `R.version.string`

This command should display the version of R you installed.

- The base installation of R comes with many useful packages as standard.
- These packages will contain many of the functions you will use on a daily basis, which needs to be updated.



Getting Started

• Launching RStudio

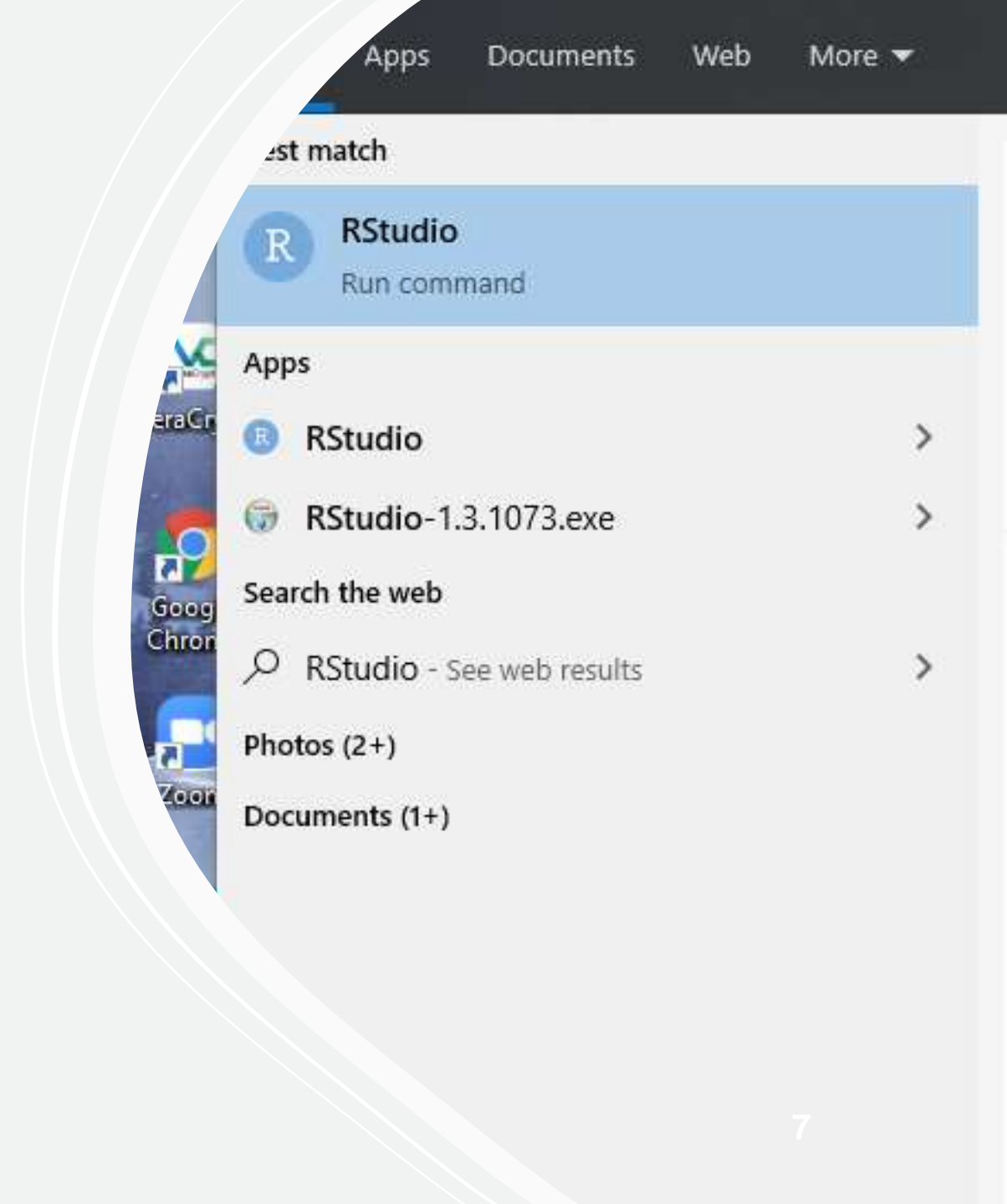
• To launch RStudio, follow these steps:

• **Windows:** Go to your Start menu and search for "RStudio" or navigate to the RStudio shortcut if you created one during installation.

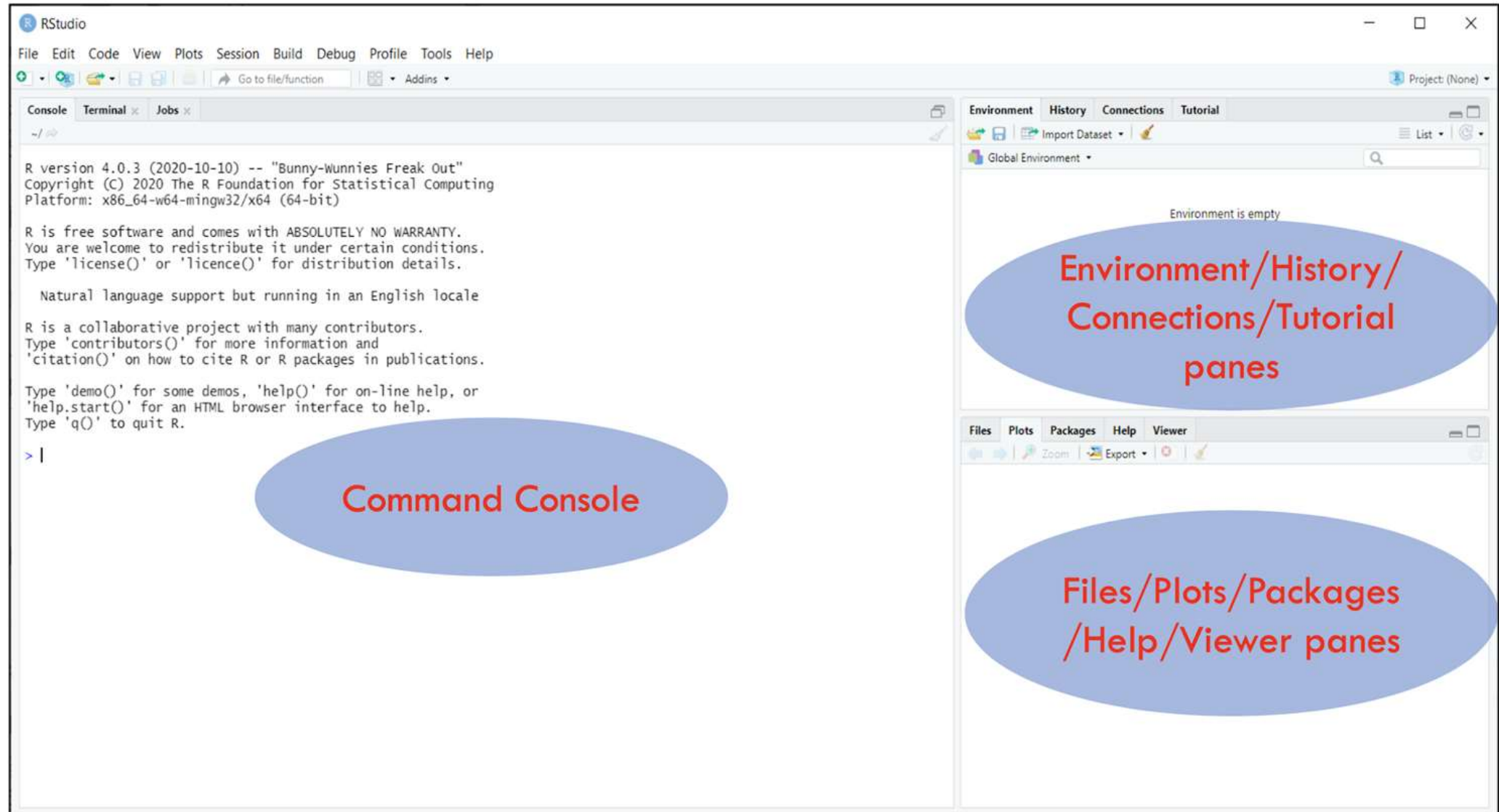
• **macOS:** Open your Applications folder and double-click on "RStudio" to launch it.

• **Linux:** Depending on your distribution, you can launch RStudio from the Applications menu or by typing "rstudio" in the terminal.

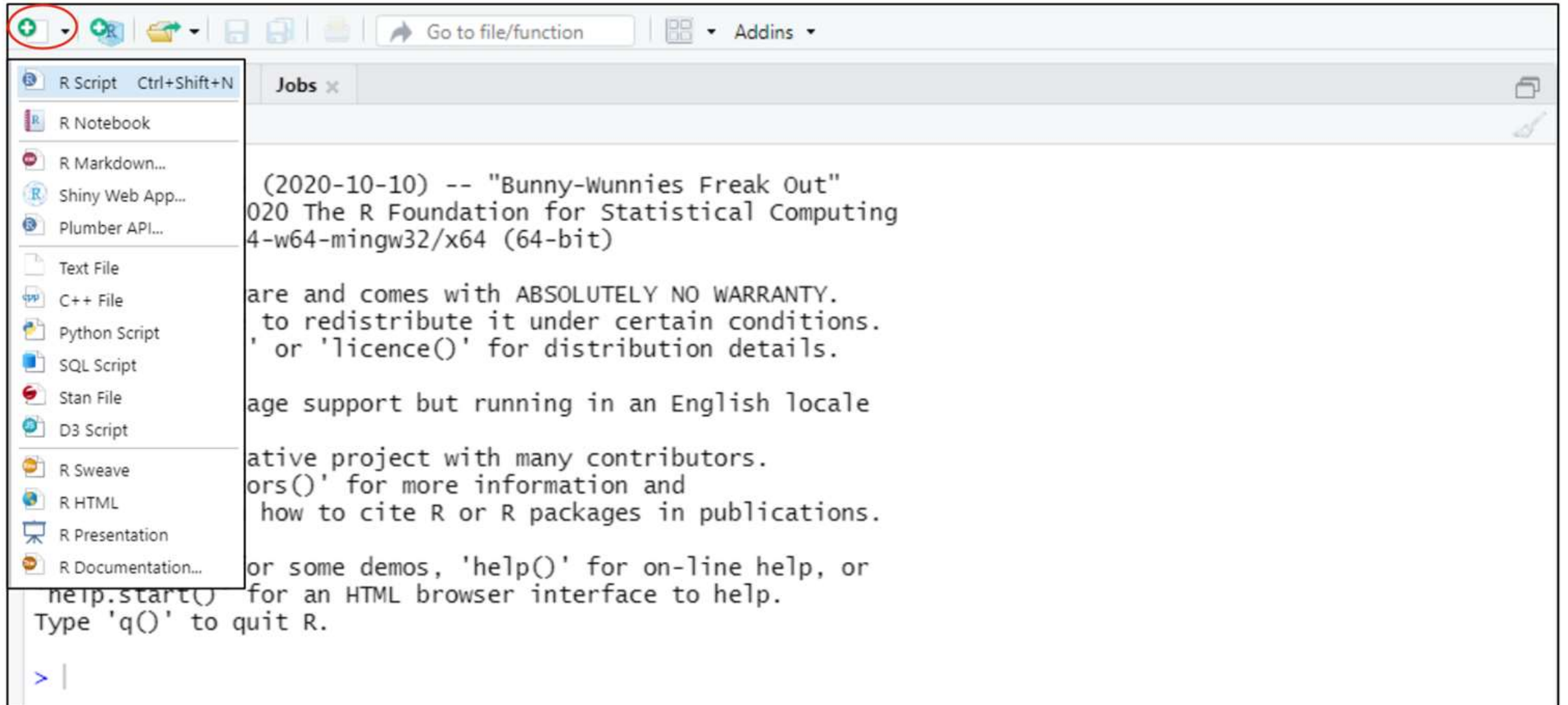
Type in RStudio in windows search bar and open RStudio



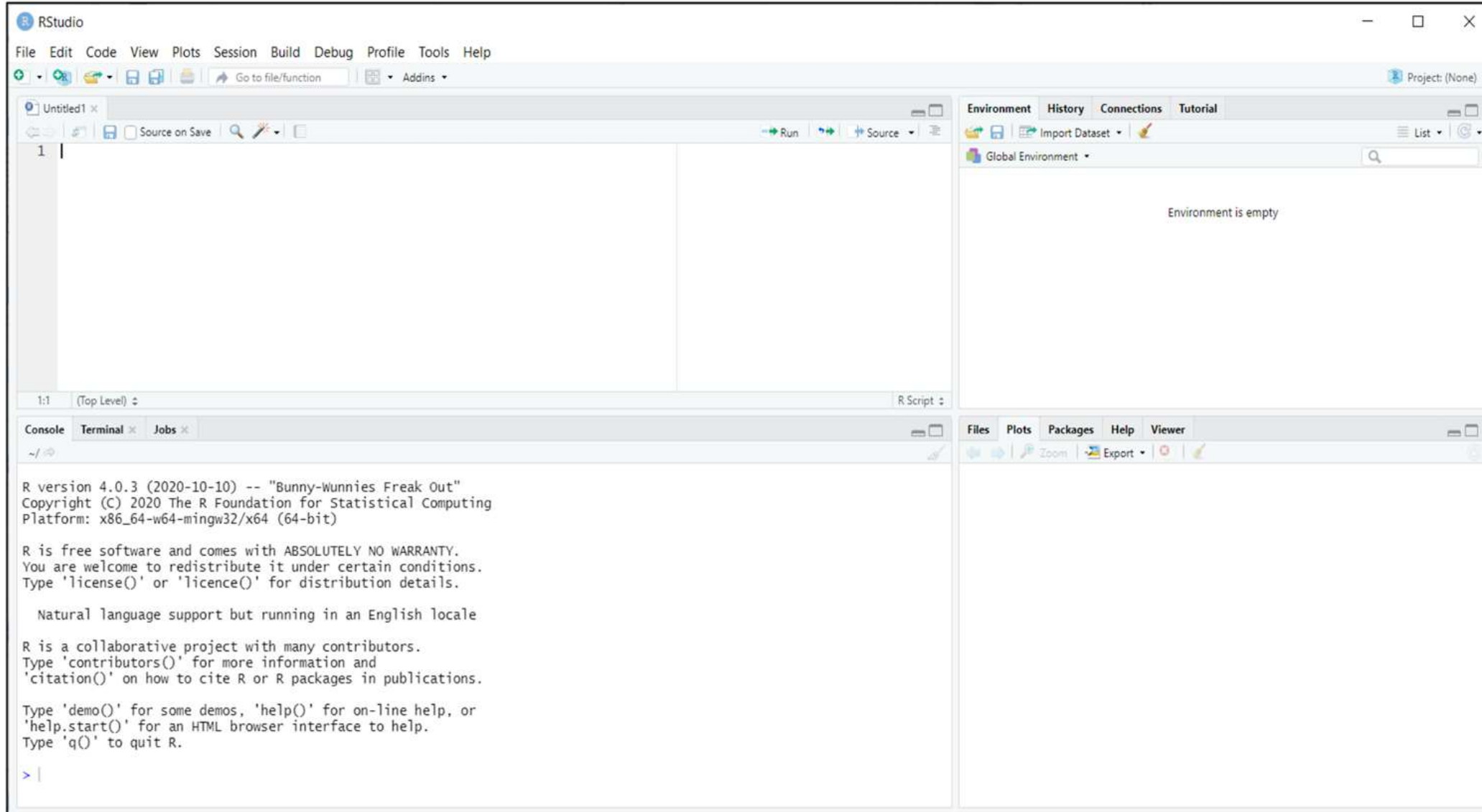
RStudio interface



RStudio: command console



RStudio interface with editor window open



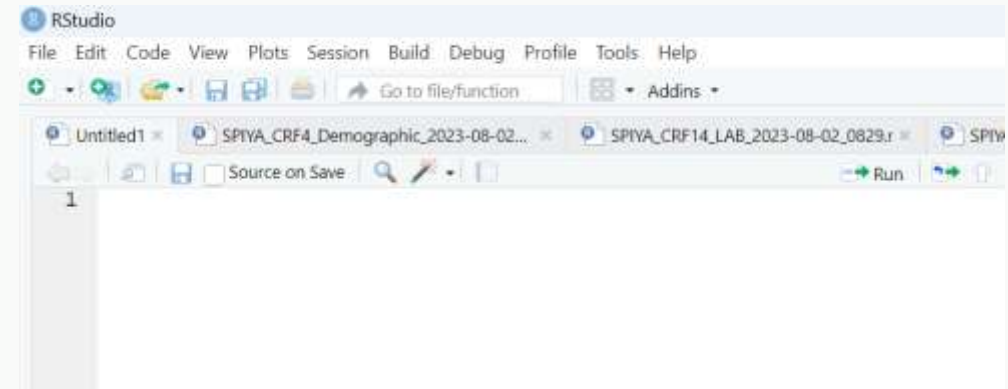
R Script

You will hear people talking about 'R scripts'. This is simply a collection of all of the codes you have written or created in the 'source' window.

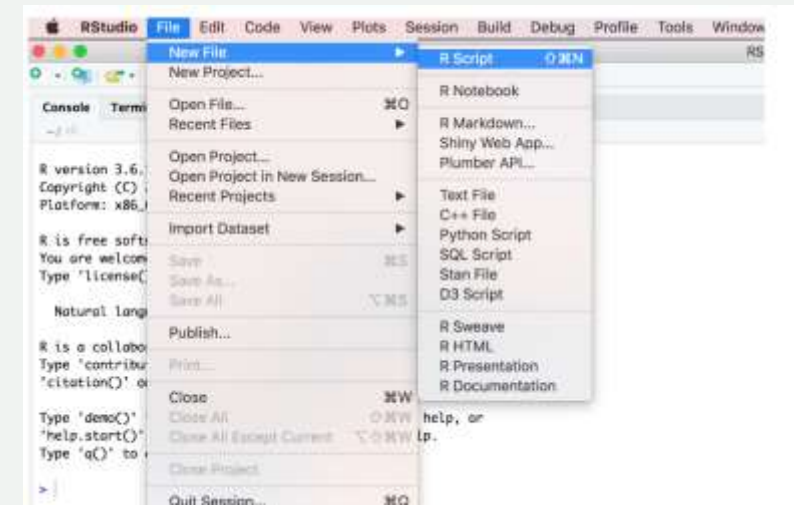
When you have saved the program codes, you will notice that these are saved under a file designated with '.R' extension

Let's simply add 2+2 in the R script. Type in the following code, highlight the code and select 'Run'

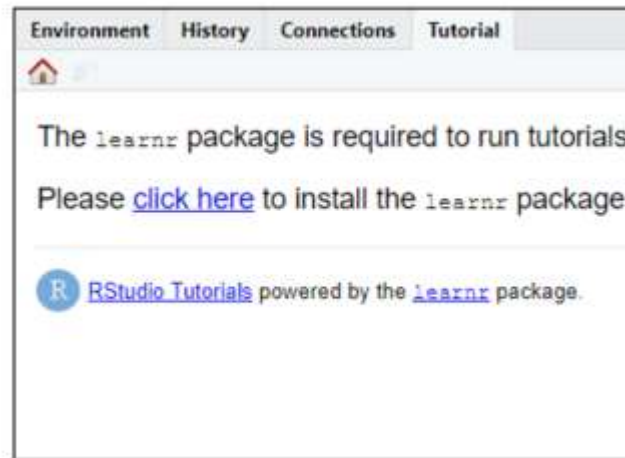
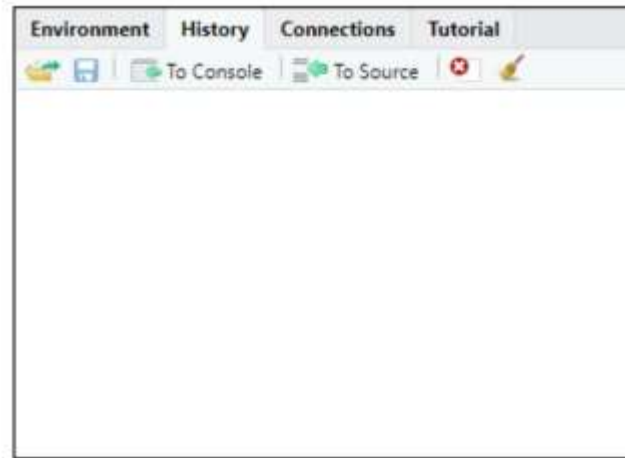
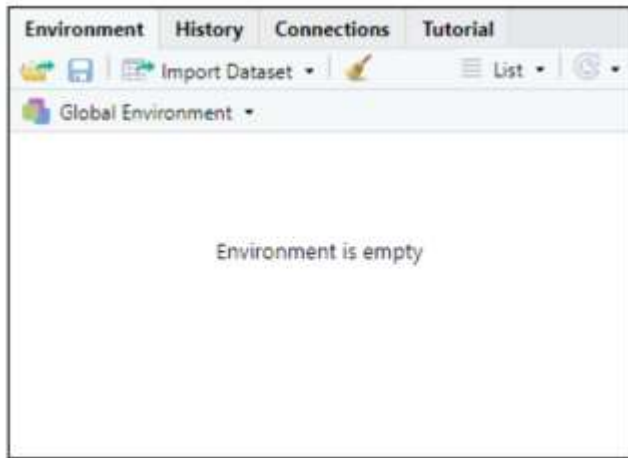
If you don't select a certain section of your code before clicking 'run', all codes present in the RScript file will be executed. You can either highlight the section of code or place your mouse on the same line as the code (i.e., place your mouse on line 6) then click run.



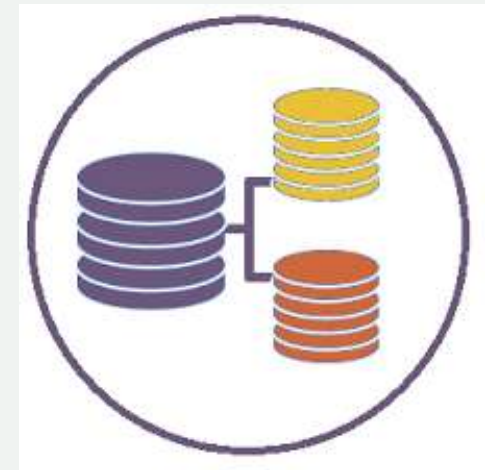
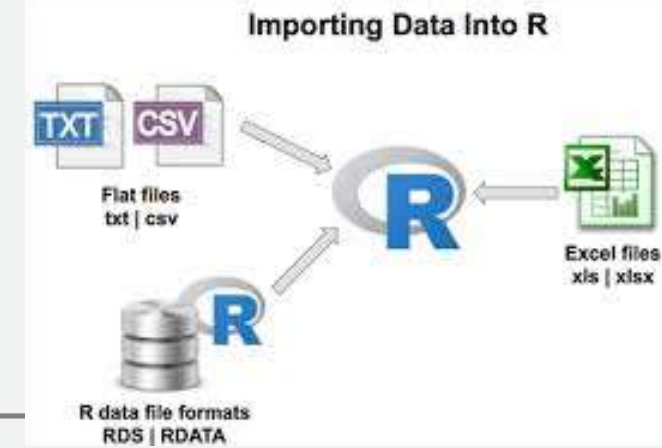
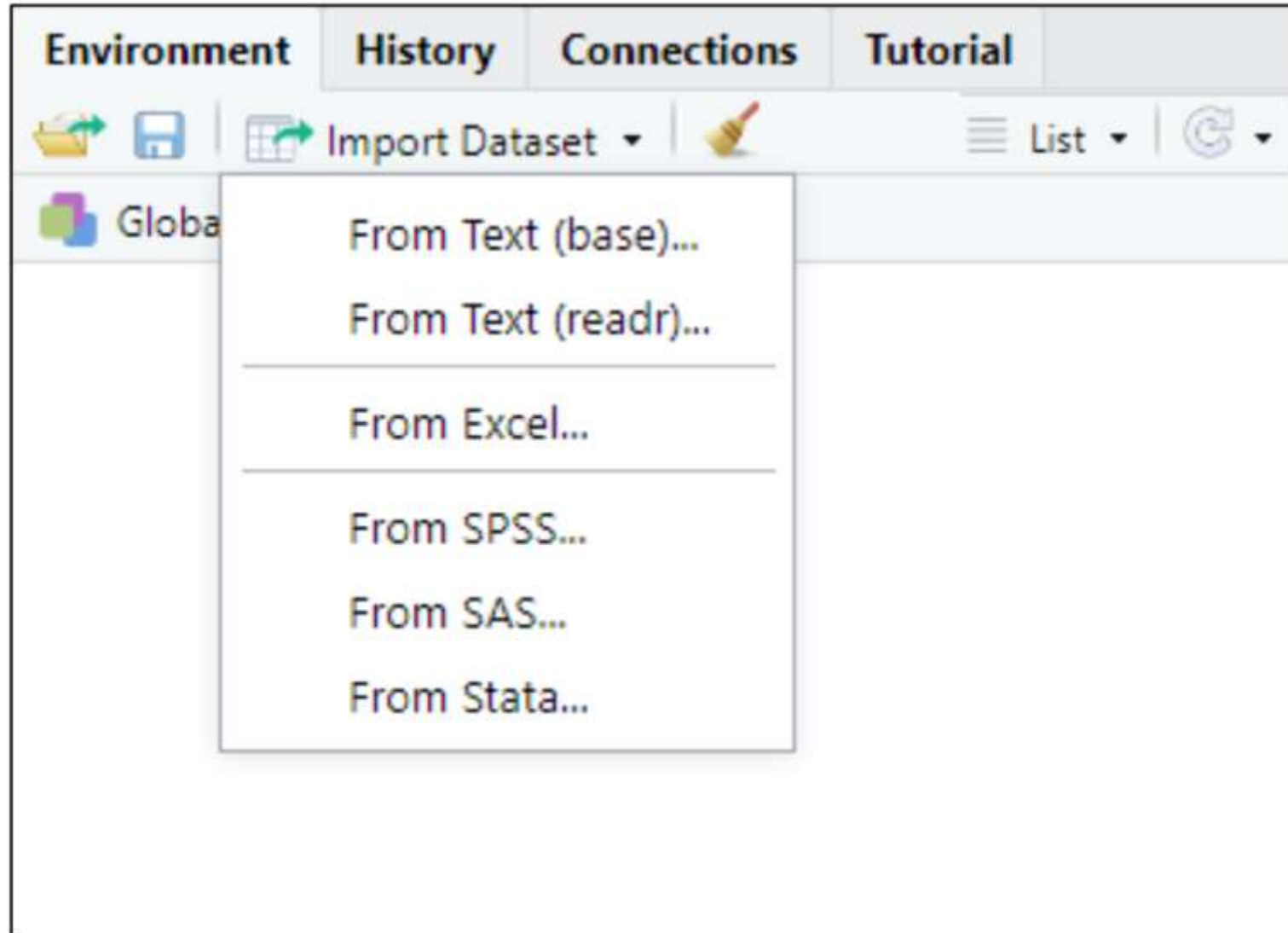
R Script



RStudio: Environment/History/Connections/Tutorial panels



Import dataset tab



Import dataset tab (2)

Import Excel Data

File/URL:

Browse...

Data Preview:

Sepal.Length (double)	Sepal.Width (double)	Petal.Length (double)	Petal.Width (double)	Species (character)
5.1	3.5	1.4	0.2	Character
4.9	3.0	1.4	0.2	Numeric
4.7	3.2	1.3	0.2	Date
4.6	3.1	1.5	0.2	Include
5.0	3.6	1.4	0.2	Skip
5.4	3.9	1.7	0.4	setosa
4.6	3.4	1.4	0.3	setosa
5.0	3.4	1.5	0.2	setosa
4.4	2.9	1.4	0.2	setosa
4.9	3.1	1.5	0.1	setosa
5.4	3.7	1.5	0.2	setosa
4.8	3.4	1.6	0.2	setosa
4.8	3.0	1.4	0.1	setosa
4.3	3.0	1.1	0.1	setosa
5.8	4.0	1.2	0.2	setosa
5.7	4.4	1.5	0.4	setosa
5.4	3.9	1.3	0.4	setosa

Previewing first 50 entries.

Import Options:

Name: iris

Max Rows:

☒ First Row as Names

Sheet: Default

Skip: 0

☒ Open Data Viewer

Range: A1:D10

NA:

Code Preview:

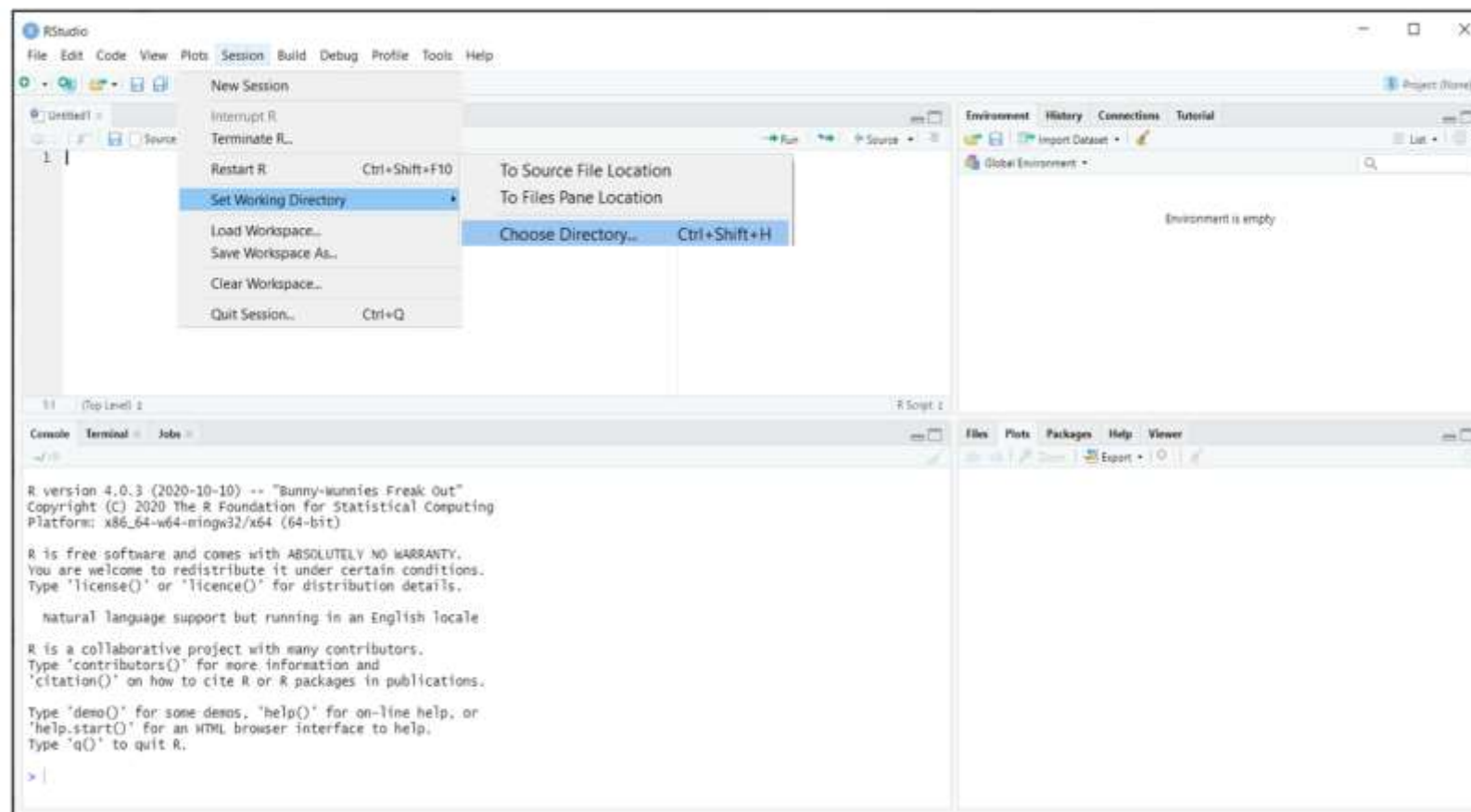
```
library(readxl)
iris <- read_excel("iris.xlsx")
View(iris)
```

Reading Excel files using readxl

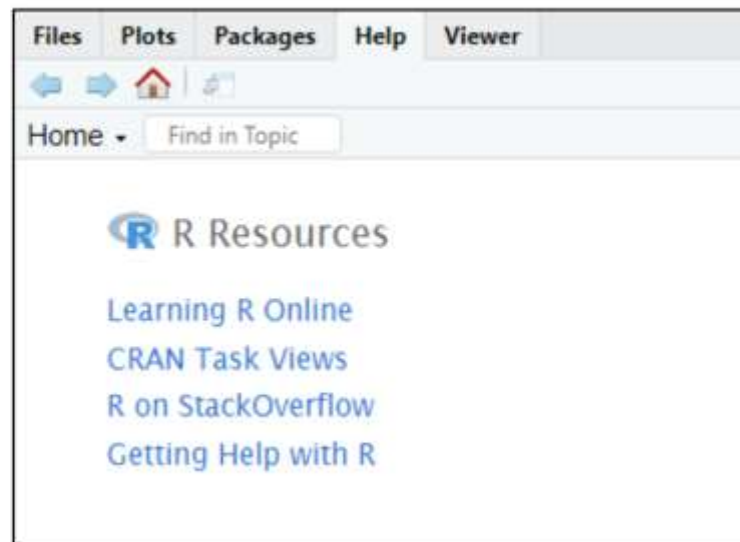
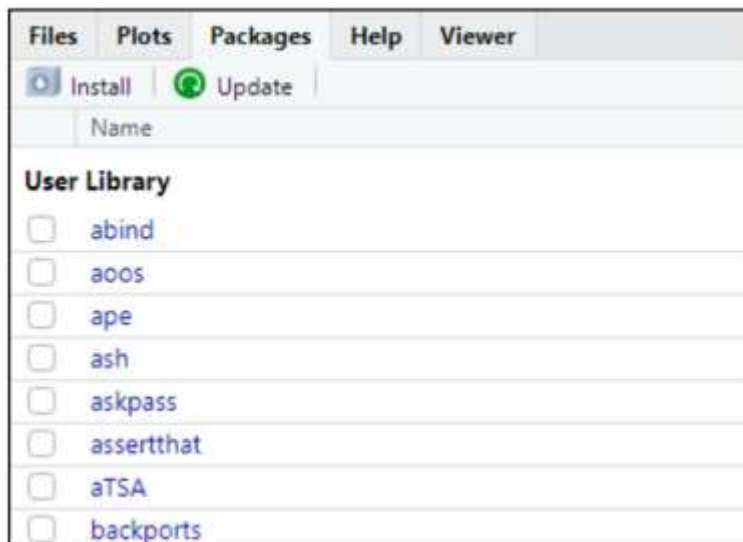
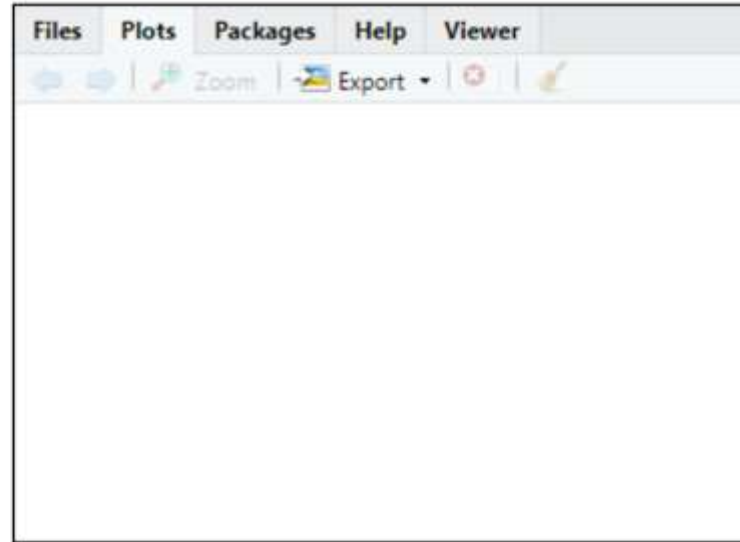
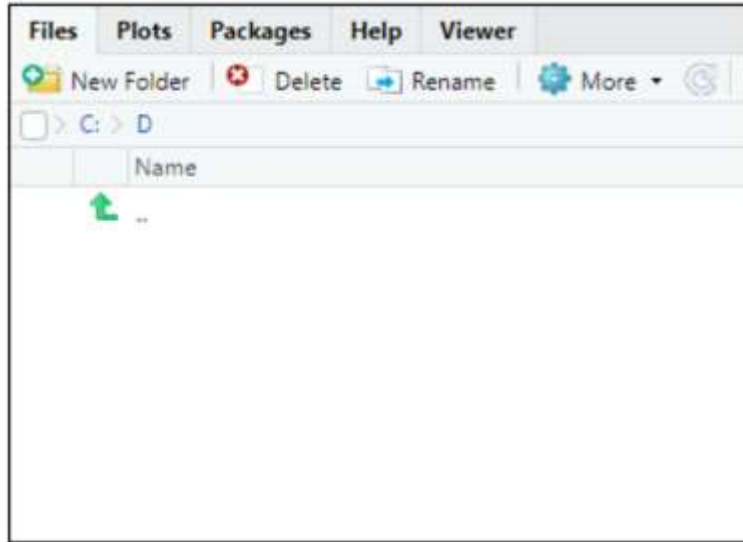
Import

Cancel

Setting the working directory



RStudio: Files/Plots/Packages/Help/Viewer panels



Packages

- **Packages:** extensions that contain code, data, and documentation in a standardized format that can be installed and used by users of R to solve specific analytical problems.
- The base version of R already includes many useful packages that allow performing elementary tasks such as simple calculations, data exploration, and loading of text data files.
- Complex tasks may require intensive coding using base packages functions, but are made easier by user-supplied packages.

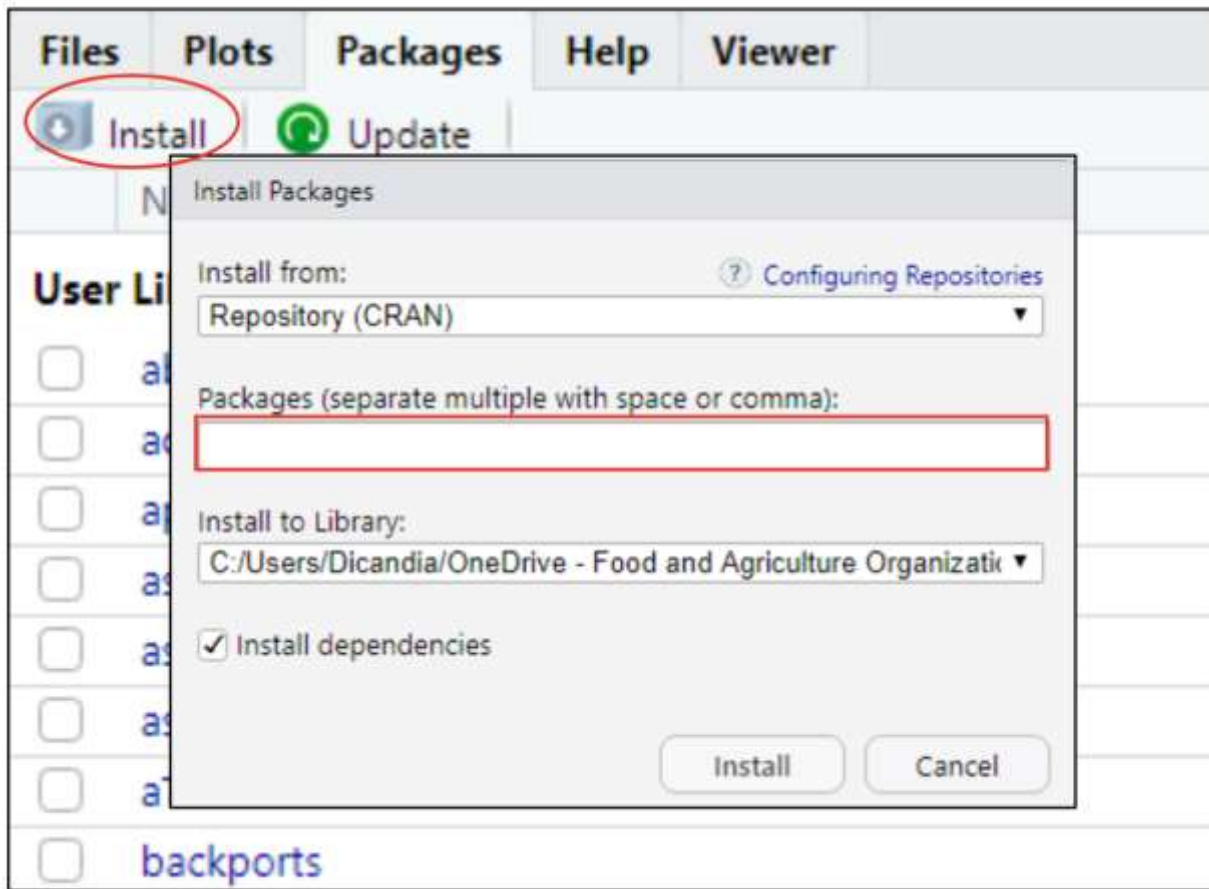
Packages (2)

To **install a package** from CRAN (the official repository for user contributed R packages) and then load it, use the following commands:

install.packages("name of the package")

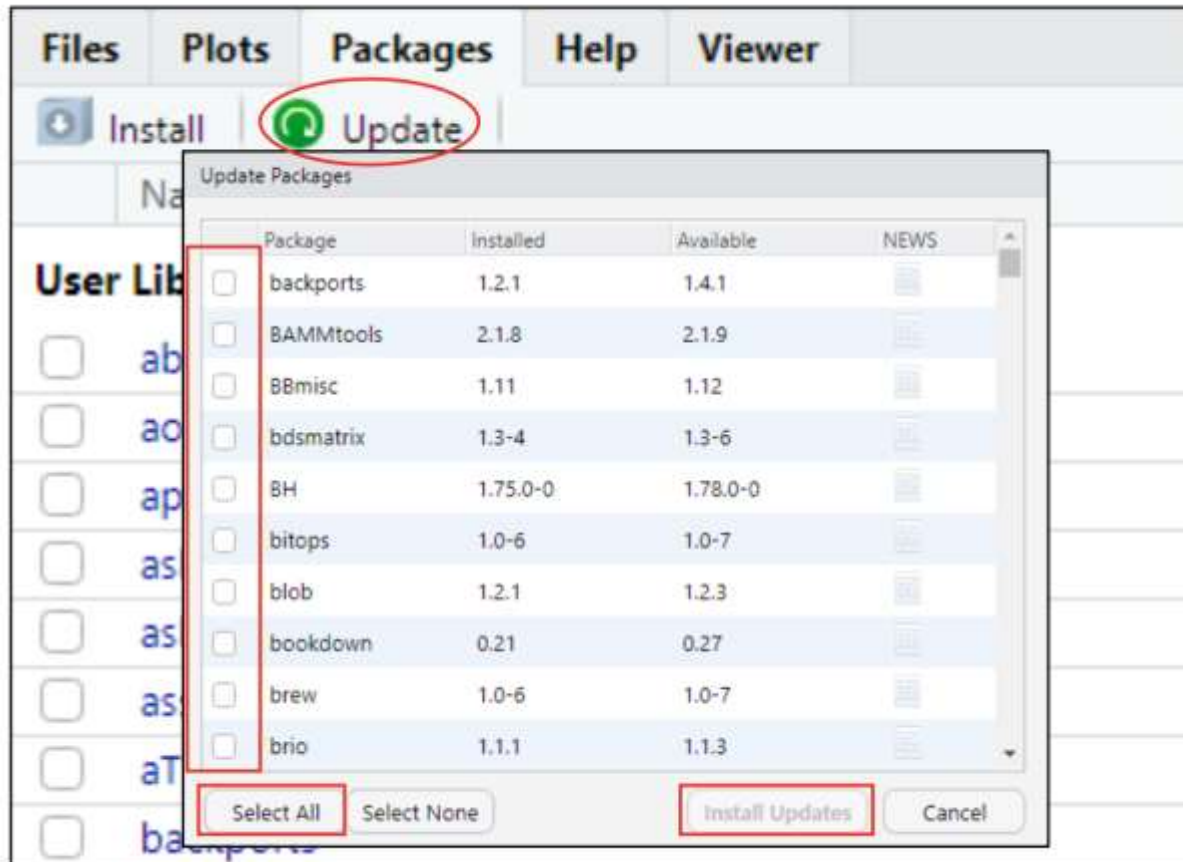
library("name of the package")

Another way to install packages is to use the Install Packages tab:



Packages (3)

- R packages are sometimes **updated** to improve or modify functionality. It is advisable to occasionally update the packages installed on your computer.
- You can update your installed R packages in RStudio by clicking the Update button in the toolbar in the Packages panel.



List of packages used in the training

For importing	Description	For data manipulation	Description
openxlsx	<i>Read, Write and Edit xlsx Files</i>	dplyr	<i>A fast, consistent tool for working with data frame</i>
readxl	<i>Only read excel files</i>	tidyr	<i>Tools to help to create tidy data</i>
data.table	<i>Fast file reader, writer</i>	tidyverse	Easily install and load the 'Tidyverse
		For various uses	Description
		ggplot2	Create Elegant Data Visualisation Using the Grammar of Graphics
		lubridate	Make Dealing with Dates a Little Easier
		Gtsummary	Presentation-Ready Data Summary and Analytic Result Tables

R Basics

PRACTICAL EXAMPLES IN
RSTUDIO

