

Session 1_2. What is R and RStudio?

Table of contents

| | |
|--|---|
| Questions | 1 |
| Learning Objectives | 1 |
| Introduction | 2 |
| What is R? | 2 |
| Why use R? | 2 |
| Why not use R? | 3 |
| R License | 3 |
| What is RStudio? | 3 |
| Getting started with RStudio | 4 |
| The RStudio Interface | 4 |
| Summary | 4 |

Questions

- What is R?
- Why use R?
- Why not use R?
- Why use RStudio and how does it differ from R?

Learning Objectives

- Know advantages of analyzing data in R
- Know advantages of using RStudio
- Be able to start RStudio on your computer
- Identify the panels of the RStudio interface
- Be able to customize the RStudio layout

Introduction

In this session, we will discuss the basics of R and RStudio, the two essential tools in data visualization of this course. We will cover the advantages of using R and RStudio, how to set up RStudio, and the different panels of the RStudio interface.

What is R?

R is

- A programming language
- Designed for statistical computing and graphics
- Widely used by statisticians, data scientists, and researchers for data analysis and visualization
- An open-source language, which means it is free to use, modify, and distribute
- Offering extensive libraries and powerful data manipulation capabilities
- Separate from RStudio



Figure 1: Google trends showing the popularity of R over time based on Google searches

Why use R?

There are several reasons why R is a popular choice for data analysis, which include:

1. **Open-source:** R is free to use and has a large community of developers who contribute to its growth and development. [What is “open-source”?](#)
2. **Extensive libraries:** There are thousands of R packages available for a wide range of tasks, including specialized packages (e.g. bioinformatics). These libraries have been extensively tested and are available for free.
3. **Data manipulation:** R has powerful data manipulation capabilities, making it easy (or at least possible) to clean, process, and analyze large datasets.
4. **Graphics and visualization:** R has excellent tools for creating high-quality graphics and visualizations that can be customized to meet the specific needs of your analysis. In most cases, graphics produced by R are publication-quality.

5. **Reproducible research:** R enables you to create reproducible research by recording your analysis in a script, which can be easily shared and executed by others.
6. **Cross-platform:** R runs on Windows, Mac, and Linux (as well as more obscure systems).
7. **Interoperability with other languages:** R can interface with FORTRAN, C, and many other languages.
8. **Scalability:** R is useful for small and large projects.

Why not use R?

- R cannot do everything.
- R is not always the “best” tool for the job.
- R will *not* hold your hand. Often, it will *slap* your hand instead.
- The documentation can be opaque (but there is documentation).
- Finding the right package to do the job you want to do can be challenging; worse, some contributed packages are unreliable.

R License

R is free (yes, totally free!) and distributed under GNU license. In particular, this license allows one to:

- Download the source code
- Modify the source code to your heart’s content
- Distribute the modified source code and even charge money for it, but you must distribute the modified source code under the original GNU license

This license means that R will always be available, will always be open source, and can grow organically without constraint.

What is RStudio?

- IDE = Integrated Development Environment
- Provides a graphical user interface (GUI) for R
- Includes useful features such as a built-in console, syntax-highlighting editor, and tools for plotting, history, debugging, workspace management, and workspace viewing
- Console is where R is actually running
 - Can work in here “interactively”
 - Run a single command and see the result ($2 + 2$)
 - This is also where RStudio will run code written in the text editor

Getting started with RStudio

To get started with RStudio, you first need to install both R and RStudio on your computer. Follow these steps:

1. Download and install R from the [official R website](#).
2. Download and install RStudio from the [official RStudio website](#).
3. Launch RStudio. You should see the RStudio interface with four panels.

The RStudio Interface

RStudio's interface consists of 4 "panels" (see Figure 2):

- The **Source** for your scripts and documents (top-left, in the default layout)
- Your **Environment/History** (top-right) which shows all the objects in your working space (Environment) and your command history (History)
- Your **Files/Plots/Packages/Help/Viewer** (bottom-right)
- The R **Console** (bottom-left)

i Do I need to use RStudio?

No. You can use R without RStudio. However, RStudio makes it easier to write and execute R code, and it provides several useful features that are not available in the basic R console. Note that the only part of RStudio that is actually interacting with R directly is the console. The other panels are simply providing a GUI that enhances the user experience.

💡 Customizing the RStudio Interface

You can customize the layout of RStudio to suit your preferences. To do so, go to **Tools > Global Options > Appearance**. Here, you can change the theme, font size, and panel layout. You can also resize the panels as needed to gain screen real estate (see Figure 3).

Summary

R and RStudio are powerful tools for data analysis and visualization. By understanding the advantages of using R and RStudio and familiarizing yourself with the RStudio interface, you can efficiently analyze and visualize your data. In the following sessions, we will delve deeper into the functionality of R to help you gain a comprehensive understanding of data analysis and visualization.

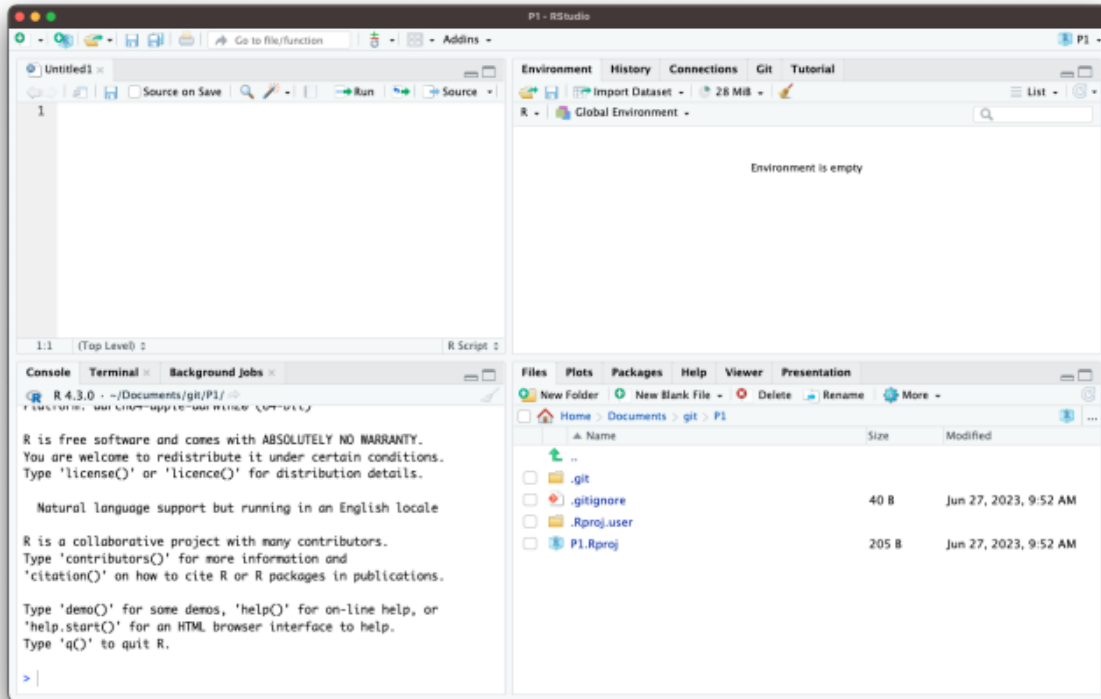


Figure 2: The RStudio interface. In this layout, the **source** pane is in the upper left, the **console** is in the lower left, the **environment** panel is in the top right and the **viewer/help/files** panel is in the bottom right.

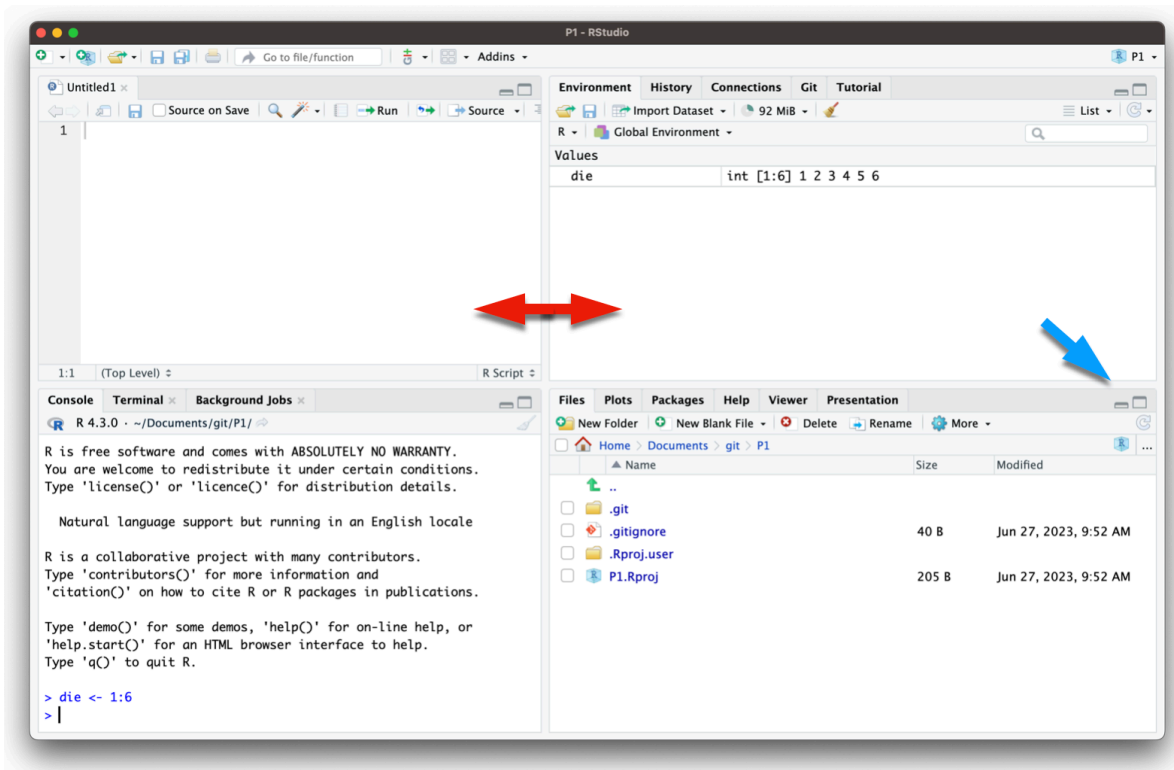


Figure 3: Dealing with limited screen real estate can be a challenge, particularly when you want to open another window to, for example, view a web page. You can resize the panes by sliding the center divider (red arrows) or by clicking on the minimize/maximize buttons (see blue arrow).

Reference

<https://seandavi.github.io/RBiocBook/intro.html>