# Interactive R tutorial
# Installation guide

Our interactive R tutorial covers the basic content introduced in Chapters 9-11. It does not require prior knowledge of R or experience of programming languages. We have written the code and prepared a user friendly interface to run it. The tutorial explains, albeit briefly, the main steps in statistical modelling. It contains simple coding exercises and quizzes. For every coding exercise there is a solution button which can be used to check the correct answer and copy-paste it in the coding box.

Though the tutorial runs independently from R, you'd need to have R installed on your computer. Alternatively, you can use R Studio Cloud, a cloud based version of R: https://rstudio.cloud. R Studio cloud has pretty much the same functionality as R if you install it on your machine. The free subscription to R Studio Cloud allows users to run up to 5 projects at a time, though no more than 15 hours a month in total (you have a 15-hour allowance for every calendar month).

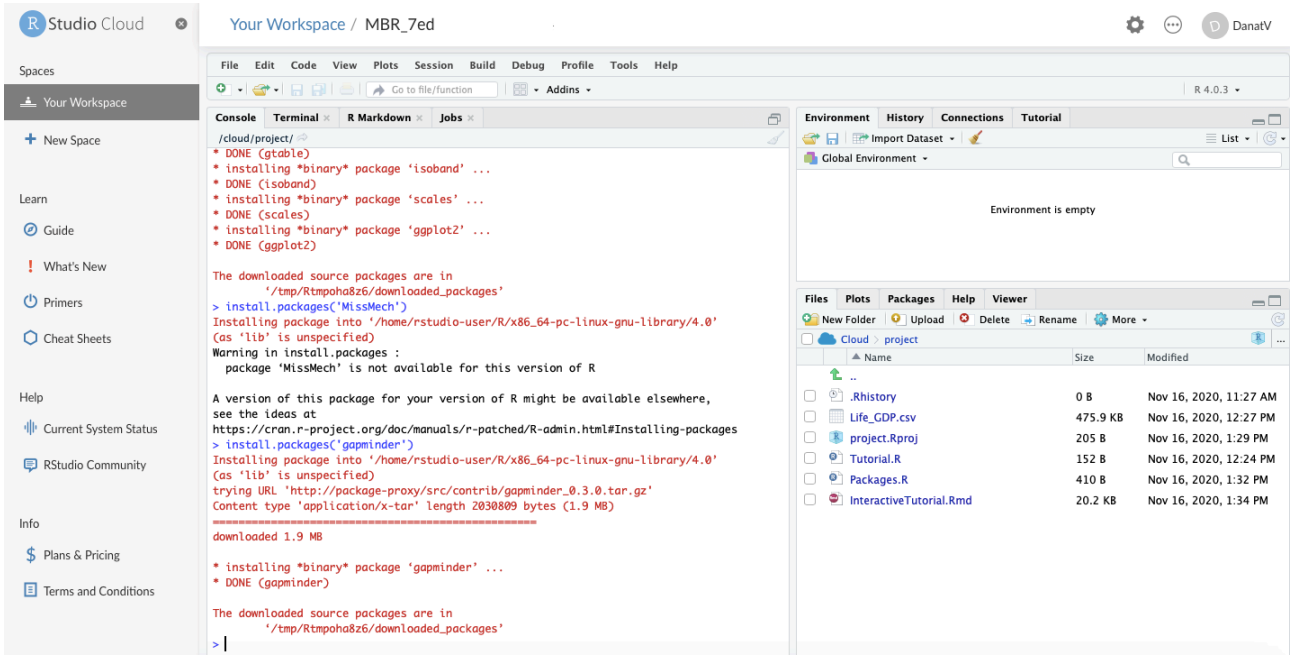
What follows is step-by-step guidelines for installing and running the interactive tutorial.

## 1. Using a shared R Studio project

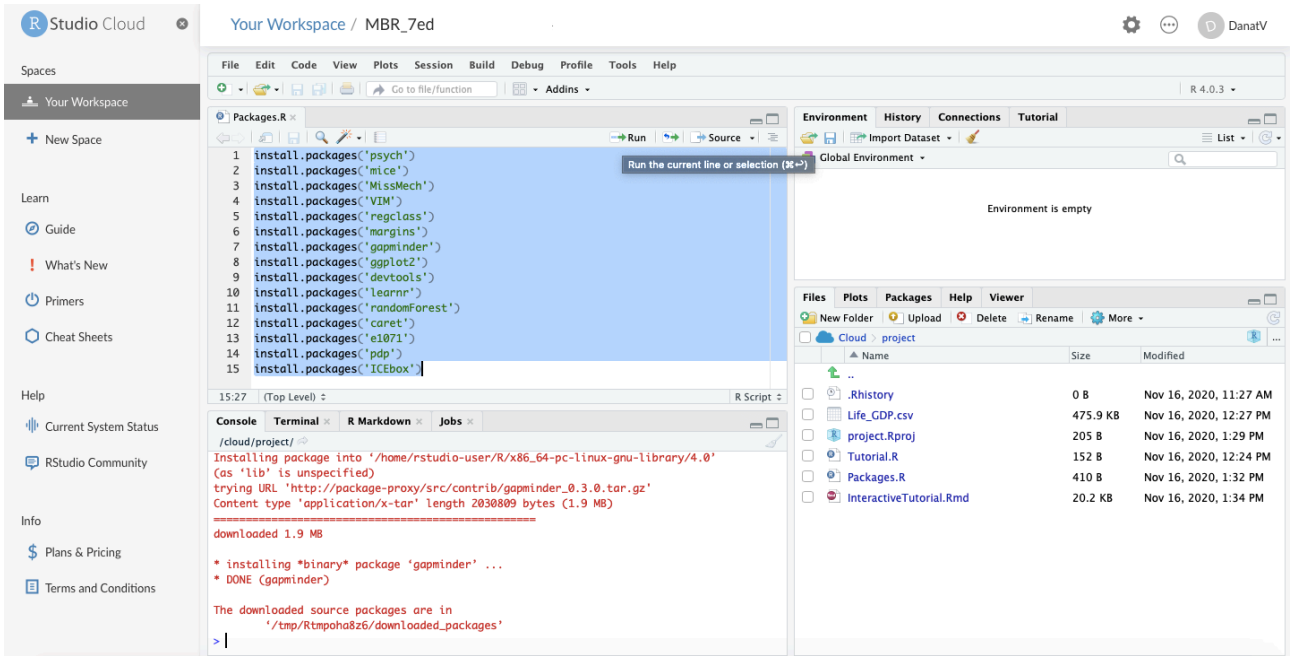
The easiest way to run the tutorial is though a shared R studio cloud project. You will have to complete the following steps.

- Go to https://rstudio.cloud and create a new account following the instructions on the screen.
- Follow this link to R studio project: https://rstudio.cloud/project/1919573. If prompted, log in to R Studio Cloud using your credentials step up in the previous step

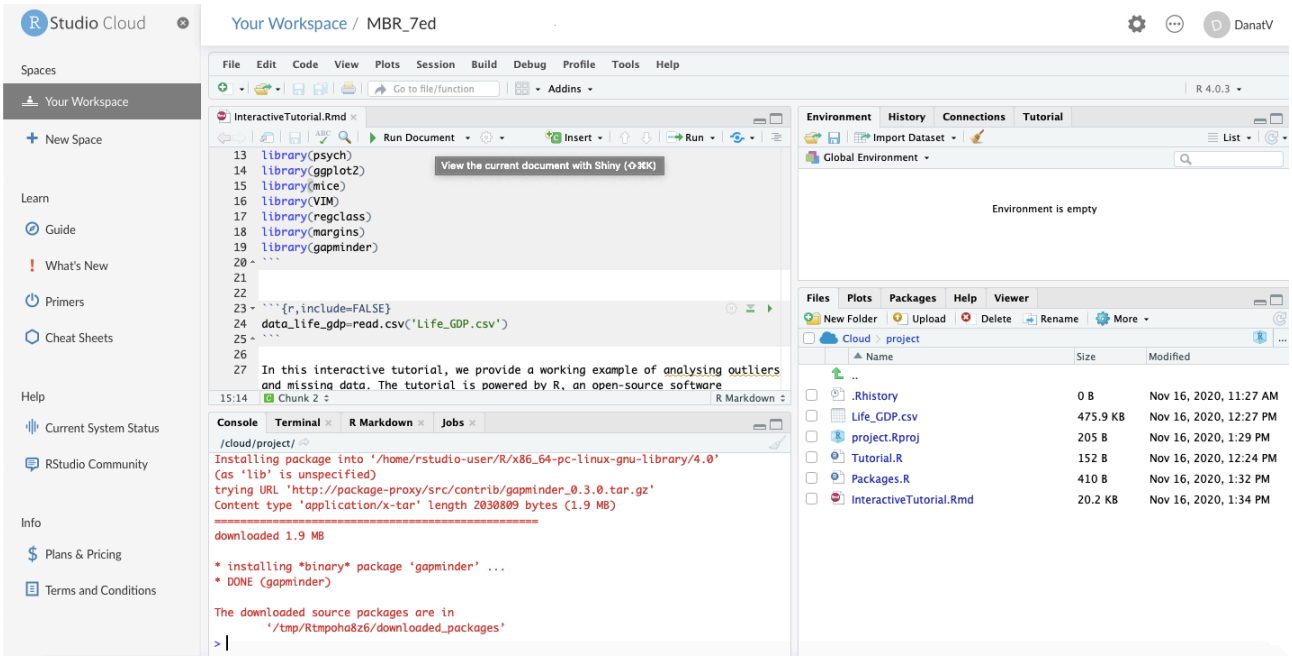
- You should see an interface similar to the one in the screenshot below

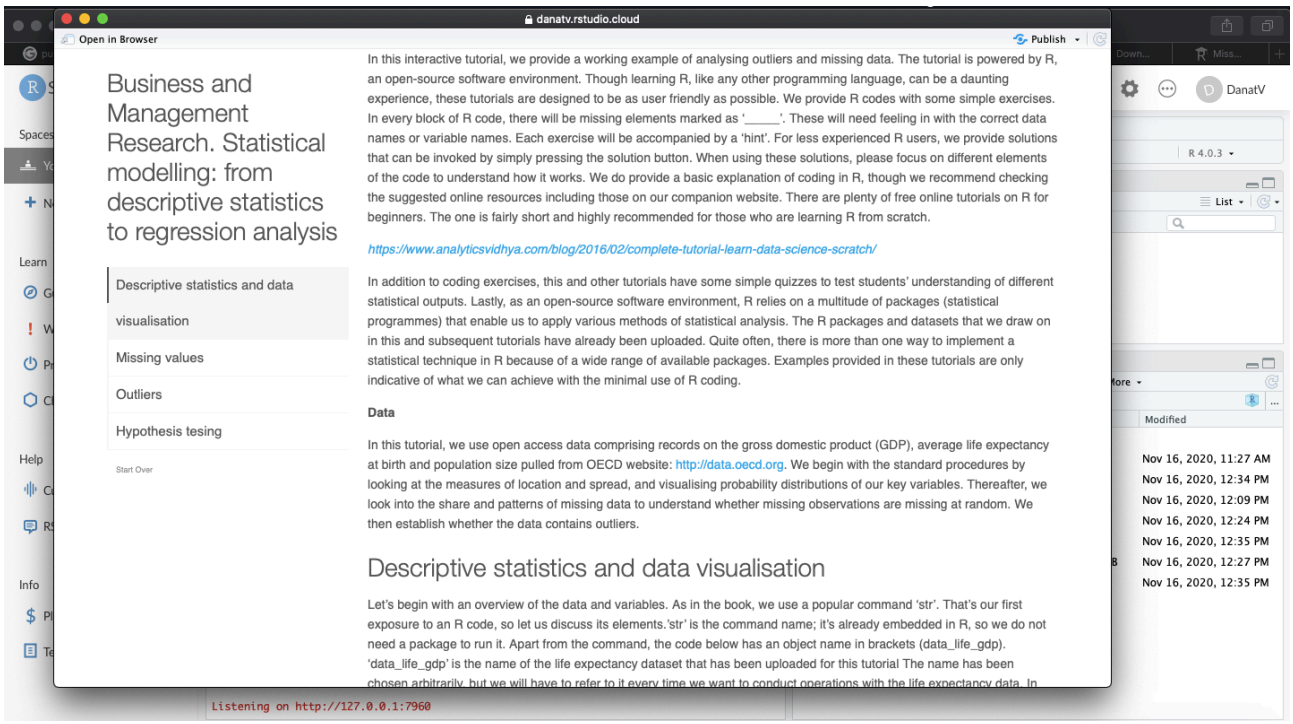



- We are interested in the bottom right quadrant (the fourth quadrant clockwise)
- Open the file titled 'Packages.R'. Highlight all lines of code using your mouse, as shown in the screenshot below, then hover your mouse to 'Run' and click it. It will take a couple of minutes to install all necessary packages and dependencies. You will know the process is finished when you see no further activity in the console quadrant (the third quadrant clockwise).



- Thereafter, open the file titled ‘InteractiveTutorial.Rmd’ which can be foundd in the fourth quadrant. Hover your mouse to ‘Run document’ and click it. You may be prompted with a warning message asking you to ‘Try again’ (that depends on how your browser is set up). Click ‘Try again’ if needed and the tutorial will open in a new window.



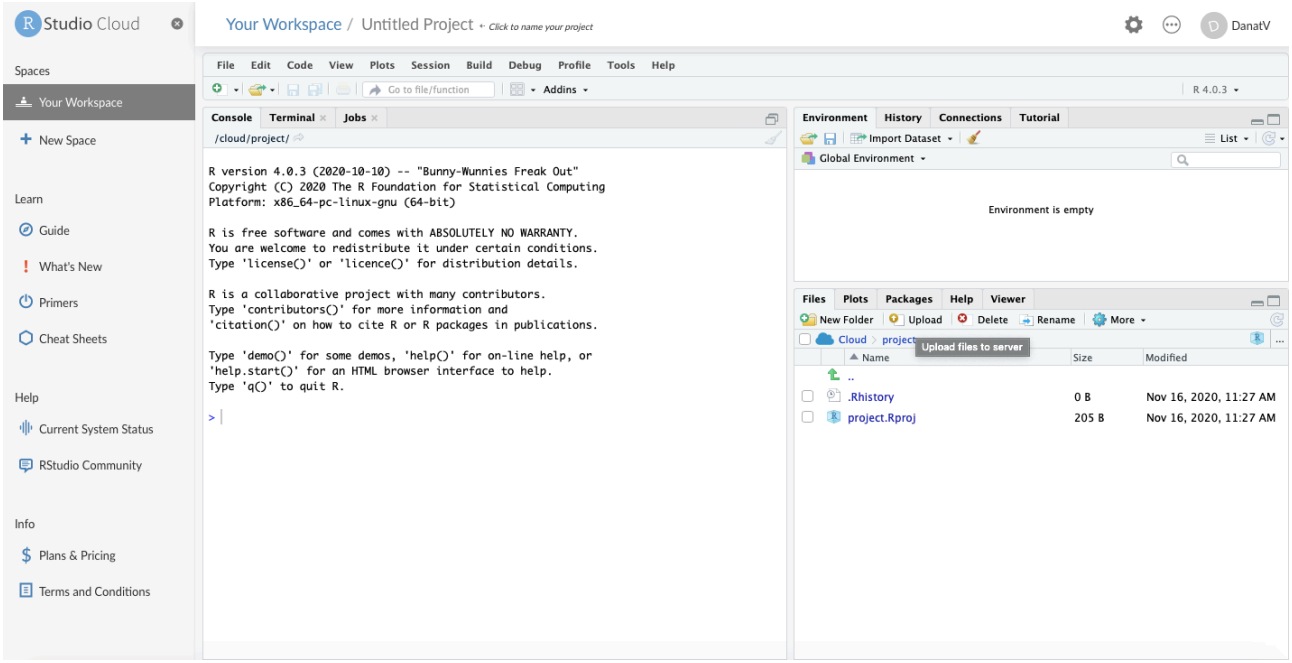
## 2. Using R Studio cloud independently

You can create your own R project on R Studio cloud and upload the files required to run the tutorial. This gives you more independence but is a slightly more complex approach. Follow the steps below.

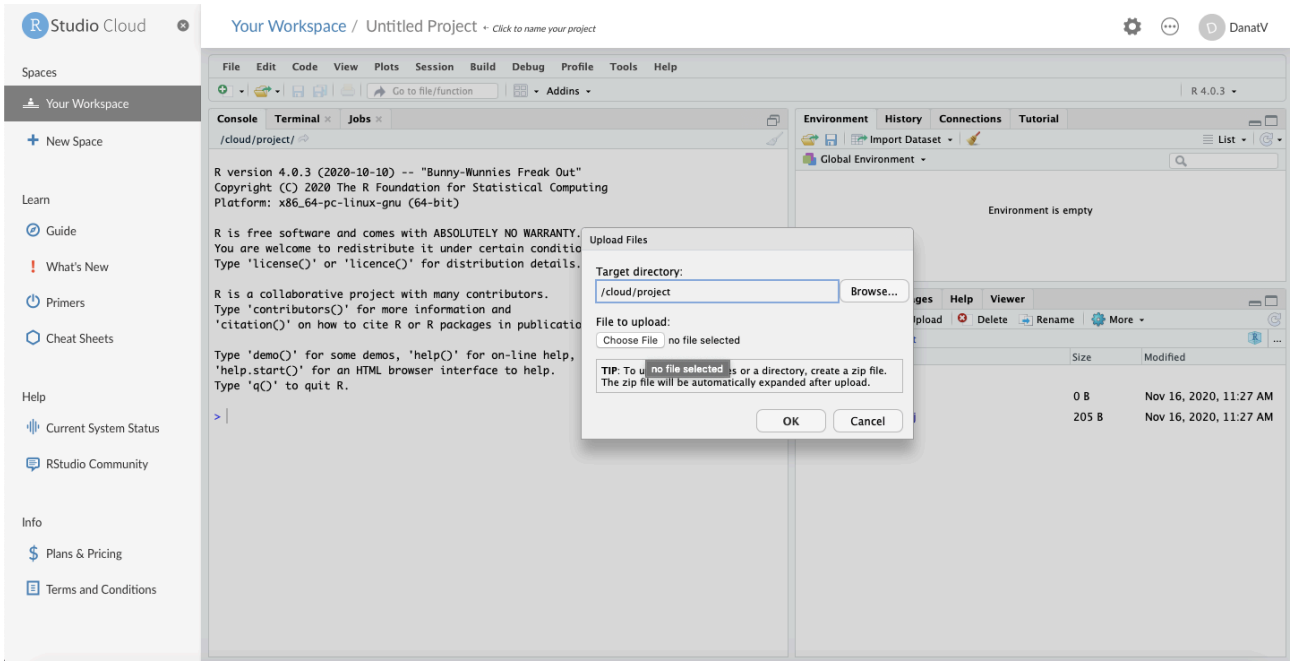
- Download two R files from our companion website: ‘Packages.R’ and ‘Tutorial.R’. Save them anywhere on your local machine (your desktop or laptop).

- Go to https://rstudio.cloud and create a new account following the instructions on the screen.

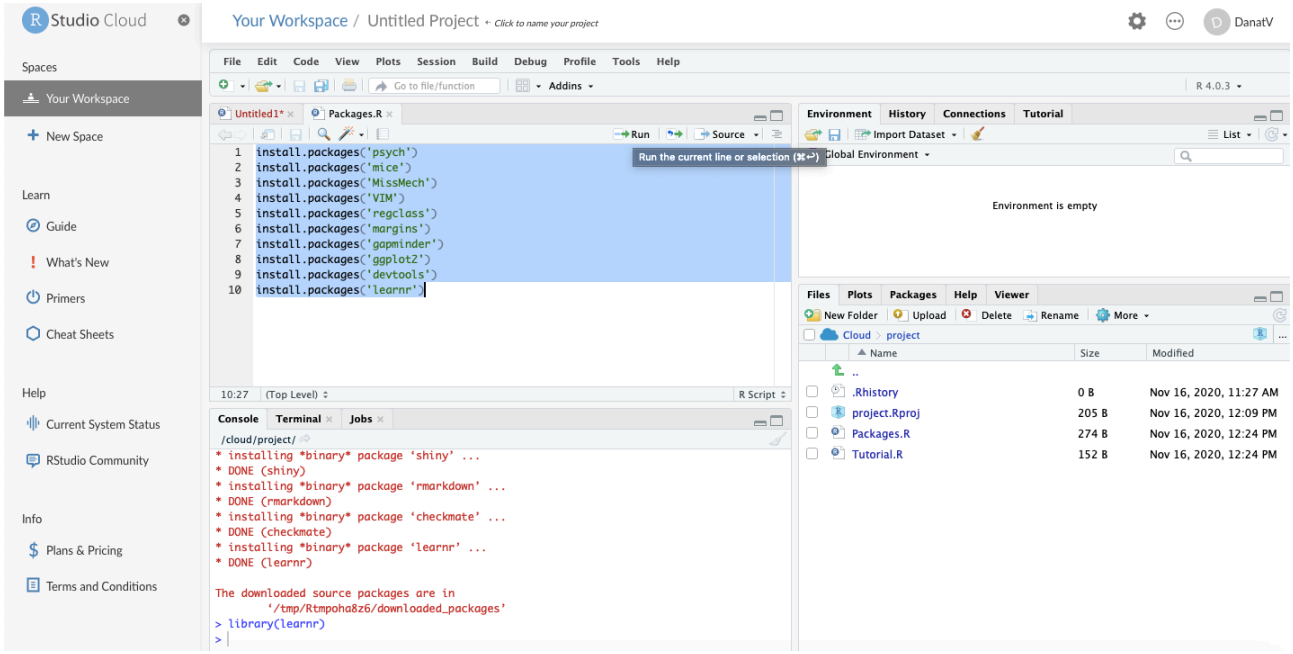
- Log on to your account and create a new project. It does not matter what name you give to the project. Open the project and hover your mouse to ‘Upload’ in the fourth quadrant (as shown in the screenshot below).



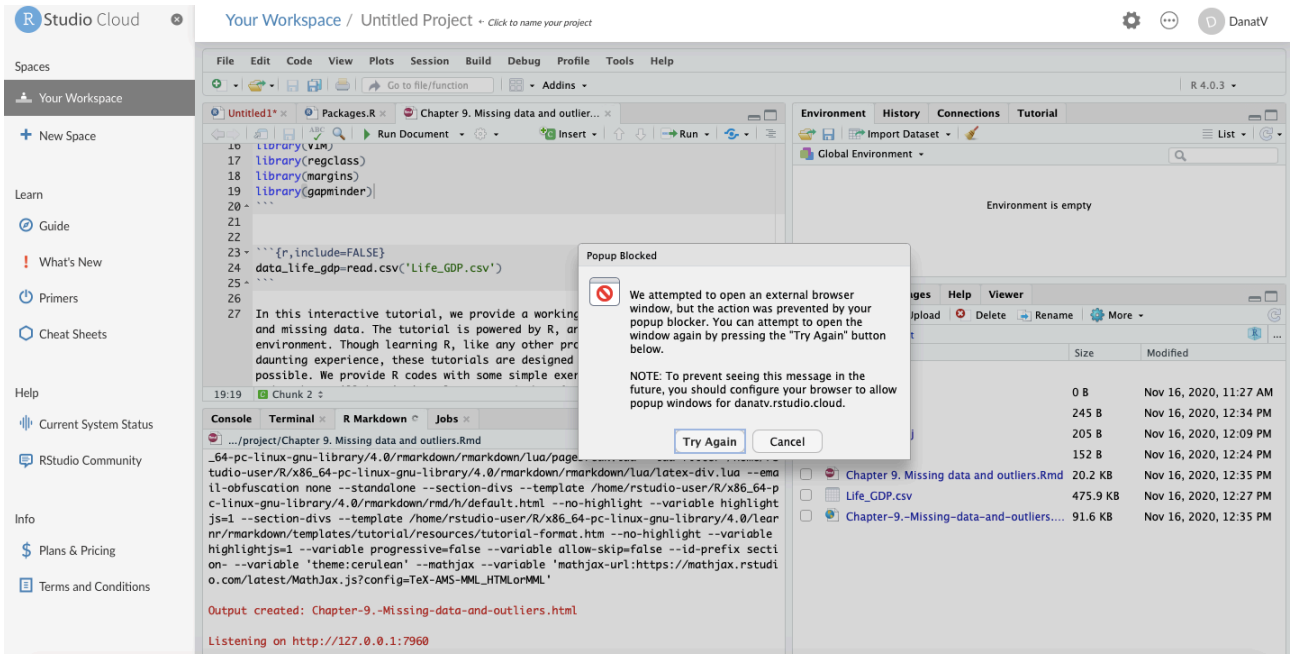
- Click ‘Choose file’ and then select any of the two .R files that you have downloaded from our companion website. You will have to repeat this procedure for the second file.

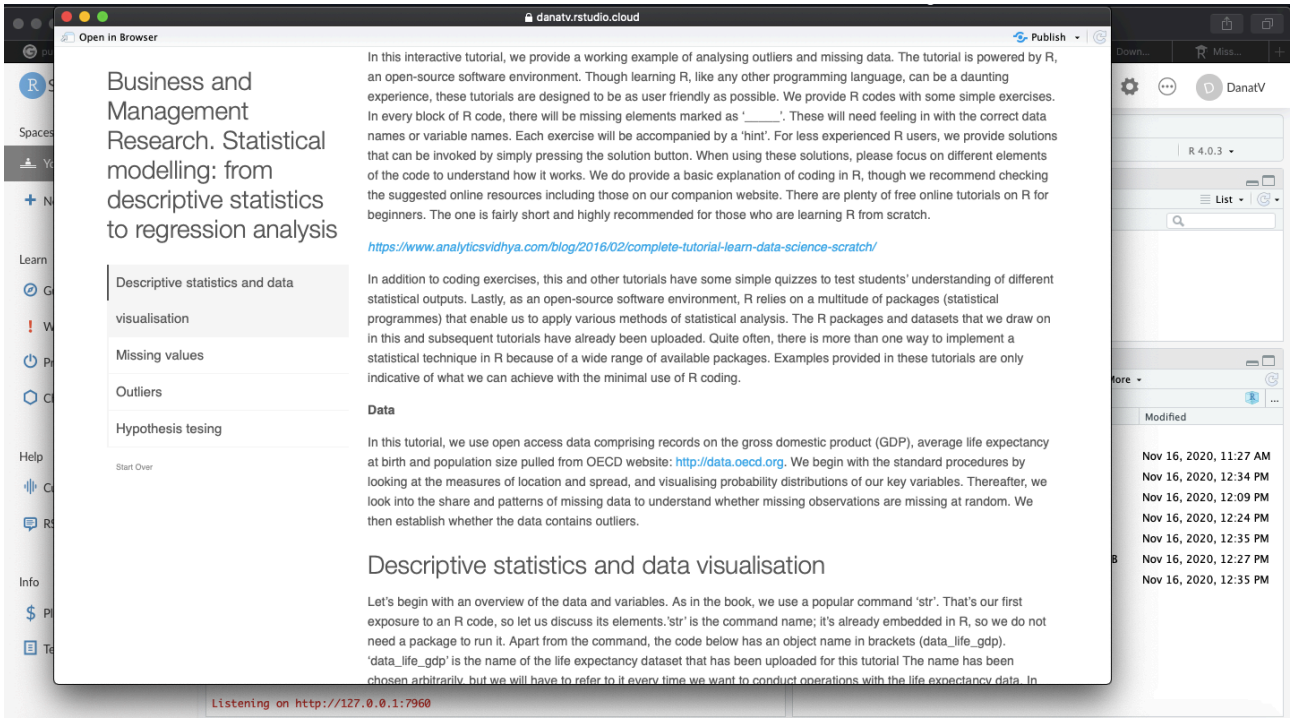



- Upon completion of the previous task, you should see the uploaded files in the fourth quadrant. To run the tutorial, open ‘Packages.R' first. The file should appear in the top left quadrant. Highlight all lines of code, as shown in the screenshot below, then hover your mouse to ‘Run’ and click it. It will take a couple of minutes to install all necessary packages and dependencies. You will know the process is finished when you see no further activity in the console quadrant (the bottom left quadrant).




Next, open the second .R file (Tutorial.R). Similarly to the previous step, highlight all lines of code and click 'Run'. It will take up to 10-15 seconds for the software to open the tutorial in a new window. You can now work with the tutorial in this new window.




danatv.rstudio.cloud
Open in Browser
Publish
Business and Management Research. Statistical modelling: from descriptive statistics to regression analysis
Descriptive statistics and data visualisation
Missing values
Outliers
Hypothesis tesing
Start Over
In this interactive tutorial, we provide a working example of analysing outliers and missing data. The tutorial is powered by R, an open-source software environment. Though learning R, like any other programming language, can be a daunting experience, these tutorials are designed to be as user friendly as possible. We provide R codes with some simple exercises. In every block of R code, there will be missing elements marked as '_____'. These will need feeling in with the correct data names or variable names. Each exercise will be accompanied by a 'hint'. For less experienced R users, we provide solutions that can be invoked by simply pressing the solution button. When using these solutions, please focus on different elements of the code to understand how it works. We do provide a basic explanation of coding in R, though we recommend checking the suggested online resources including those on our companion website. There are plenty of free online tutorials on R for beginners. The one is fairly short and highly recommended for those who are learning R from scratch.
https://www.analyticsvidhya.com/blog/2016/02/complete-tutorial-learn-data-science-scratch/
In addition to coding exercises, this and other tutorials have some simple quizzes to test students' understanding of different statistical outputs. Lastly, as an open-source software environment, R relies on a multitude of packages (statistical programmes) that enable us to apply various methods of statistical analysis. The R packages and datasets that we draw on in this and subsequent tutorials have already been uploaded. Quite often, there is more than one way to implement a statistical technique in R because of a wide range of available packages. Examples provided in these tutorials are only indicative of what we can achieve with the minimal use of R coding.
Data
In this tutorial, we use open access data comprising records on the gross domestic product (GDP), average life expectancy at birth and population size pulled from OECD website: http://data.oecd.org. We begin with the standard procedures by looking at the measures of location and spread, and visualising probability distributions of our key variables. Thereafter, we look into the share and patterns of missing data to understand whether missing observations are missing at random. We then establish whether the data contains outliers.
Descriptive statistics and data visualisation
Let's begin with an overview of the data and variables. As in the book, we use a popular command 'str'. That's our first exposure to an R code, so let us discuss its elements.'str' is the command name; it's already embedded in R, so we do not need a package to run it. Apart from the command, the code below has an object name in brackets (data_life_gdp). 'data_life_gdp' is the name of the life expectancy dataset that has been uploaded for this tutorial The name has been chosen arbitrarily, but we will have to refer to it every time we want to conduct operations with the life expectancy data. In
Listening on http://127.0.0.1:7960
DanatV
R 4.0.3
List
Modified
Nov 16, 2020, 11:27 AM
Nov 16, 2020, 12:34 PM
Nov 16, 2020, 12:09 PM
Nov 16, 2020, 12:24 PM
Nov 16, 2020, 12:35 PM
Nov 16, 2020, 12:27 PM
Nov 16, 2020, 12:35 PM

2. On your machine (e.g. desktop, laptop)

- Go to https://cran.r-project.org and download the latest version of R for your operating system. Install the software by opening the downloaded file and following the instructions on the screen.
- Go to https://rstudio.com/products/rstudio/download/ and downloaded the latest version of R Studio for your operating system.
- Download two R files from our companion website: 'Packages.R' and 'Tutorial.R'. Save them anywhere on your local machine (your desktop or laptop).
- Open R Studio and go to the small R icon in the top right corner, as shown in the screenshot above. Click the small arrow and select 'New Project'.
- In the next window choose 'R project' and the 'Existing directory'. Click 'Browse' and select the folder where you have downloaded the files from our companion website.
- Repeated the steps from the previous R Studio guide with 'Packages.R' and 'Tutorial.R'.
- The tutorial will appear in a new window.