Linguistic Geocomputation with R

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Contents

This book is about

Chapter 1

Introduction

1.1 Why linguistic geocomputations?

1.2 Why do we need geostatistics in linguistics?

1.3 Why R?

Chapter 2

Introduction to R language

Since this book includes a lot of R code examples, this chapter will describe some basics for those, who is not familiar with R. For purposes of understanding R code in this book you don't need any deep knowledge of R. In case you want to learn more, there are a lot of good books on it. I will list only few of them:

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2.1 Instalation

2.1.1 R instalation

To download R, go to CRAN. Don't try to pick a mirror that's close to you, instead it is better to use the cloud mirror, https://cloud.r-project.org.

2.1.2 RStudio

RStudio is an integrated development environment, or IDE, for R programming. There are two possibilities:

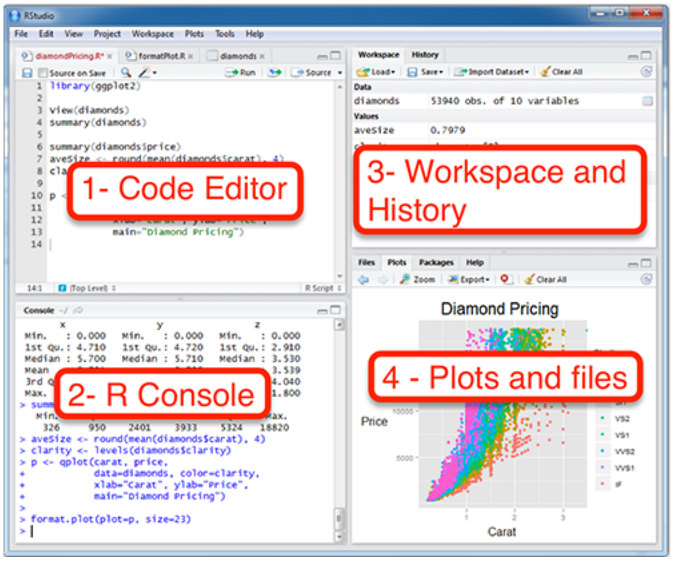
- type R code in the R console pane, and press enter to run it;
- type R code in the Code editor pane, and press Control/Command + Enter to run selected part. It is easier to correct and it is possible to save the result as a script.

When you first launch RStudio it is more likely, that you won't see the Code Editor pane. It is possible to decrease R Console pane on icons in the pane's right upper corner.

Everything from this book will be availible without RStudio instalation. There are a lot of possibilities to work with R not using RStudio such as R console, command line, Jupyter Notebook, some plugins for working in Sublime, Vim, Emacs, Atom, Notepad++ and other programming text editors.

2.1.3 RStuio cloud

It is also possible not to install anything on your own PC, using RStudio Cloud, a web-based interface for Rstudio and R. In RStudio Cloud it is also possible to share your R projects and collaborate with a select group in a private space. RStudio Cloud is currently free to use, but soon there will be free and paid options.



```
library(ggplot2)

View(diamonds)
summary(diamonds)

summary(diamonds$price)
aveSize <- round(mean(diamonds$carat), 4)
cla

p <


             main="Diamond Pricing")
```

```
        x                 y                 z
 Min.   : 0.000   Min.   : 0.000   Min.   : 0.000
 1st Qu.: 4.710   1st Qu.: 4.720   1st Qu.: 2.910
 Median : 5.700   Median : 5.710   Median : 3.530
 Mean                                     : 3.539
 3rd Q                                    : 4.040
 Max.                                     :31.800
> summ
   Min.                                   Max.
    326     950    2401    3933    5324   18820
> aveSize <- round(mean(diamonds$carat), 4)
> clarity <- levels(diamonds$clarity)
> p <- qplot(carat, price,
+            data=diamonds, color=clarity,
+            xlab="Carat", ylab="Price",
+            main="Diamond Pricing")
>
> format.plot(plot=p, size=23)
> |
```

```
diamonds    53940 obs. of 10 variables
aveSize     0.7979
```

Figure 2.1: RStudio layout

2.2 Base elements, variables, vectors, dataframe

2.2.1 Base elements

```
7
```

```
[1] 7
```

```
-5.7
```

```
[1] -5.7
```

```
"bonjour"
```

```
[1] "bonjour"
```

```
"bon mot"
```

```
[1] "bon mot"
```

```
TRUE
```

```
[1] TRUE
```

```
FALSE
```

```
[1] FALSE
```

2.2.2 Variables

```
my_var <- 7
my_var
```

```
[1] 7
```

```
my_var+7
```

```
[1] 14
```

```
my_var
```

```
[1] 7
```

```
my_var <- my_var + 7
```

2.2.3 Vectors

```
5:9
```

```
[1] 5 6 7 8 9
```

```
11:4
```

```
[1] 11 10  9  8  7  6  5  4
```

```
numbers <- c(7, 9.9, 24)
multiple_strings <- c("the", "quick", "brown", "fox", "jumps", "over", "the", "lazy", "dog")
one_string <- c("the quick brown fox jumps over the lazy dog")
true_false <- c(TRUE, FALSE, FALSE, TRUE)
length(numbers)
```

```
[1] 3
```

```
length(multiple_strings)
```

```
[1] 9
```

```
length(one_string)
```

```
[1] 1
```

2.2.4 Dataframes

```
my_df <- data.frame(latin = c("a", "b", "c"),
                    cyrillic = c(" ", " ", " "),
                    greek = c(" ", " ", " "),
                    numbers = c(1:3),
                    is.vowel = c(TRUE, FALSE, FALSE),
                    stringsAsFactors = FALSE)
my_df
```

```
  latin cyrillic greek numbers is.vowel
1     a                     1     TRUE
2     b                     2    FALSE
3     c                     3    FALSE
```

```
nrow(my_df)
```

```
[1] 3
```

```
ncol(my_df)
```

```
[1] 5
```

2.2.5 Indexing

```
numbers[3]
```

```
[1] 24
```

```
multiple_strings[9]
```

```
[1] "dog"
```

```
my_df[2, 3]
```

```
[1] " "
```

```
my_df[2,]
```

```
  latin cyrillic greek numbers is.vowel
2     b                      2    FALSE
```

```
my_df[,3]
```

```
[1] " " " " " "
```

```
my_df$is.vowel
```

```
[1]  TRUE FALSE FALSE
```

```
my_df$is.vowel[2]
```

```
[1] FALSE
```

2.3 Reading files

We can read to R a dataset about Numeral Classifiers from AUTOTYP database.

```
new_df <- read.csv("https://raw.githubusercontent.com/autotyp/autotyp-data/master/data/Numeral_classific
head(new_df)
```

```
  LID NumClass.n NumClass.Presence
1 148          0             FALSE
2  65          0             FALSE
3  75          0             FALSE
4  85          0             FALSE
5 111         NA                NA
6 163          0             FALSE
```

```
tail(new_df)
```

```
     LID NumClass.n NumClass.Presence
250 1397          0             FALSE
251 2994          5              TRUE
252 2779          0             FALSE
253  192          0             FALSE
254  551          0             FALSE
255 2564          2              TRUE
```

It could be also a file on your computer, just provide a whole path to the file. Windows users need to change backslashes `\` to slashes `/`.

```
new_df_2 <- read.csv("/home/agricolamz/my_file.csv")
```

2.4 Writing files from R

```
write.csv(new_df_2, "/home/agricolamz/my_new_file.csv",
          row.names = FALSE)
```

2.5 Missing data

In R, missing values are represented by the symbol `NA` (not available).

```
is.na(new_df$NumClass.Presence)
```

```
  [1] FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
 [12] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [23] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [34] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [45] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [56] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [67] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [78] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 [89] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[100] FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE
[111] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[122] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[133] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[144] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[155] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE
[166] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[177]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE
[188] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[199] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[210] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[221] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[232] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[243] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
[254] FALSE FALSE
```

```
sum(is.na(new_df$NumClass.Presence))
```

```
[1] 5
```

```
sum(is.na(new_df))
```

```
[1] 22
```

2.6 How to get help in R

```
?nchar
```

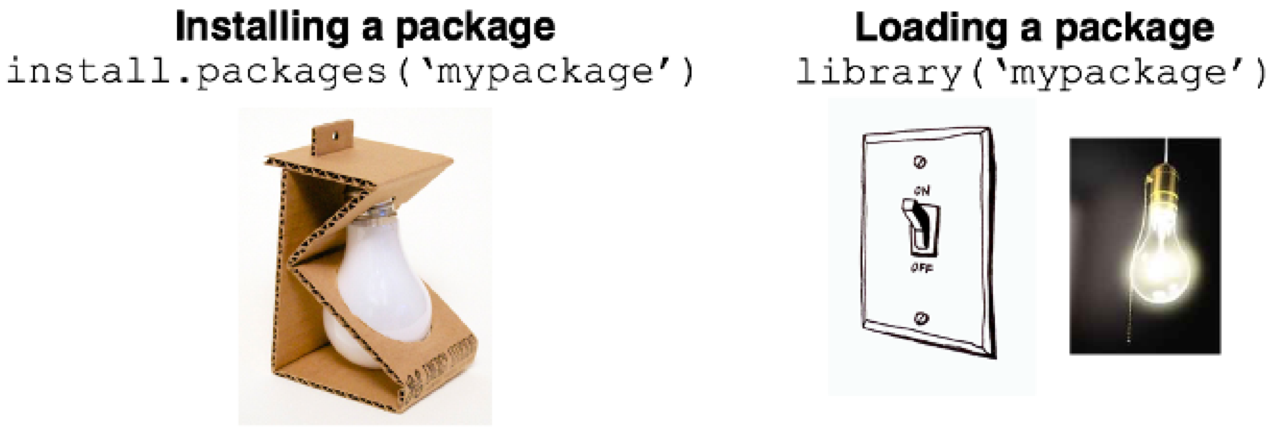


Figure 2.2: Lamp metaphore

2.7 Packages

There are a lot of R packages for solving a lot of different problems. There are two way for install them (you need an internet connection):

- packages on CRAN are checked in multiple ways and should be stable

```
install.packages("lingtypology")
```

- packages on GitHub are NOT checked and could contain anything, but it is the place where all package developers keep the last vertion of they work.

```
install.packages("devtools")
devtools::install_github("ropensci/lingtypology")
```

- or package file

```
install.packages("lingtypology",
                 destdir = "/path/to/your/package")
```

After the package is installed you need to load the package using the following command:

```
library("lingtypology")
```

There is a nice picture from Phillips N. D. (2017) YaRrr! The Pirate's Guide to R:

Chapter 3

Map creation

Chapter 4

Linguistical databases

4.1 Linguistical databases APIs

4.2 Linguistical databases creation

Look 4.1 and 3

Chapter 5

Spatial statistics

Here will be a nice sections

Chapter 6

Conclusion