Overview

October 30, 2017

Why R?

- Open source and extensible. It is also free of charge. More importantly, you (and the community) can inspect the code for any function.
- Very popular *programing language* for statistics. "It promotes experimentation and exploration, which improves data analysis." Lots of libraries for all kinds of specialized tasks.
- Great for visualization. Excellent packages for graphics.
- Excellent documentation and online help.
- A very active and helpful community.

What is R anyway?

If you are coming from SAS or Stata, you are better off thinking about it as a programming language and not as a statistical environment:

- Interpreted: allows direct executions of code, which makes it slower than compiled languages.
- Dynamically typed: Easy and less boiler plate, makes metaprogramming a lot easier.
- Multi-paradigm. Although most users exploit object orientation.

The extension of the R files is usually `.R`

RStudio

R can be downloaded from the Comprehensive R Archive Network, CRAN. We will be using RStudio, a popular IDE. It is important to keep in mind that R (the language) and RStudio (the GUI) are separate things, and it is entirely possible to use different workflows with other tools or text editors:

- `emacs` through ESS (what I use).
- `vim` with the Vim-R-Plugin.
- Sublime Text.

A few useful resources

There is a constantly growing collection of materials available offline and online to learn R. The Journal of Statistical Software and the Use R! series from Springer regularly publish applications of R to different domains.

A good overview for beginners is Learning R.

SAS users may find useful R for SAS and SPSS users, although I have never used it myself.

For the analysis of compley survey data, you may want to take a look to "Complex Surveys. A Guide to Analysis Using R".

The official documentation in CRAN (The Comprehensive R Archive Network) is simply excellent but it goes well beyond the scope of this class.

Looking around

RStudio offers four basic windows.

- Console (R interpreter)
- Code, where we will write our code.
- History/Environment
- Plots/Packages/Help

Getting help

The documentation of R has a well-earned reputation of being excellent. It can be accessed through the interpreter. For instance, if we wanted to get information about what `lm` does, or what paramaters it takes or some examples of usage, we would type:

```
?lm
```

The R community is very helpful and active. If you ever get stuck in a problem, the best solution is to ask in StackOverflow, a very large community of programmers using the `#r` tag.

For obvious reasons, the language is sometimes referred to as "Rstats" (social media and search engines, amirite?).

Within Westat, there is a growing community of users and we have a number of resources for Q&A and sharing information or announcements.

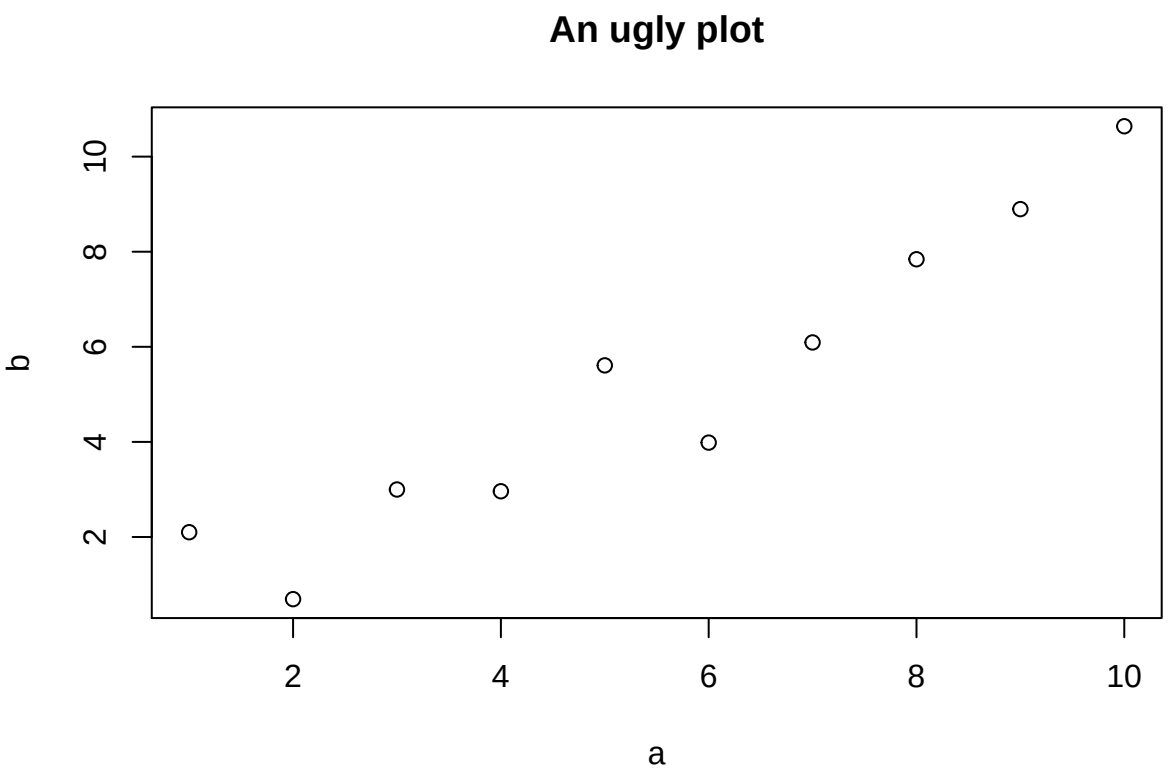
About this document

I have prepared these materials using using Rmarkdown, a format that makes it easy to create dynamic documents. The text is written in markdown, the easiest possible markup language ("easy-to-read, easy-to-write"): `_italic_`, `**bold**`, ... but it also allows to include chunks of executable R code. It simplifies reproducibility and it is very easy to share.

For instance,

is rendered as:

```
N <- 10
a <- 1:N
b <- a + rnorm(N)
plot(a, b); title("An ugly plot")
```



GitHub and `git` more generally deserve a class on its own (we cover it in the Advanced R class), but here it will only be used to host the notes.