

Introduction to R

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Today's workshop

Teach you how to use R to:

- ▶ read in and manipulate tabular data
- ▶ do some basic statistics
- ▶ do some graphing

I'm assuming you're new to R.

The goal: get you comfortable enough to help yourself go further with R.

RStudio

- ▶ I recommend you use R with the free RStudio IDE (Interactive Development Environment).
- ▶ RStudio makes it easier to learn and use R.
- ▶ It does things like autocomplete, syntax highlighting, and much more.
- ▶ **After you install R and RStudio, you only need to run RStudio.**

R basics - functions

- ▶ R uses *functions* to do things.
- ▶ Functions take *arguments* to specify how to do those things.
Examples:
 - ▶ `read.csv(file="scores.csv")`
 - ▶ `plot(x = scores$SAT, y = scores$GPA)`
- ▶ `read.csv` is a function to import a CSV file; `file` is an argument that specifies which file to import.
- ▶ `plot` is a function that creates a graph; `x` and `y` are arguments that specify what to plot on the `x` and `y` axes, respectively.

R basics - running functions

Two common ways to run functions:

1. In the console at the command line; type the function and hit Enter
2. In an R script; type one or more functions, and run one or more of them by highlighting and hitting Ctrl + Enter (Win) or Command + Enter (Mac)

An R script is a text file that contains all your R code. R scripts allow you to save, edit, reproduce and share your code.

Today's workshop will be centered around an R script I wrote in advance.

R basics - assignment

- ▶ We often need to save a function's result or output. For this we use the assignment operator: `<-`
- ▶ For example, when you import a CSV file you need to give it a name:

```
scores <- read.csv(file="scores.csv")
```

- ▶ Now we can use `scores` as an argument to other functions. For example, compute summary statistics for each column in the data:

```
summary(scores)
```

- ▶ **Note:** Use `Alt + -` (Win) or `Option + -` (Mac) in RStudio to quickly insert `<-`. You can also use `=` for assignment.

R basics - packages

- ▶ All functions belong to *packages*. R comes with about 30 packages (sometimes called “base R”), but as of August 2016, there are *over 8700* user-contributed packages!
- ▶ Example: `ggplot2` is a popular package that adds functions for creating graphs in a different way than what base R provides
- ▶ To use functions in a package, the package must be installed and loaded. (They're free)
- ▶ You only *install* a package once.
- ▶ You *load* a package whenever you want to use its functions.

Let's get started!

- ▶ Open RStudio and follow along with me!
- ▶ First we'll work interactively with R.
- ▶ Then we'll open the R script I prepared for this workshop (Intro_R_workshop.R).
- ▶ Don't hesitate to ask questions!

Keep Going!

- ▶ Join the UVa R Users Group:
<http://www.meetup.com/UVa-R-Users-Group/>
- ▶ Sign up for the R-Bloggers daily email:
<http://www.r-bloggers.com/>
- ▶ Lander, J., *R for Everyone*, Addison-Wesley, 2014.
- ▶ Kabacoff, R., *R in Action*, Manning, 2015.
- ▶ Teetor, P., *R Cookbook*, O'Reilly, 2011.
- ▶ Hothorn, T. & Everitt, B., *A Handbook of Statistical Analyses Using R*, CRC Press, 2009.

Check out these web sites

- ▶ Contributed Documentation:
<http://cran.r-project.org/other-docs.html>
- ▶ Quick-R: <http://www.statmethods.net/>
- ▶ Cookbook for R: <http://www.cookbook-r.com/>
- ▶ R-statistics blog: <http://www.r-statistics.com/>
- ▶ The R Journal: <http://journal.r-project.org/>
- ▶ UCLA R Starter Kit:
<http://www.ats.ucla.edu/stat/r/sk/>

Thanks for coming today!

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