Introduction to R

Introduction to R for Public Health Researchers

Welcome to class!

1. Introductions
2. Class overview
3. Getting R up and running

About Us

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Introductions

What do you hope to get out of the class?

Why R?

Course Website

`http://www.aejaffe.com/winterR_2017/`

Materials will be uploaded the night before class

Learning Objectives

- Reading data into R
- Recoding and manipulating data
- Writing R functions and using add-on packages
- Making exploratory plots
- Understanding basic programming syntax
- Performing basic statistical tests

Course Format

- 3 modules per class session, each approximately 1 hour
  - "Interactive" Lecture with RStudio + slides
  - Lab/Practical experience

Grading

1. Attendance/Participation: 20%
2. Nightly Homework: 3 x 15%
3. Final "Project": 35%

Grading

- **Homework 1**: Due Tuesday 1/10 by class
- **Homework 2**: Due Thursday 1/12 by class
- **Homework 3**: Due Friday 1/13 by class
- **Project**: Due Friday 1/27 by 5pm

What is R?

- R is a language and environment for statistical computing and graphics
- R is the open source implementation of the S language, which was developed by Bell laboratories
- R is both open source and open development

(source: `http://www.r-project.org/`)

Why R?

- Powerful and flexible
- Free (open source)
- Extensive add-on software (packages)
- Designed for statistical computing
- High level language

Why not R?

- Fairly steep learning curve
  - "Programming" oriented
  - Minimal interface
- Little centralized support, relies on online community and package developers
- Annoying to update
- Slower, and more memory intensive, than the more traditional programming languages (C, Java, Perl, Python)

Installing R

Install the latest version from: `http://cran.r-project.org/`

R Studio

(Makes R easier)

- Integrated Development Environment (IDE) for R
  - Syntax highlighting, code completion, and smart indentation
  - Execute R code directly from the source editor
  - Easily manage multiple working directories using projects
  - Workspace browser and data viewer
  - Plot history, zooming, and flexible image and PDF export
  - Integrated R help and documentation
  - Searchable command history
- `http://www.rstudio.com/`

Working with R

- The R Console "interprets" whatever you type
  - Calculator
  - Creating variables
  - Applying functions
- "Analysis" Script + Interactive Exploration
  - Static copy of what you did (reproducability)
  - Try things out interactively, then add to your script
- R revolves around functions
  - Commands that take input, performs computations, and returns results
  - Many come with R, but people write external functions you can download and use

Useful R Studio Shortcuts

- `Ctrl + Enter` (`Cmd + Enter` on OS X) in your script evaluates that line of code
  - It's like copying and pasting the code into the console for it to run.
- `Ctrl+1` takes you to the script page
- `Ctrl+2` takes you to the console
- `http://www.rstudio.com/ide/docs/using/keyboard_shortcuts`

Useful (+Free) Resources

- Homework will involve working through: `http://tryr.codeschool.com/`
- DataCamp `http://www.datacamp.com`
- UCLA Institute for Digital Research and Education: `http://www.ats.ucla.edu/stat/r/`
- R reference card: `http://cran.r-project.org/doc/contrib/Short-refcard.pdf`
- Undergrad Guide to R: `https://sites.google.com/site/undergraduateguidetor/`
- Quick R: `http://statmethods.net/`
- Data Camp: `https://www.datacamp.com/`