R bootcamp - August 2020: Syllabus/schedule

August 6, 2020

Unless otherwise noted, modules are about 90 minutes long: 50 minutes for presentation, 30 minutes for breakout and 10 minutes for discussion of solutions.

- Session 1 (Monday) (learning R)
  - Module 0: Introduction, what is R, starting R, why R? why not R? (15 minutes)
  - Module 1: Basics of R, with Rstudio
    - R as a calculator
    - helpful shortcuts: tab-complete, up arrow, Ctrl-{up arrow}
    - vectors and indexing and subset assignment
    - some basic functions; help()
    - basic R objects: vectors, matrices, dataframes, lists
    - basic graphics
    - breakout problems
  - Break (15 minutes)
  - Module 2: Managing R and your analyses (60 minutes)
    - managing R objects, the R workspace
    - using packages (installing, loading, namespaces)
    - the working directory and basic file reading/writing
    - more on reading data into R
    - Git, Github and version control
    - getting R help online
    - breakout problems

  - Break (15 minutes)
  - Module 3: Working with data (60 minutes)
    * dataframes/matrices
    * attributes
    * missing values
    * logical vectors
    * subsetting
    * strings
    * breakout problems

- Session 2 (Tuesday) **TRACK 2 splits from TRACK 1**
  - Track 2: Session 2a (Evan)
    * Revisit variables, data types, data structures
  - Break (30 minutes)
  - Track 2: Session 2b (Evan)
    * Revisit data frames, subsetting, and data summarization

- Session 3 (Wednesday) (data analysis and plotting using the Tidyverse)

  TRACK 2 rejoins TRACK 1
  - Module 6: Data manipulation using the Tidyverse
    * stratified analyses: groupwise operations and split-apply-combine using dplyr
    * reshaping and tidying data
    * breakout problems/homework
  - Break (30 minutes)
  - Module 7: Graphics
    * overview of graphics in R
    * ggplot2
    * organizing and exporting graphics (vector/raster formats)
    * breakout problems

- Session 4 (Thursday)

  TRACK 2 splits from TRACK 1

- Track 2: Session 4a (Evan)
    - Revisit base graphics and ggplot, data analysis
- Break (30 minutes)
- Track 2: Session 4b (Evan)
    - Programming: for loops, if-then-else conditionals, functions
    - Automation example: Monte Carlo simulation and the birthday problem