HEALTH
UNIVERSITY OF UTAH

Tidyverse

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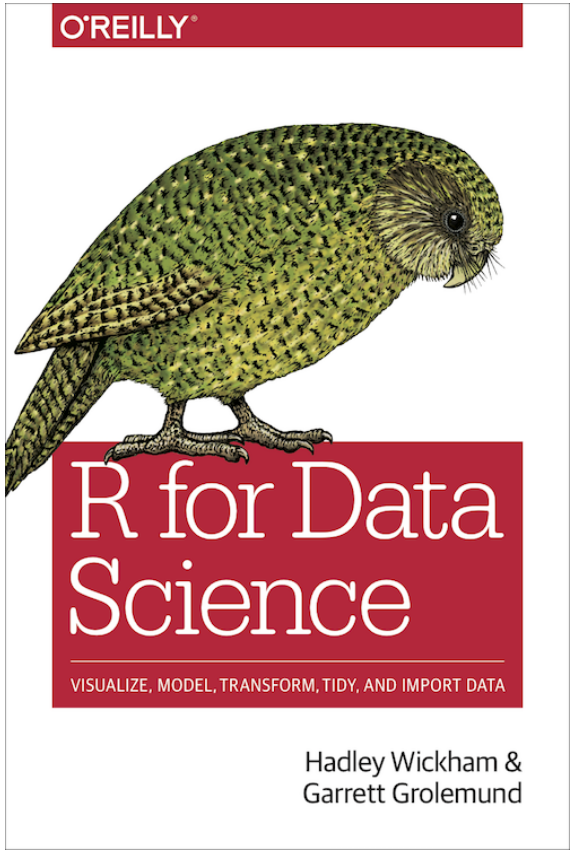
R Bootcamp 2020

Tidyverse

Tidyverse - R For Data Science

- The Tidyverse is R for Data Science (https://r4ds.had.co.nz/)
    - The book (https://r4ds.had.co.nz/) is well worth your time to read.



Tidyverse - Packages

- Cohesive set of packages to handle common aspects of data analysis.
  - Import data
    - readr (https://readr.tidyverse.org/) - flat data files (csv, tsv, fwf)
    - haven (https://haven.tidyverse.org/) - SAS, SPSS, Stata
    - readxl (https://readxl.tidyverse.org/) - Excel data
    - DBI (https://github.com/rstats-db/DBI) + dbplyr (https://dplyr.tidyverse.org/) - Database Inferfaces
    - Web data: httr (https://github.com/r-lib/httr)(API), rvest (https://github.com/tidyverse/rvest)(Scraping), jsonlite (https://github.com/jeroen/jsonlite#jsonlite)(JSON), and xml2 (https://github.com/r-lib/xml2)(XML)

Tidyverse - Packages

- Cohesive set of packages to handle common aspects of data analysis.
  - Import
  - Wrangle
    - dplyr (https://dplyr.tidyverse.org/) - grammar of data manpulation
    - tidyr (https://tidyr.tidyverse.org/) - data shaping; wide, long, & nesting
    - stringr (https://stringr.tidyverse.org/) & stringi (https://github.com/gagolews/stringi) - String manipulation
    - forcats (https://forcats.tidyverse.org/) - Categorical manipulation; labeling, combining categories, etcetera.
    - lubridate (https://lubridate.tidyverse.org/) & hms (https://github.com/tidyverse/hms) - Date & time
    - broom (https://broom.tidymodels.org/) - Making untidy R objects tidy.

Tidyverse - Packages

- Cohesive set of packages to handle common aspects of data analysis.
  - Import
  - Wrangle
  - Abstraction
    - tibble (https://tibble.tidyverse.org/) - Table *like* objects with a common inferface.
    - dbplyr (https://dplyr.tidyverse.org/) - database operation abstraction.
    - purrr (https://purrr.tidyverse.org/) - Functional programming, map & reduce.

Tidyverse - Packages

- Cohesive set of packages to handle common aspects of data analysis.
  - Import
  - Wrangle
  - Abstraction
  - Visualization
    - ggplot2 (https://ggplot2.tidyverse.org/) - Data visualization & graphics abstraction through the grammar of graphics.

Tidyverse - Packages

- Cohesive set of packages to handle common aspects of data analysis.
  - Import
  - Wrangle
  - Abstraction
  - Visualization
  - Programming
    - magrittr (https://magrittr.tidyverse.org/) - Pipes to simplify programming.
    - glue (https://github.com/tidyverse/glue) - Strings + data
    - rlang (https://rlang.r-lib.org/) - manipulation of R language base types.

Tidyverse - Packages

- Cohesive set of packages to handle common aspects of data analysis.
  - Import
  - Wrangle
  - Abstraction
  - Visualization
  - Programming
  - Modeling
    - tidymodels (https://www.tidymodels.org/) - A whole separate set of packages.

The Tidy Manifesto

There are four basic principles to a tidy API:

- Reuse existing data structures.
- Compose simple functions with the pipe.
- Embrace functional programming.
- Design for humans.

https://tidyverse.tidyverse.org/articles/manifesto.html (https://tidyverse.tidyverse.org/articles/manifesto.html)

Principle: Reuse existing data structures

- Use existing data structures
- Data are table-like and rectangular
  - observations are rows
  - variables are columns

Principle: Compose simple functions with the pipe.

- Strive to keep functions as simple as possible (but no simpler!).
- Functions do one thing and one thing only.
- Either modify or side-effects but never both.
- Naming:
    - Functions are **verbs**

Principle: Embrace functional programming.

- Immutable objects
- Dependant only on inputs. Avoid “state” variables.
- Generic functions over object methods
- Abstract over for-loops & map operations.

Principle: Design for humans.

- Easy to use names, easy to remember & consistent.
- Favor longer names that are descriptive, informative, and accurate.
- save the shortest names for the most important and often used.
- Think about auto-complete, use common prefix rather than suffix.

Tidyverse is evolving

- RStudio supports the Tidyverse.
- Development is ongoing.
- Check their blog (https://www.tidyverse.org/blog/) for the newest developments.