R and R Markdown

What is R?

- ▶ R is a **language** and **environment** for statistical computing and graphics

- ▶ Generally (but see here), is a functional language, but also has aspects of object oriented programming (described in more detail here)

Why R?

- Free, open source, and available on every major platform
- Community (R User Groups & local meet-ups, R-Ladies, #rstats and #r4ds on twitter)
- So many good packages!
- Communication (R Shiny & R Markdown)
- Integrated development environment (R Studio)
- Connect to C, Fortran, C++
- Cutting-edge tools, thanks to researchers in statistics and machine learning

quiRks

- ▶ Many users are not programmers; software engineering best practices not always adhered to
- ▶ Inconsistency across contributed packages
- ▶ Can be very slow and memory-intensive

Resources for R

For the language:
- Swirl an interactive package
- Data Carpentry materials from workshops freely available
- Advanced R by Hadley Wickham
- Youtube videos by David Dalpiaz

For development:
- R Packages by Hadley Wickham

For data science:
- R for Data Science by Garrett Grolemund & Hadley Wickham
- R Markdown: The Definitive Guide by Yihui Xie, J. J. Allaire, & Garrett Grolemund
- The Tidyverse Cookbook by Garrett Grolemund
- The R Graphics Cookbook by Winston Chang

What is Markdown?

▶ Markdown is a plain text formatting syntax for authoring HTML, PDF, and MS Word documents.

▶ Provides a standard way of formatting text, like

italics
bold
`code`
links
Latex equations, $E = mc^2$
and bibliographies

What is Markdown?

▶ BUT original version did not include syntax for tables, footnotes, math expressions, or citations

▶ Enter **pandoc**, a 'swiss-army knife' for converting between markup formats (https://pandoc.org)

▶ *A markup language is a system for annotating a document in a way that is syntactically distinguishable from the text; markup language is not shown when the document is processed for display*

What is R Markdown?

▶ "R markdown" document format was first introduced in 2012 as part of **knitr** package, enabling users to embed code chunks in Markdown documents.

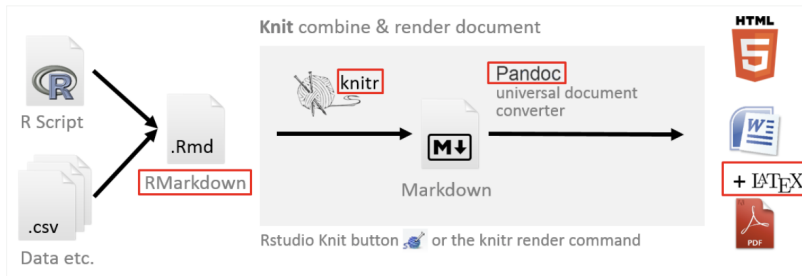▶ The **rmarkdown** package, first created in 2014, provides an 'ecosystem' for authoring documents.

Figure 1: rmarkdown, knitr, and pandoc

What is R Markdown?

For more details on using R Markdown see
http://rmarkdown.rstudio.com and R Markdown: The Definitive
Guide by Yihui Xie, J. J. Allaire, & Garrett Grolemund

Rendering a .Rmd file

- ► R Studio:
  - ► Click the **Knit** button to generate document that includes both content and output of any embedded R code chunks within the document
- ► R Console:

```
rmarkdown::render('/path/to/file/Intro.Rmd')
```

- ► CLI:

```
Rscript -e "rmarkdown::render('./Intro.Rmd')"
```