Authoring Documents in RStudio

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February 16, 2017

Basics

- R Markdown
  - R version of Markdown, a markup language
- YAML
  - Header (RStudio builds this for you)
  - Tells computer what kind of doc your building
- knitr
  - Package that integrates the above (along with other components like LaTeX) to actually build the document
- RStudio has a couple of documents that flesh out most of the material in this presentation
  - cheatsheet
  - reference document
  - Available in RStudio (Help -> Cheetsheets)
  - Even more resources at `http://rmarkdown.rstudio.com/`
  - Good blog post on integrating R Markdown into your workflow

Requirements

- RStudio
- Packages
  - markdown
  - rmarkdown
  - yaml
- Additonal Programs
  - TeX for PDF documents/math
  - MS Word or Open/Libre Office for Word documents

Creating a Document

- File -> New File -> R Markdown
- Select document type you want to build
  - this presentation was knit as a Slidy presentation
- RStudio automatically creates the apporopriate YAML header and some sample code
- When you want to create the document, click “Knit”

R Markdown Basics

- Starting line with #s followed by space for headers (more #s = sub-headers)
- Format is done by surrounding text with symbols (* or _ for italics, ** or ___ for bold, for ^ for superscripts)
  - Equations are similar, surrounded by $
- These bullets were created with *
  - The + symbol was used for this line (preceded by four spaces)
  - For ordered lists, use number.
  - This line was done with >-
- For PDF/DOC files page breaks can be created by `\newpage` or `\pagebreak` (on their own line)
- for slides, breaks by either (sub)headers or *** on one line

Math Syntax Basics

- R Markdown uses LaTeX for handling equations
- Superscripts are done with ^; subscripts with _
  - for both, {} helps with longer strings
- Most othe commands start with \
- for fractions, use `\frac{a}{b}` gives $\frac{a}{b}$
- Sigma notation is done with `\sum_{n=1}^N` to get $\sum_{n=1}^{N}$
- `\sqrt{27}` yields $\sqrt{27}$
- More basics:
  - `http://www.calvin.edu/~rpruim/courses/m343/F12/RStudio/LatexExamples.html`
  - `https://rstudio-pubs-static.s3.amazonaws.com/18858_0c289c260a574ea08c0f10b944abc883.html`
- For something more comprehensive:
  `https://www.giss.nasa.gov/tools/latex/ltx-2.html`

R Code in documents

- For inline code, start code with `` `r `` and end with `` ` ``.
  - e.g. to get 1.7320508, use `` `r sqrt(3)` ``.
- For code chunks, first line is "`` ```{r nameofchunk} ``
  - code chunks don't need names, but can be useful
- Last line of chunk is "`` ``` ``.
- Both should be their own line
- Shortcut for creating chunks: Ctrl/Cmd + Alt + I

Code Chunk Parameters

- A variety of parameters can be included within {}
- Some common ones (and their default values)
  - eval (TRUE): Should the code be run
  - echo (TRUE): should the code be displayed in doc
- Can use knitr::opts_chunk$set(Parameter = TRUE/FALSE) to change defaults

Caching

- By default, data from chunks not stored
- Can set cache = TRUE to store output
- This lasts until you change the chunk (however, doesn't check if earlier chunk changed)

Quick Demo

R Presentations

- Another way to produce html slide decks
- Requires RStudio 0.98 or later
- Mostly the same syntax (differences include slide breaks (13x= under title))
- Generaly simpler than Rmarkdown (particularly for two-column slides)
- Allows global options for slide transitions, incremental items within slides, etc.
- More resources at `https://support.rstudio.com/hc/en-us/articles/200486468-Authoring-R-Presentations`

R Notebooks

- Introducted in RStudio v1.0
- Allows chunks to be run as you work, instead of having to re-knit the whole documents
- Also allows chunks written in other languages
- More resources at `http://rmarkdown.rstudio.com/r_notebooks.html` and `https://blog.rstudio.org/2016/10/05/r-notebooks/`

bookdown

- r package for authoring books w/R Markdown
- In addition to HTML and PDF, can have EPUB outputs.
- More resources at `https://bookdown.org/` and `https://bookdown.org/yihui/bookdown/`

flexdashboards

- Package to allow you to build a dashboard of visualizations using R Markdown
- Incorporates htmlwidgets
- Designed to work well on mobile devices as well
- Can integrate with shiny for reactivity
- More resources at `http://rmarkdown.rstudio.com/flexdashboard/`
- Useful blog post on building flexdashboards

ReporteRs

- Package for producing Word and PowerPoint documents
- Also contains functions for inserting code output into existing documents
- Package homepage: `https://davidgohel.github.io/ReporteRs/index.html`

Questions?