

Reproducible Research: with R, Renv and \LaTeX

Liberty Mlambo

Research Assistant:
University of Nottingham

June 15, 2022

- 1** Introduction
 - Presenter's Assumptions
 - What we will discuss
 - Disclaimer
- 2** Software/packages
 - \LaTeX
 - TinyTeX
 - Renv
 - knitr
 - Overleaf
- 3** RStudio Practical Session

- 1 Introduction
 - Presenter's Assumptions
 - What we will discuss
 - Disclaimer
- 2 Software/packages
 - \LaTeX
 - TinyTeX
 - Renv
 - knitr
 - Overleaf
- 3 RStudio Practical Session

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

- You have R and RStudio installed (ideally the latest versions)
- You know how to install R packages
- You have an 'open' mind
- You know how to use a computer (Cheesy I know, but very important to mention)

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

Links to software/packages:

- 1 R : <https://cran.rstudio.com/>
- 2 RStudio : <https://www.rstudio.com/products/rstudio/download/>
- 3 \LaTeX : <https://www.latex-project.org/get/>
- 4 TinyTeX : <https://yihui.org/tinytex/>
- 5 renv : <https://rstudio.github.io/renv/articles/renv.html>
- 6 knitr : <https://yihui.org/knitr/>
- 7 Overleaf : <https://www.overleaf.com/>

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

"If we knew what it was we were doing, it would not be called research, would it?" ... Albert Einstein

- 1 Introduction
 - Presenter's Assumptions
 - What we will discuss
 - Disclaimer
- 2 Software/packages
 - \LaTeX
 - TinyTeX
 - Renv
 - knitr
 - Overleaf
- 3 RStudio Practical Session

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

- \LaTeX is a document preparation software developed by Leslie Lamport in the early 1980s¹.
- \LaTeX uses the \TeX typesetting system originally designed and written by Donald Knuth²
- There are various \LaTeX distributions for most major operating systems which combine the \LaTeX and editors e.g. MacTeX(MacOS), MikTeX(Windows) and Overleaf(Online)

¹<https://en.wikipedia.org/wiki/LaTeX>

²<https://en.wikipedia.org/wiki/TeX>

Like every piece of software \LaTeX has several advantages:

- \LaTeX is just text; anyone can edit your file³
- The document is automatically formatted
- Makes beautiful documents
- Very good with math and symbols
- Can intergrate separate PDF documents neatly

³<https://academia.stackexchange.com>

Unfortunately \LaTeX is not as popular as some 'WYSIWYG' editors like MSWord due to some of the following:

- Fairly steep learning curve
- Collaborators unfamiliar with LaTeX will have difficulty reviewing your manuscripts
- Many features require libraries, which you have to find/be made aware of (view changes, etc)
- Layout changes are difficult (i.e., will require time for you to hunt down solution and implement it)⁴

⁴<https://academia.stackexchange.com>

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

TinyTeX^a

- A custom \LaTeX distribution based on \TeX Live that is small in size but still functions well in most cases.
- missing packages will just be installed automatically.
- if you create RMarkdown in PDF then you may have used \LaTeX and tinytex without knowing they existed.
- An R package installed using:
`install.packages("tinytex")`



^a<https://yihui.org/tinytex/>

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

renv^a

- R dependency and library paths management to isolate your projects.
- renv 'freezes' your project workspace so that your existing workflows in future will just work as they did before
- very important for collaboration(especially with the future you)



^a<https://rstudio.github.io/renv/articles/renv.html>

The recommended workflow for renv is⁵:

- Call `renv::init()` to initialize a new project-local environment with a private R library,
- Work in the project as normal, installing and removing new R packages as they are needed in the project,
- Call `renv::snapshot()` to save the state of the project library to the lockfile (called `renv.lock`),
- Call `renv::snapshot()` again to save the state of your project library if you change any packages successfully, or call `renv::restore()` to revert to the previous state

⁵<https://rstudio.github.io/renv/articles/renv.html> Adapted from here

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

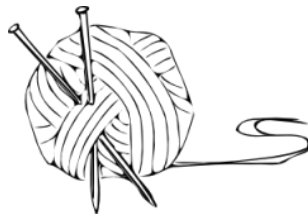
2 Software/packages

- L^AT_EX
- TinyTeX
- Renv
- knitR
- Overleaf

3 RStudio Practical Session

knitR^a

- knitR is a general-purpose literate programming engine, with lightweight API's designed to give users full control of the output without heavy coding work.
- It is the magic behind RMarkdown document rendering
- knitR 'weaves' **.R** files into a **.tex** file then **.pdf**



^a<https://yihui.org/knitr/>

1 Introduction

- Presenter's Assumptions
- What we will discuss
- Disclaimer

2 Software/packages

- \LaTeX
- TinyTeX
- Renv
- knitr
- Overleaf

3 RStudio Practical Session

Overleaf^a

- Online \LaTeX Editor.
- Collaboration features
- Track changes
- GitHub integration
- Basic R integration (*uses only base R libraries*)
- Easy learning with integrated documentation
- It is the 'RStudio' of \LaTeX in my opinion



^a<https://www.overleaf.com>

- 1 Introduction
 - Presenter's Assumptions
 - What we will discuss
 - Disclaimer
- 2 Software/packages
 - \LaTeX
 - TinyTeX
 - Renv
 - knitr
 - Overleaf
- 3 RStudio Practical Session

THE END : Questions?