浙江大学爱丁堡大学联合学院

ZJU-UoE Institute

R Markdown - Why and How?

ADS 2, Lecture 12

Melanie Stefan - melanie.stefan@ed.ac.uk

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The Reproducibility Crisis

This lecture is about . . .

. . . how to make your data analysis reproducible by using R markdown

Learning Objectives

After this lecture, you should be able to . . .

- Explain what a markdown language is
- Discuss reasons for using R markdown

Outline

Reproducibility vs Replicability

General idea

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What differences do you see between replicability and reproducibility? What do they have in common? Can you imagine obstacles to achieving replicability or reproducibility?

Reproducible research

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Have you come across techniques or ideas that are designed to make research more reproducible?

- Tidy data
- Publishing data
- Documenting code
- Publishing code
- Methods sections in publications
- Peer review (?)
- Preregistration
- Standards and protocols

...

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But first . . .

What is Markup?

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Example: html (hyper text markup language)

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 <dd>
 <p>
 <em>October 2019<em> - We welcome new MSc student <b>Aleksandra Slawinska</b> to the lab. Al
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 <em>September 2019<em> - <b>Mela</b> is speaking at the <b><a href="https://www.mariecurieal
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 <a href="http://stefanlab.net/news.html">Read all news</a>
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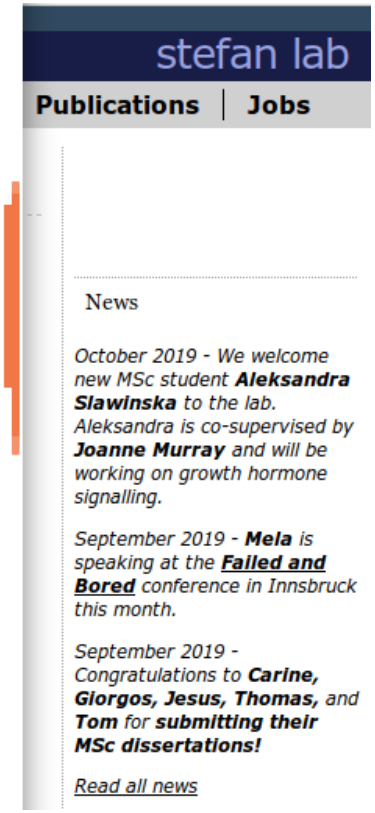

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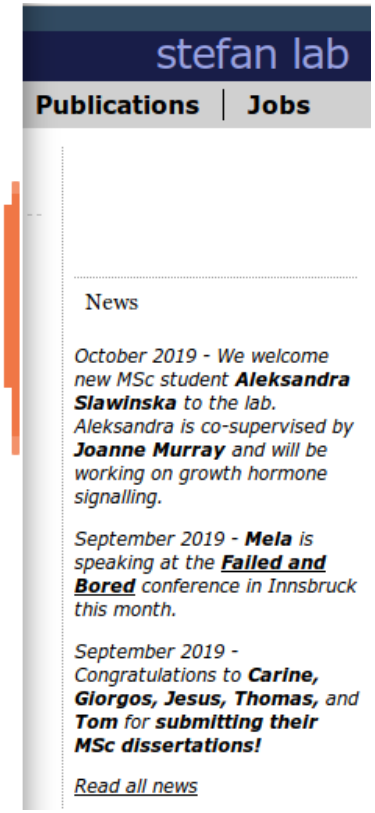


Other examples?

Markdown

Markdown is a "light-weight" markup language.

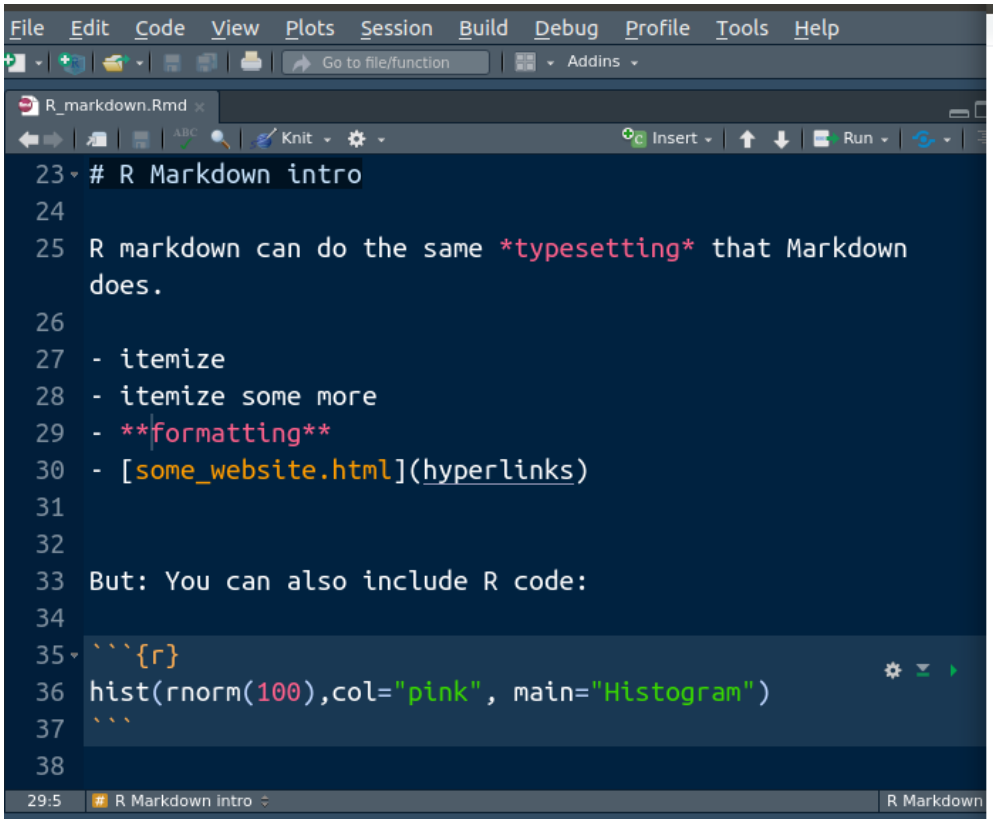
- simple syntax
- easy to read and write
- can be converted into markup (e.g. html)

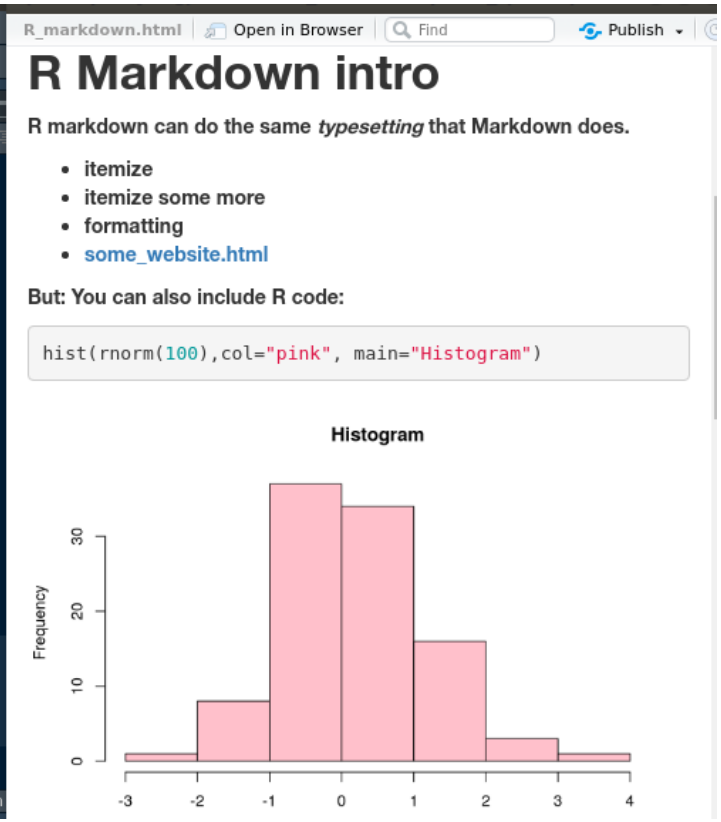
```
11
12
13 # Markdown intro
14
15 Markdown is *awesome*, look at what it can
   do, for instance:
16
17 - itemize
18 - itemize some more
19 - **formatting**
20 - [some_website.html](hyperlinks)
21
22
23
```

Outline

Main idea of R Markdown

Code and documentation in one document. This is done through a combination of formatting (using Markdown) and the inclusion of "code blocks", which are both reported and executed in the final document





Why use R Markdown?

You work in biomedical informatics. In what situations would it be useful to use R Markdown, and why?

What questions do you have?

Now, you should be able to . . .

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Optional further reading

- Baker, M. (2016). 1,500 scientists lift the lid on reproducibility. Nature News, 533(7604), 452. https://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970

Image credits

- Example of html code and the resulting webpage (screenshot). My own work (2019), CC-BY-SA 3.0.
- Example of markdown code (screenshot). My own work (2019), CC-BY-SA 3.0.
- Example of R Markdown code and resulting file (screenshot). My own work (2019), CC-BY-SA 3.0
- Reproducibility crisis screenshot. From: Baker, M. (2016). 1,500 scientists lift the lid on reproducibility. Nature News, 533(7604), 452. `https://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970`
- Three students working on computers. By Yuuki Guzman and Agoston Tyll (Okinawa Institute of Science and Technology), 2015.
- Two students working on an experiment together. By Yuuki Guzman (Okinawa Institute of Science and Technology), 2016.