Motivation: Version Control with Git as a Learning Objective in Statistics Courses

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August 4, 2020
JSM Virtual Conference

Who cares about reproducibility & VC?

- American Statistical Association [1][2][3]
- National Science Foundation [4] [5]
- CS education (e.g., ACM SIGCSE) [6] [7]
- Employers, Practitioners, & Students [8]

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[1] ASA Undergraduate Guidelines Workgroup (2014)
[2] DeVeaux et al. (2016); a.k.a., The Park City Report
[3] Broman et al. (2017); ASA reproducibility recommendations
[4] Broman et al. (2017); ASA reproducibility recommendations
[5] Bollen et al. (2015); Cmte recommendations to NSF
[6] Haaranen & Lehtinen (2015); SIGCSE teaching with VC
[7] Zagalsky et al. (2015); SIGSCE teaching VC
[8] Kaggle (2017); user survey

The Kubler-Ross model [9]

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- **Depression:** I don't know *anything* about Git. . .
- **Acceptance:** Wait, there are buttons in RStudio? Maybe it won't be so bad after all. . .

[9] Kübler-Ross E (2005). *On Grief and Grieving: Finding the Meaning of Grief Through the Five Stages of Loss.* Simon & Schuster.

Reproducibility:

- completely self-contained including. . .
  - source data
  - code book
  - all data wrangling/prep steps
  - recreate all analysis, models, visuals
  - final reporting
- easy to verify results or refresh if source data updates
- e.g., all code "just works" with no changes needed

Version control (1/2)

- collaboration among users
- self-collaboration–e.g., RStudio Desktop and RStudio Server

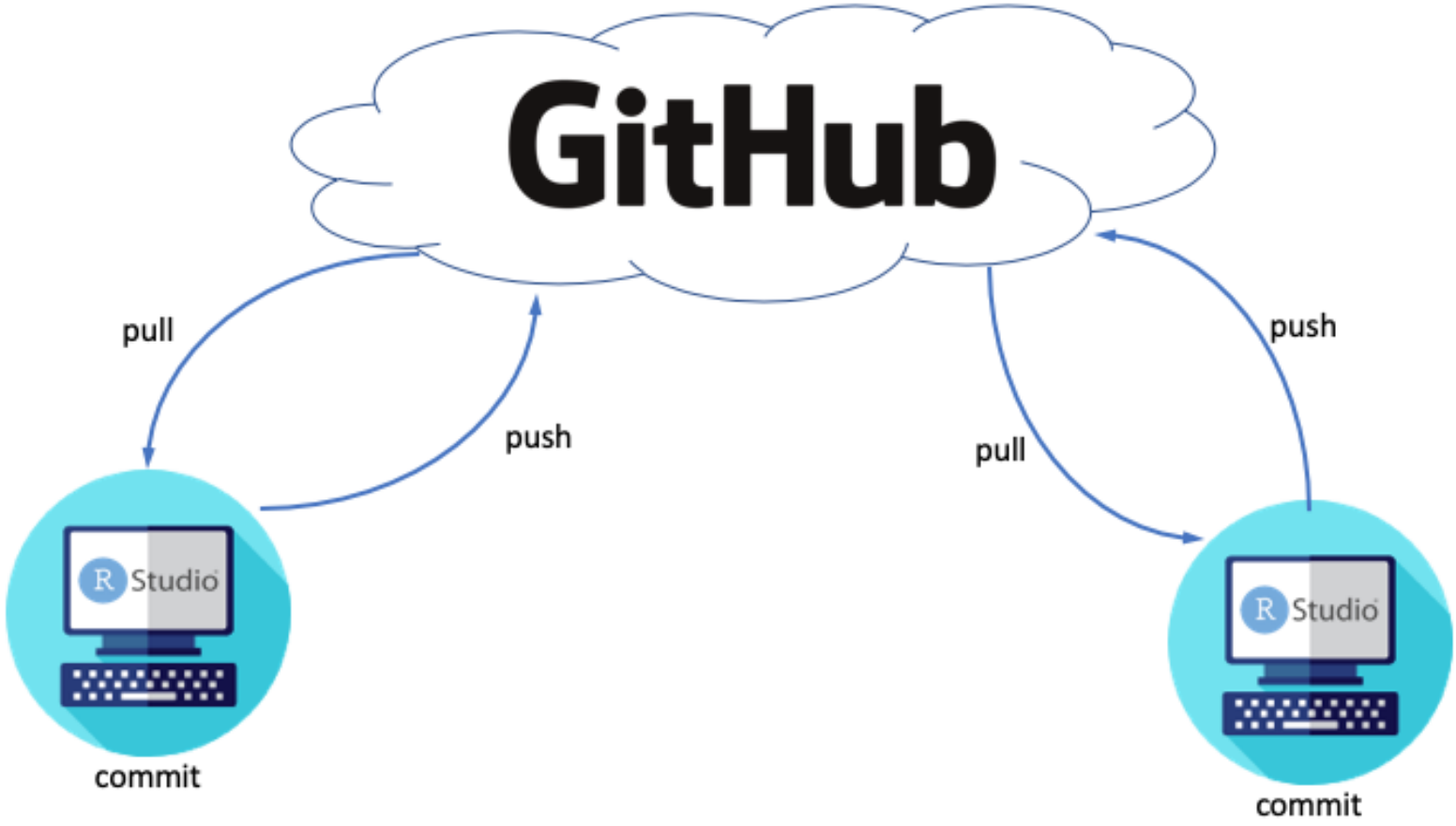

Figure 1: Collaboration schematic

Version control (2/2)

- maintains the evolution of the project
- safely explore alternative solutions/ideas in parallel

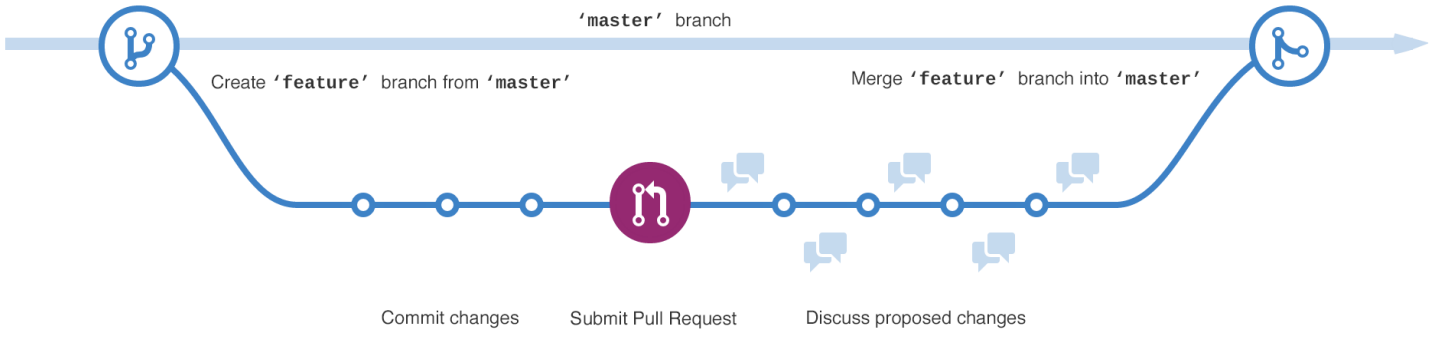

Figure 2: exploring parallel solutions
(https://guides.github.com/activities/hello-world/)

Reproducibility $\neq$ Version Control

Sometimes lumped together as if they're one in the same, and it's even tempting to speak of Git(Hub) as a panacea...

They aren't and it isn't...

Our motivation: invest in good habits with a professional workflow designed to streamline **both** virtues.

Ethical practice

- Any analysis may require hundreds of tiny decisions
- Many of these decisions may be handled in private by a single person
- Our work is often intended for audience without the expertise required to scrutinize those decisions

With reproducibility & version control

- all decisions are documented
- all results can be checked
- proper scrutiny is possible (now or in future)

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Thank You

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https://mdbeckman.github.io/JSM2020-Virtual/