Fundamentals of Bioinformatics workshop

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Genomic Data Science Core

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Website: https://sites.dartmouth.edu/cqb/projects-and-cores/data-analytics-core/

March 2024

Center for Quantitative Biology (CQB) at Dartmouth

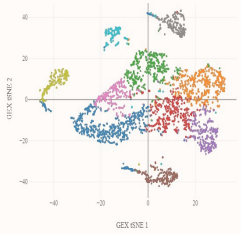
- COBRE funded initiative to enhance NIH-funded quantitative research (PI: Michael Whitfield)
- Facilitates integration of quantitative & experimental biological research
- Supports multiple core facilities

Single cell genomics Core

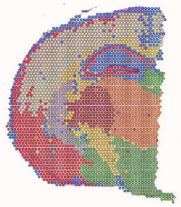
- Implement state of the art single cell workflows
- Maintain & develop existing technologies
- Acquire & operate novel instrumentation

Parse BIOSCIENCES

10X Multiome
(scRNA- & scATAC-seq)

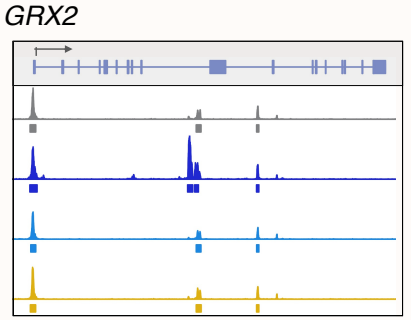


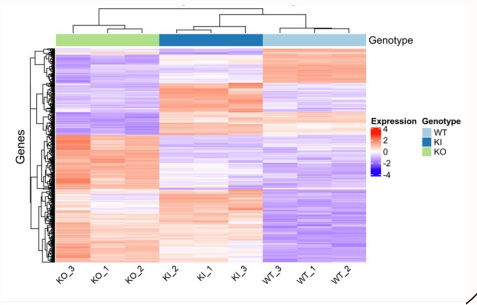
10X Visium
Spatial genomics



Genomic Data Science Core

- Genomic and bioinformatic analysis services
- Publication & grant support
- Bioinformatics workshops

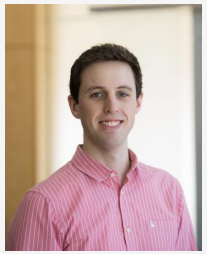




Director: Fred Kolling

The Genomic Data Science Core

Personnel:



Owen Wilkins, PhD
GDSC Co-director

Shannon Soucy, PhD
GDSC Co-director

Tim Sullivan, BA
Bioinformatics Research Scientist

Noelle Kosarek, PhD
Bioinformatics Research Scientist

What we do:

Genomic & bioinformatic data analysis to the CQB & Dartmouth research community

Services:

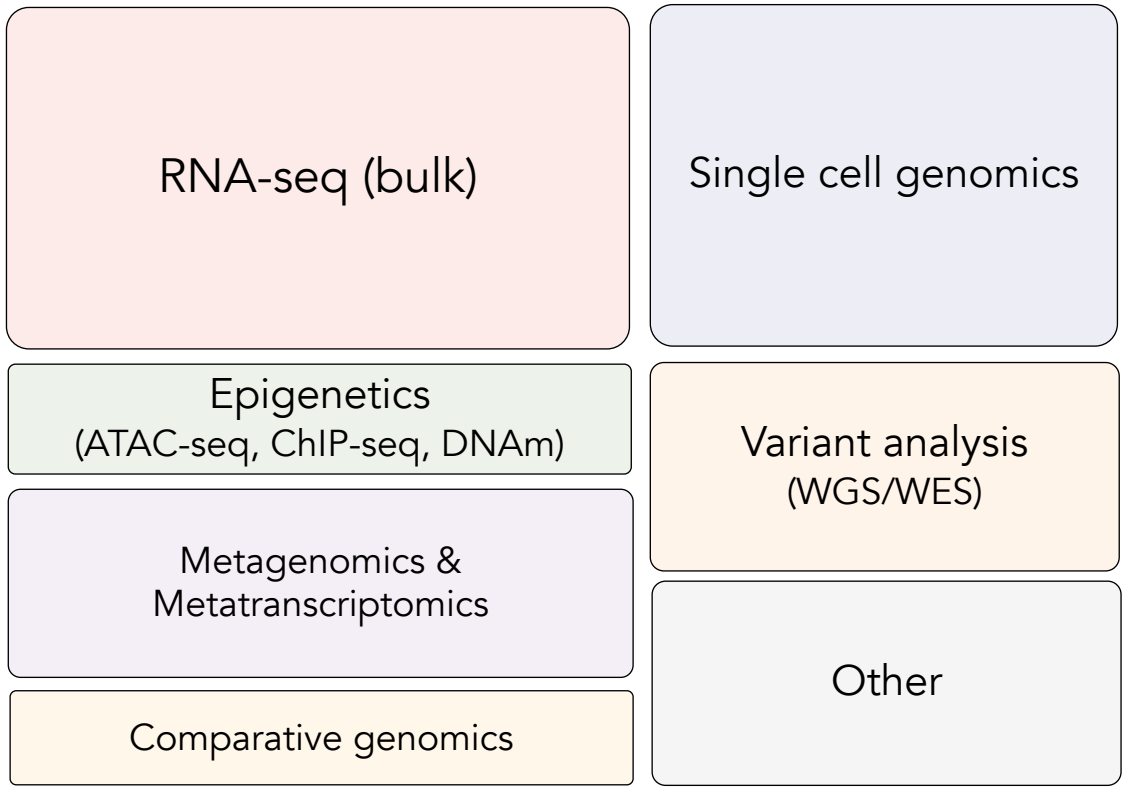
Data Analysis

Publication & grant support

Bioinformatics training (workshops)

Bioinformatics analysis services

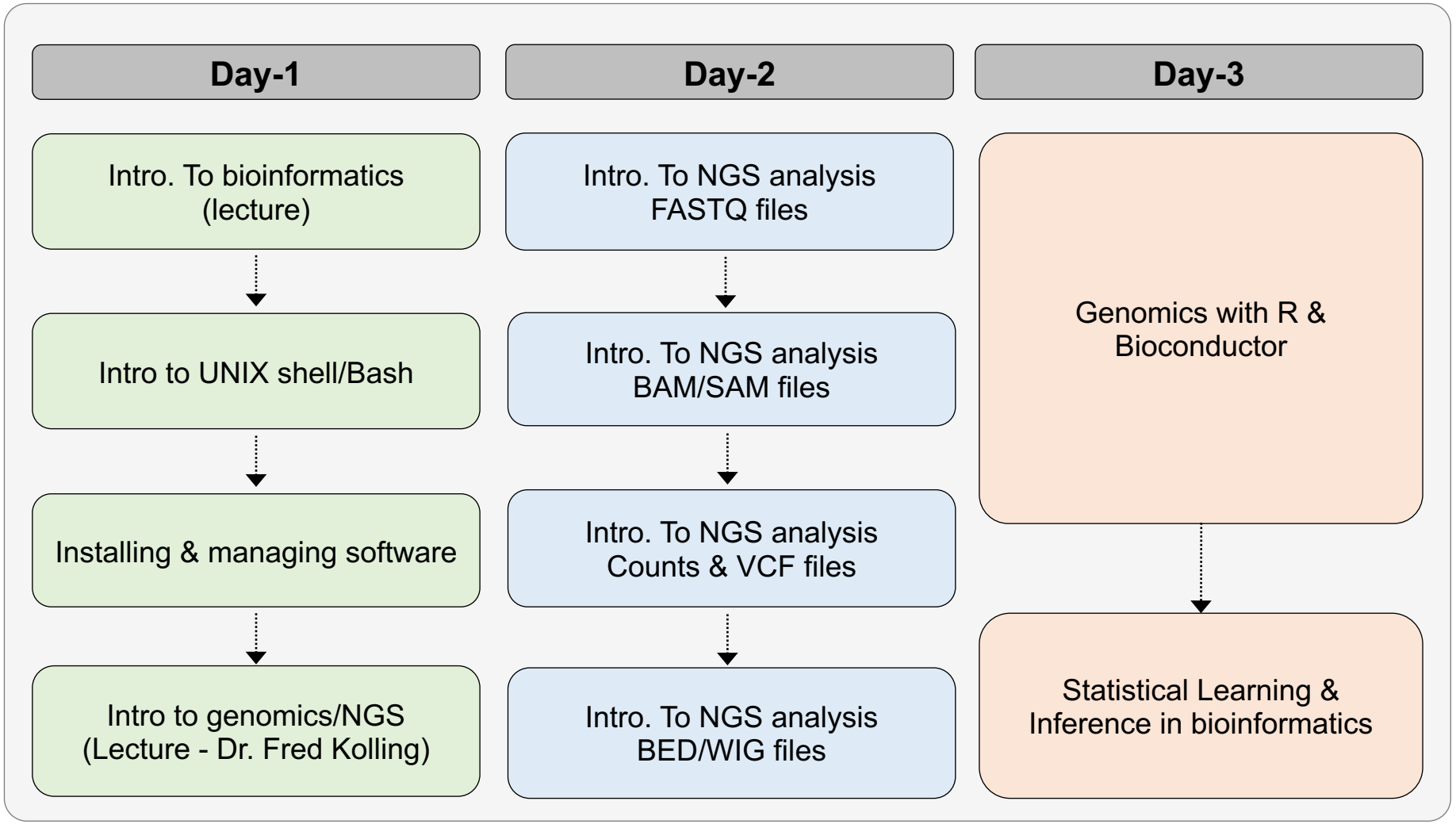
Main services:



Other services:

- Tunneling to leverage Rstudio on discovery
- Host reference data on DartFS for Human, Mouse, & Zebrafish
    - FASTA
    - Gene annotation (Ensembl & GENCODE)
    - Genome indicies (STAR, Bowtie, HISAT, RSEM)
    - RefFlat & ribosomal intervals (Picard Tools)
- Custom workflow development
- One on One training (consultation hours)

Workshop outline



Schedule

- Can be found at: https://github.com/Dartmouth-Data-Analytics-Core/Bioinformatics_workshop-2024/blob/main/schedule.md
- 12pm-5pm each day
- Schedule is best guess, and we may deviate from it based on time
- If you will be absent for a session, just let us know

Logistics I

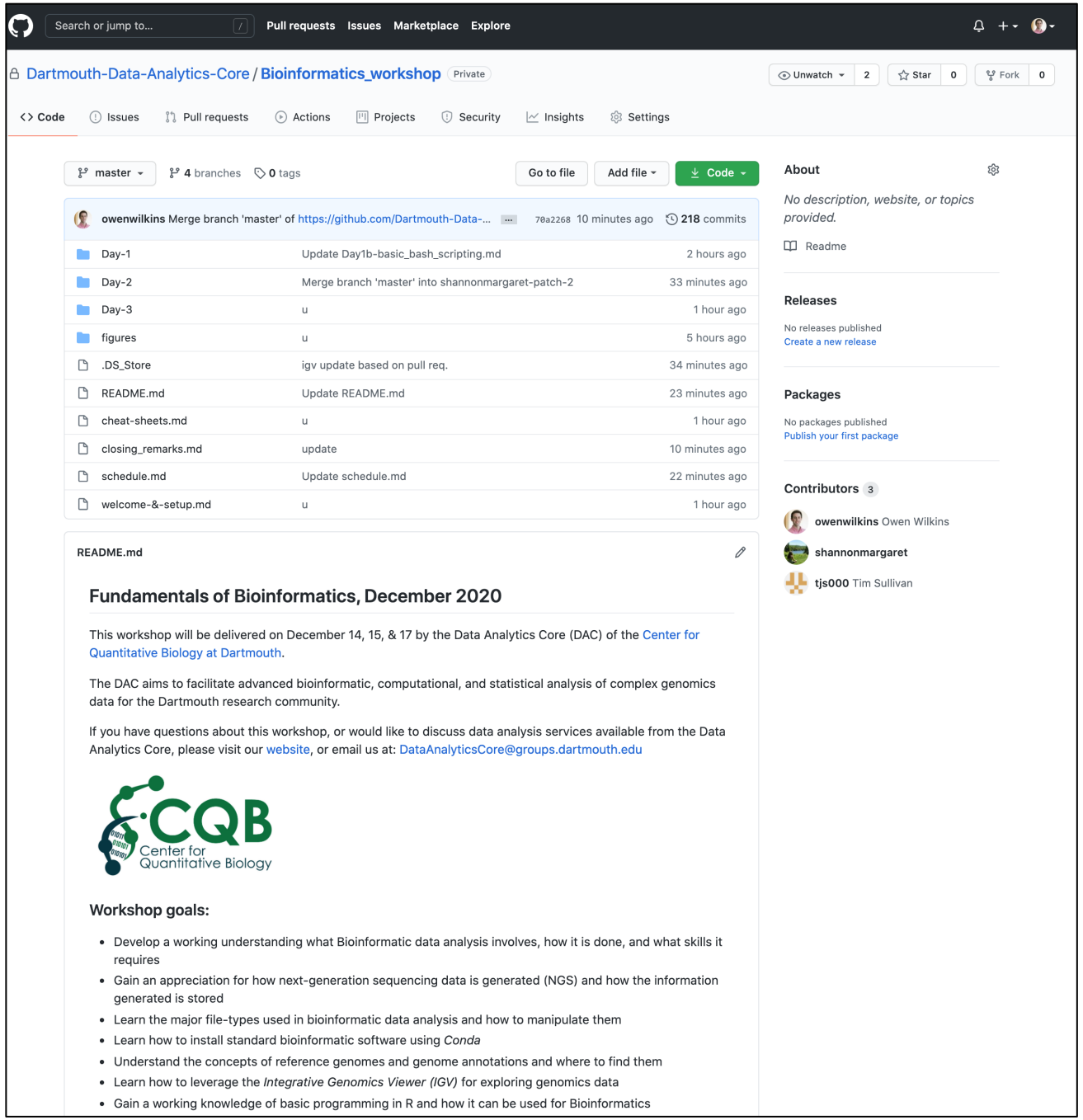
- Course materials are all online (and will stay there):

  https://github.com/Dartmouth-Data-Analytics-Core/Bioinformatics_workshop-2024/

- You should have the repo downloaded locally

- Day 1 we will be copying Bash code from markdowns (.md) into the terminal, or into R Studio

- This is deliberate, and will help you learn how to organize code



Logistics II

- **When working in the terminal:**

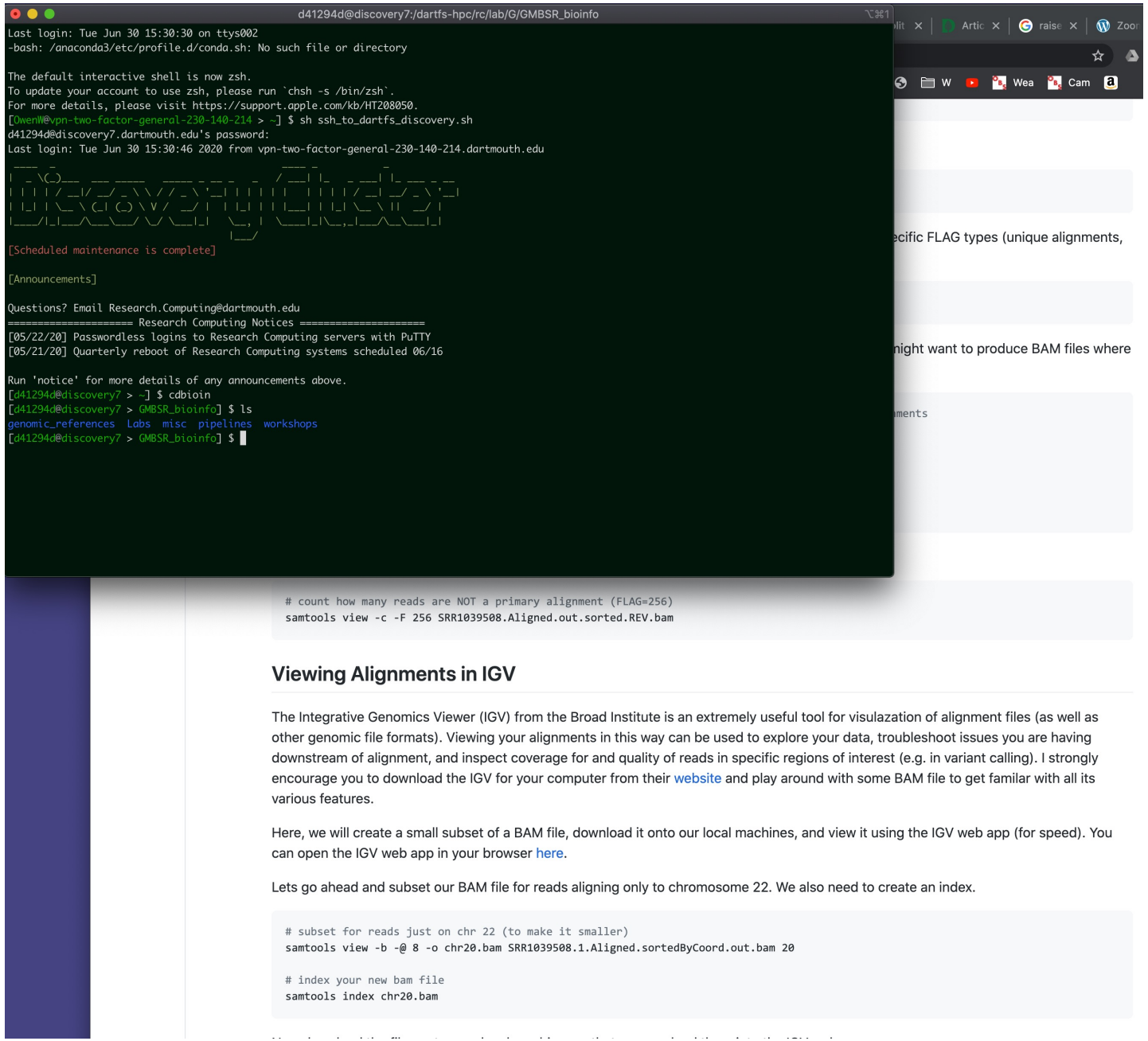
- Multiple windows open

- Terminal window
  (ssh to discovery7)

- Web browser to GitHub repo

- If you finish: edit the code, try different options, generate scripts

- Use the ***cheat sheets!***



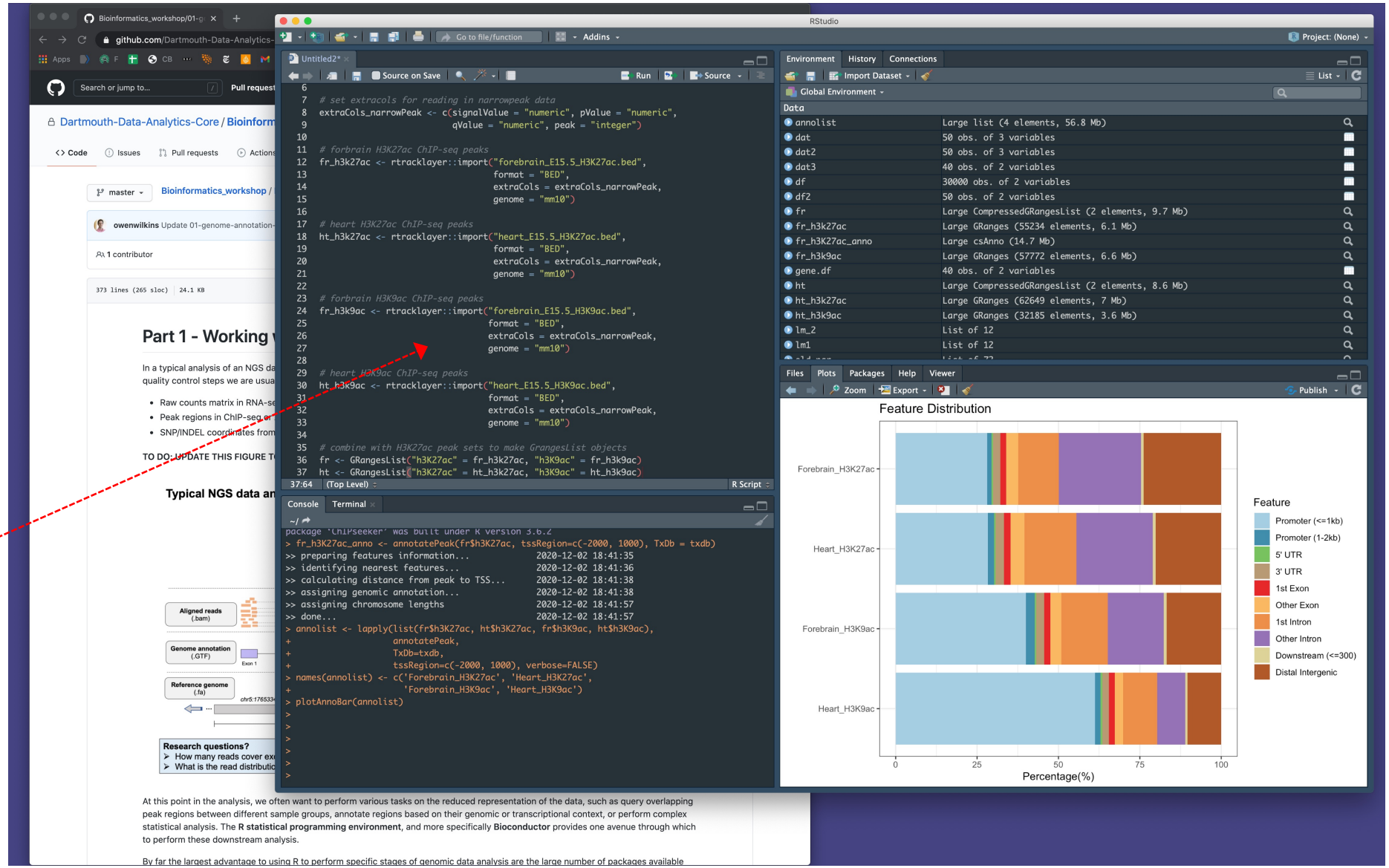
Logistics III

- **When working in R/Rstudio:**

- Multiple windows open (including GitHub repo)

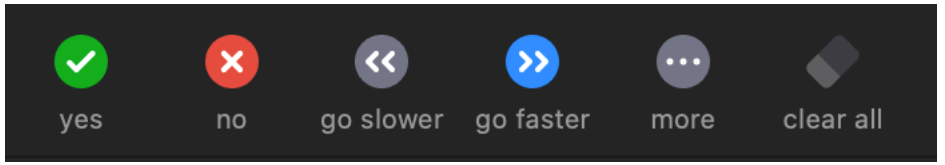
- Copy and paste R code into scripting window

- Save the scripts you generate as .R files

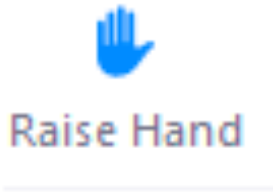


Logistics IV

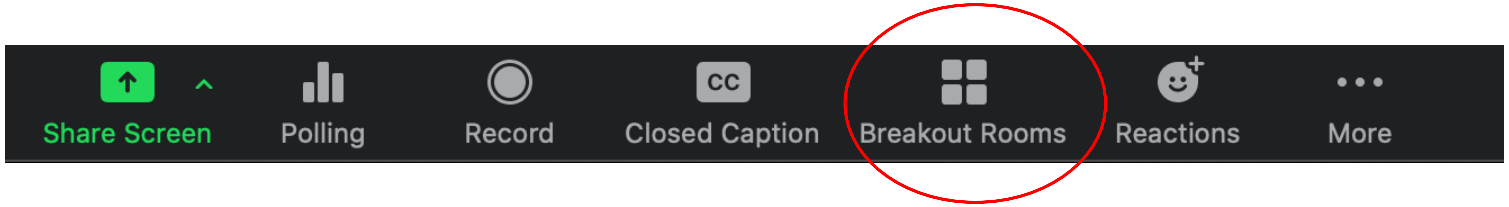
- **Use buttons in *Participants* tab in zoom**



- **You'll be muted, but if you want to ask a question, just raise your hand**



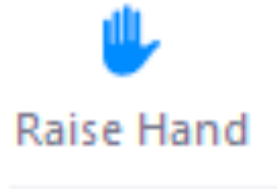
- **We'll be using *breakout rooms (BRs)***
  - We will use these to provide time for you to run code independently
  - If your stuck, message us on slack , and we will come help you in your (BR)
  - When we are going to move on, breakout rooms will close



- **Please be courteous on zoom..**

How to get help?

- **Raise your hand in zoom** (bottom right, participants tab)



- **Use the slack channel to message one of us or the TAs**
  - Use the ***general*** channel if it might benefit everyone
  - Message us directly if its specific

- **If all else fails, email us:**
  - GDSC: GDSC@groups.dartmouth.edu
  - Shannon Soucy (Shannon.Soucy@Dartmouth.edu)
  - Tim Sullivan (Timothy.J.Sullivan@dartmouth.edu)
  - Owen Wilkins (omw@Dartmouth.edu)
  - Noelle Kosarek (Noelle.N.Kosarek.GR@dartmouth.edu)

Questions?

…then.. Introductions!

Use the slack channel #intros to tell us :

Your Name
Your Research interests
Why are you taking the workshop?