Data Cleaning: Redwood Lab

January 29, 2025

Today’s plan

1. **Review: Git/GitHub + Reproducible Environments**
2. **Hands-on practice: Redwood data cleaning**

Review: Git/GitHub + Reproducible Environments

Setting up git, GitHub, and a reproducible environment

Details at: https://tiffanymtang.github.io/dsip-s25/

- We set up two repositories:
  - `dsip-s25`: for me to distribute course materials (lecture slides, **code**, etc) to you
    - You should only *pull* to retrieve information
  - `dsip`: **your** repository to do all your work in
- We introduced **renv** and **conda** to create reproducible environments

Overview of renv and conda

Details at: https://tiffanymtang.github.io/dsip-s25/

	renv	conda
1. Create environment:	Create .Rproj and open it `renv::init()`	`conda create --name env_name`
2. Activate:	`renv::activate("pkg_name")` # not necessary if you're working in an .Rproj # (automatically activated if in .Rproj)	`conda activate env_name`
3. Add packages:	`renv::install("pkg_name")`	`conda install pkg_name`

4. Create/update lock file:	`renv::snapshot()`	`conda env export --from-history > environment.yml`
		`conda lock`
		# to run `conda lock`, need to have installed
		# conda-lock package beforehand

Why bother with reproducible environments?

- Exact reproduction of the packages, software versions, etc.
- Different projects might use/require different package versions
  - E.g., older projects might use older package versions
- Ease of portability to different computers and operating systems:

renv

1. Clone GitHub repository
2. Open R project
3. Install renv:
   `install.packages("renv")`
4. Restore environment:
   `renv::restore()`

conda

1. Clone GitHub repository
2. Navigate to directory with lock file
3. Install conda-lock (and conda if not already available)
   `conda install conda-lock`
4. Restore environment:
   `conda-lock install --name "new_env_name"`

A couple extra bells and whistles from last time...

- How do you choose a particular conda environment in VS Code?
  - Open command palette (Ctrl+Shift+P or Cmd+Shift+P)
  - Search for "Python: Select Interpreter"
- What is quarto and how do you use quarto in VS Code?
  - Details: https://tiffanymtang.github.io/dsip-s25/#using-quarto
  - Note: to do this, usually need to install jupyterlab and ipykernel in your conda environment:

```
conda install ipykernel
conda install jupyterlab
```

Pushing changes to GitHub

We've completed our basic setup – A great time to pause and take a snapshot of our project.

But before doing so, if you check your git status,

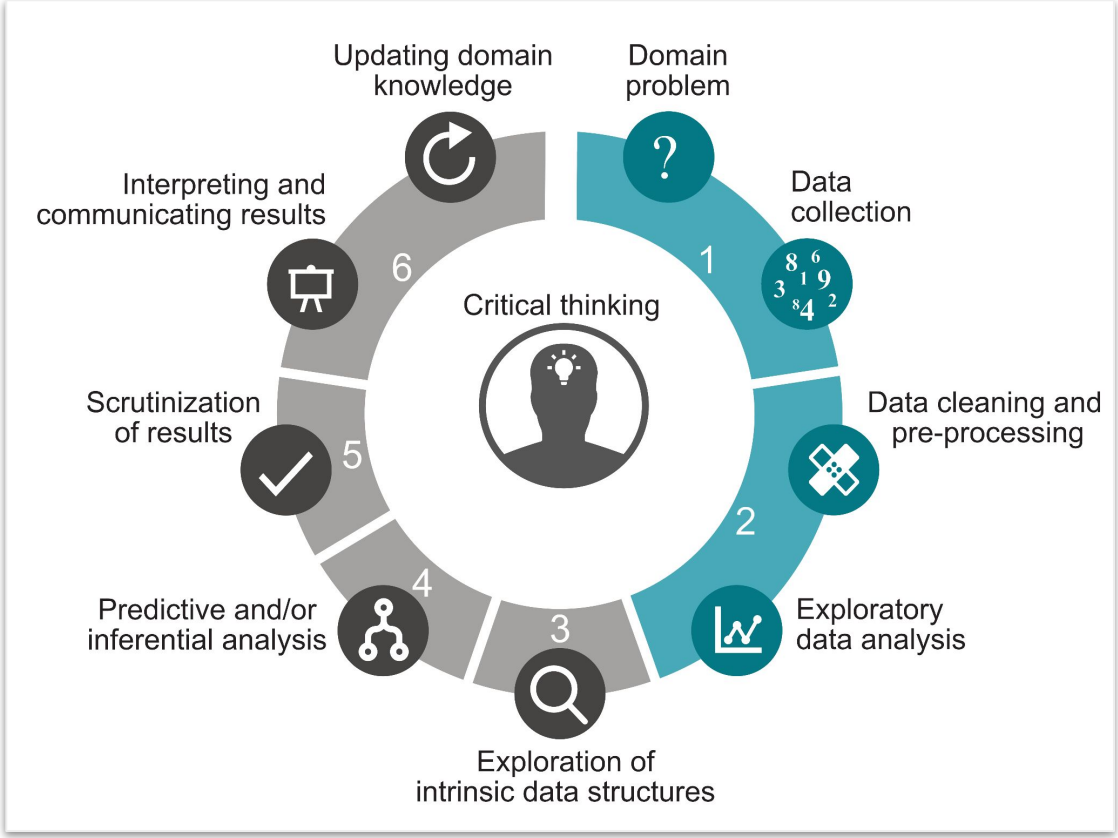
- You might notice a lot of "junk" files that aren't worth tracking (e.g., they are useless to collaborators and/or they change too frequently)
- Add these files to your .gitignore, e.g.,

```
*.DS_Store
*/data/*
*__pycache__*
*.ipynb_checkpoints*
```

Details: https://tiffanymtang.github.io/dsip-s25/#pushing-your-changes-to-github

Getting started with the Redwood Lab

Lab 1: A Macroscope in the Redwoods [Tolle et al. (2005)]



Lab 1: A Macroscope in the Redwoods [Tolle et al. (2005)]

- **Coastal redwood trees:**
  very tall, very old
- 44-day study in Sonoma, California
  (April 27, 2004 5:10pm - June 10, 2004 2pm)

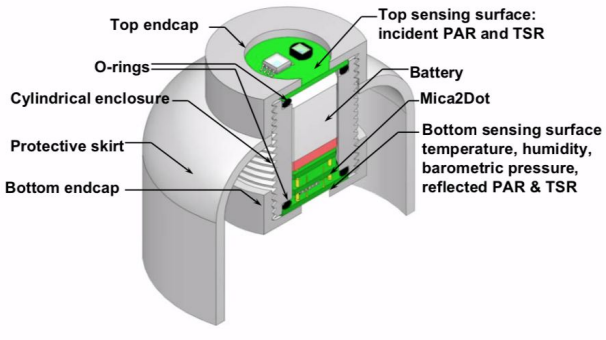


Figure 2: Sensor node and packaging

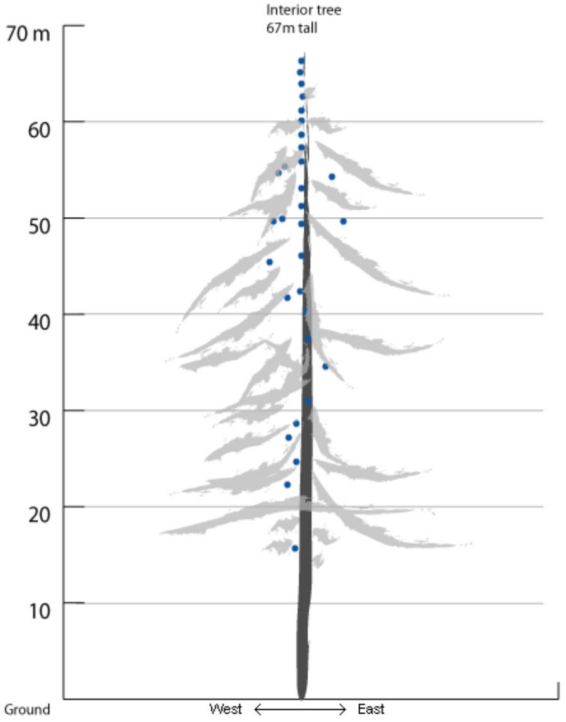
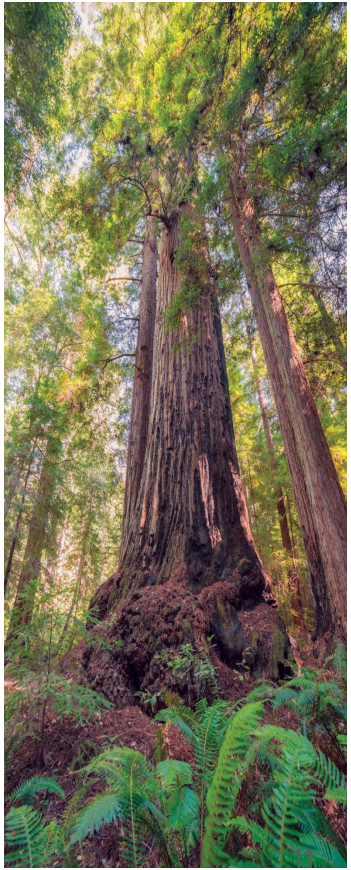


Figure 1: The placement of nodes within the tree



Getting started with the redwood lab

Available templates on the course repository (`dsip-s25`)

- For your **reproducible report**: you can find R Markdown (R only) and quarto templates (R, Python) in `notebooks/`
  - This report should only contain your "filtered" code, not everything you ever did and or looked at in this lab.
- Some **loading** and **cleaning** functions have already been populated in `R/` and `python/` folders
  - Some functions have scaffolding but not yet filled in; this is your to-do

For today's class, you can use **notebooks/exploration_R.qmd** (or _python.qmd)

Your tasks for today

1. **Load in the data**
   a. Epoch/dates and redwood datasets have already been filled out for you.
   b. You need to fill out the `load_mote_location_data()` in the load.R/load.py file.

2. Look and "play" around with the data in order to:
   a. Try to **identify as many issues or oddities** with the data as you can. *Hint:* there are many!!
   b. Also **think** about how you might address these issues and clean the data. Jot down these ideas, but no need to take the time to implement it *yet*.
      - *Time permitting*: you can start implementing your ideas, but prioritize identifying the issues over fixing them.

Redwood Data Issues

- No units, lack of documentation
- Weird humidity values
- NAs
- Strange voltages
- Depth, voltage, parent: all variables relating to the wireless sensor network data collection
- ...

Recap + Next Time

Recap

- **Data cleaning** is a highly iterative process.
- My two cents:
  - Don’t be afraid to ask lots of questions. Better to ask than to assume (more likely than not, incorrectly)
  - Read all documentation

Next Time

- More hands-on practice with data cleaning + exploratory data analysis [chapters 4 and 5 from VDS textbook]