Soil Data Hackathon

May 2018

College Station, TX

K Todd-Brown

ISCN coordinator

ktoddbrown@gmail.com

5/7/2018

Welcome

Day 1	
900- 930	Introductions
930-1100	Introduction to R
1100-1200	Git for Science!
1130-1300	Q&A and lunch
1300-1330	ISCN: SOC-DRaHR and soilDataR
1330-1600	Group exercise: data ingest
1600-1700	Recap

Day 2	
900- 930	Recap group walk through
930-1000	Digest code review
1000-1030	Brainstorm and organize
1030-1200	Hack!
1200-1245	Q&A and lunch
1300-1430	Seminar
1430-1600	Hack!
1600-1700	Push, pull-requests, and closeout

Workshop logistics

> *In the interest of fostering an open and welcoming environment, we as contributors and maintainers pledge to making participation in our project and our community a harassment-free experience for everyone, regardless of age, body size, disability, ethnicity, gender identity and expression, level of experience, education, socio-economic status, nationality, personal appearance, race, religion, or sexual identity and orientation.*

-Code of Conduct adapted from the Contributor Covenant vs1.4

`https://github.com/ISCN/SOC-DRaHR/blob/master/CODE_OF_CONDUCT.md`

- Bathroom location
- Emergency exits
- Post-it notes

Hi!

1. Who are you? (Name, R/Git experience)
2. Why are you here?
3. How do you take your coffee/tea/beverage of choice?

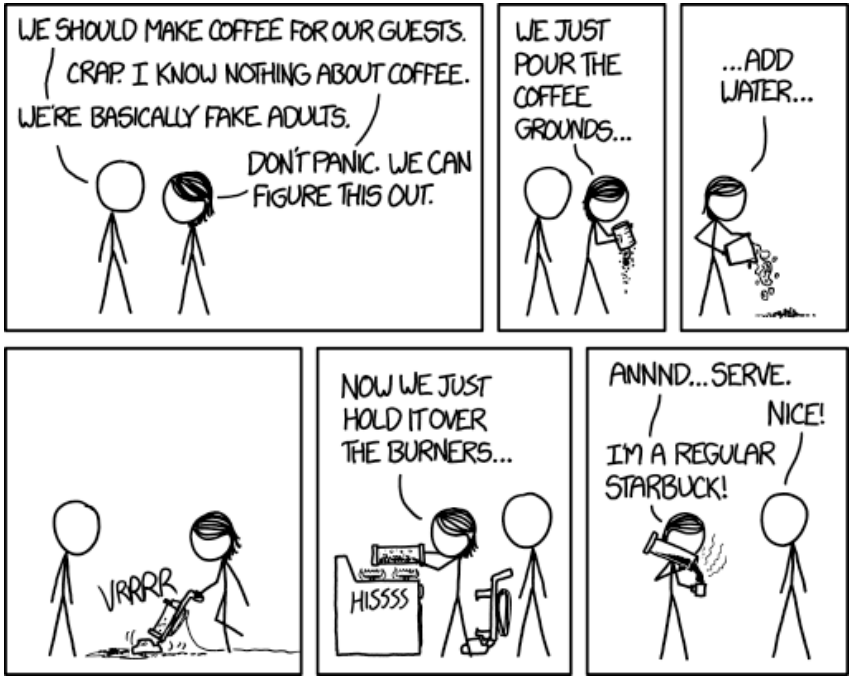


Figure 1: Remind me to order another pack of coffee filters from Dyson. Man, these things are EXPENSIVE. `https://m.xkcd.com/1743/`

Workshop Goal

- Integrate C-PEAT data with ISCN
- Connect informatics and soil science

Install

https://swcarpentry.github.io/workshop-template/#Setup

Data cleaning for R

Why script data cleaning (with R or Python)?

- Data is gold
- Easy to modify analysis
- Easy to share and reproduce
- Hooks to analysis and visualization

Why not to script data cleaning?

- Time/skills

Rstudio vs R

- Layout of Rstudio
- What is a 'project' in Rstudio
- How is R different then Rstudio?

Scripts are a series of commands

```
#let's create some points
myPoints <- data.frame(x=1:50, y=(1:50)*0.5+2)

#let's look at the first few data entries
print(head(myPoints))
```

```
##    x   y
## 1  1 2.5
## 2  2 3.0
## 3  3 3.5
## 4  4 4.0
## 5  5 4.5
## 6  6 5.0
```

Functions are a collection of commands

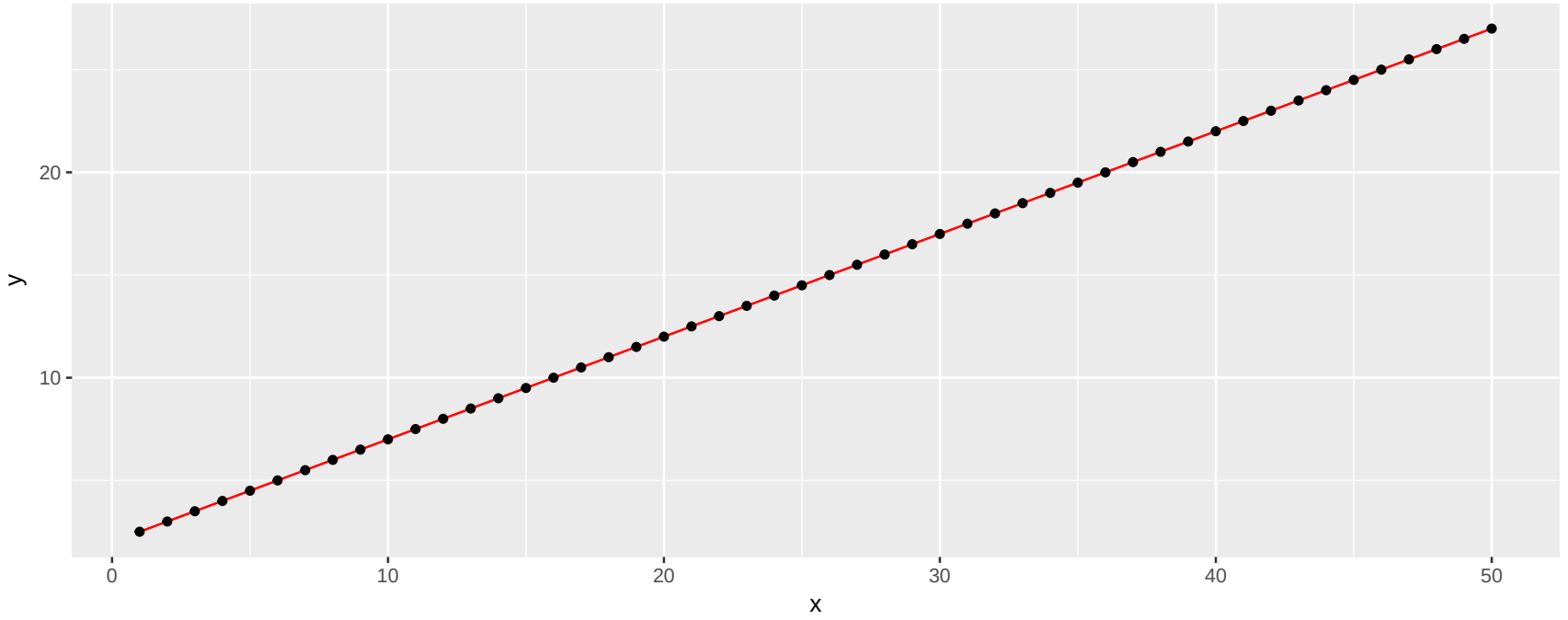
```
makeMyLine <- function(x=1:10){
  y <- x * 0.5 + 2
  return(y)
}

same_x <- data.frame(x=1:50, y=makeMyLine(x=1:50))
```

Plots with ggplot2

```
library(ggplot2)

ggplot(same_x) +
  geom_line(aes(x=x, y=y), color='red') +
  geom_point(data=myPoints, aes(x=x, y=y))
```



Tidyverse grammer

The tidyverse package is very useful for data cleaning because it simplifies code.

```
library(tidyverse)
myPoints %>%
  head %>%
  print #same as print(head(x))
```

```
##   x   y
## 1 1 2.5
## 2 2 3.0
## 3 3 3.5
## 4 4 4.0
## 5 5 4.5
## 6 6 5.0
```

Rmarkdown

- Combine text with executable code and outputs with Rmarkdown or Jupyter Notebooks.
- Rmarkdown is built into Rstudio so we'll use that for this workshop.

Things to remember about programming

- *Google is your friend.*
- When in doubt, try it. You (probably) won't break your computer.
- Never work with the only copy of the data file.
- Save frequently, also backup.

Git

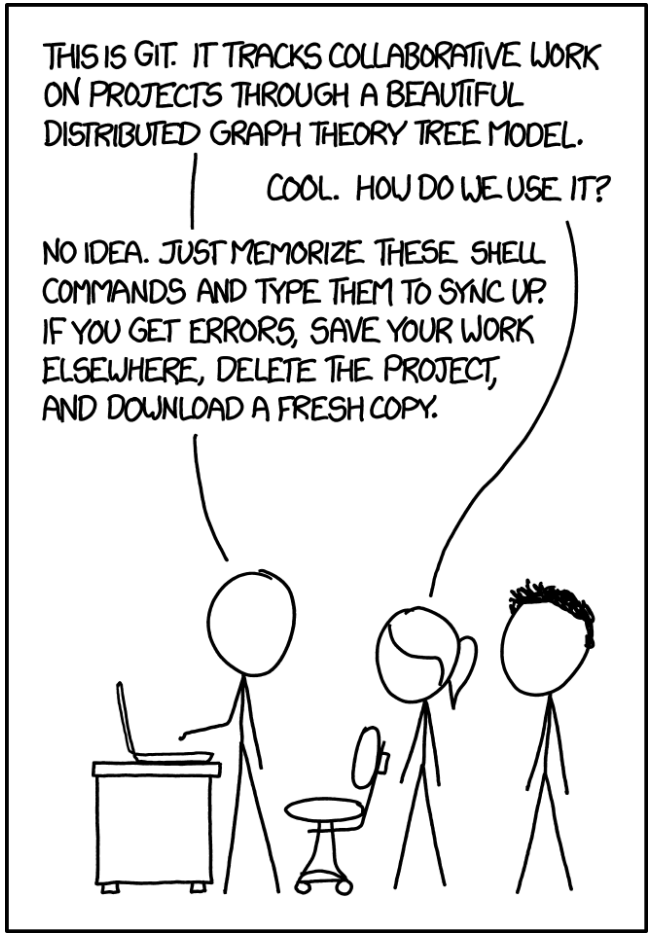


Figure 2: If that doesn't fix it, git.txt contains the phone number of a friend of mine who understands git. Just wait through a few minutes of 'It's really pretty simple, just think of branches as...' and eventually you'll learn the commands that will fix everything. `https://xkcd.com/1597/`

Git vs GitHub

- Git is a version control software
- Git hub is a public git repository with a GUI and some basic project management tools.

Does everyone have a github account?

Creating a git repository

- `git init`
- `git clone`
- Forking a repository

Tracking changes with git

1. Make changes on your local copy.
2. Tell your local repository that you want to bundle changes together.
3. Make a comment on those changes
4. Push those changes to a remote copy of your repository for other people.
5. Pull changes from the remote copy that other people have made to your local copy.

When things go badly

- Merge conflicts
- Rolling back changes

SOC-DRaHR and soilDataR

- International Soil Carbon Network
  - connecting soils scientists to leverage data across sites
  - develope harmonized data products
- Soil organic carbon data rescue and harmonization repository
  - `https://github.com/ISCN/SOC-DRaHR`
  - Main repository for data staging
- soilDataR
  - `https://github.com/ISCN/soilDataR`
  - utilities to support SOC-DRaHR and production of ISCN data products