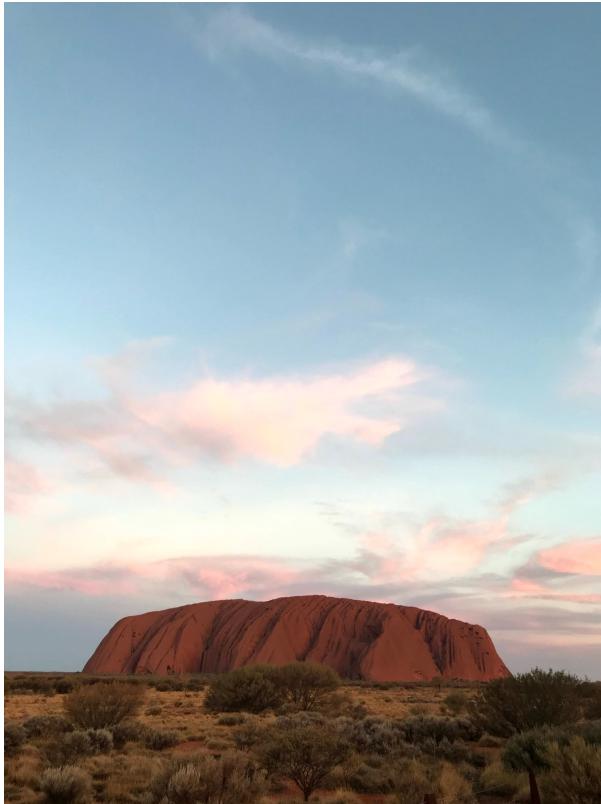




software carpentry: hopkins

Dr. Fonti Kar – University of New South Wales
illustrations by [@allison_horst](#)

Acknowledgement of country



housekeeping



| | Time | Duration (mins) | Content |
|------------------------------|---------------|--------------------|--------------------------------|
| ● <u>Code of Conduct</u> | 09:00 - 9:15 | 15 | Ice-breaker |
| ● Important resources | 09:15 - 10:15 | 60 | Session 1 - Part 1 |
| ○ <u>Collaborative notes</u> | 10:15 - 10:25 | 10 | Quick break |
| ○ <u>Github repo</u> | 10:25 - 11:25 | 60 | Session 1 - Part 2 |
| ● Sticky notes 🙋 | 11:25 - 11:45 | 20 | Extra Question time + feedback |
| | 11:45-12:45 | 60 | Lunch |

icebreaker



~8 mins

| | | |
|---|----------------------------|--|
| Someone who has the same version of R as you `version` | Uses native pipe > | Have used git before |
| Can name 3 packages from tidyverse | Uses ChatGPT for code | Uses `magrittr` pipe %>% |
| Have left their R/computer running overnight for models | Knows where R was invented | Have changed the colour palette of their RStudio IDE |



Skinks prone to slug it out

DANIEL BATEMAN

THE first rule of Lizard Fight Club: you don't talk about Lizard Fight Club.

Second rule of Lizard Fight Club: you don't talk about Lizard Fight Club, unless you have to present your work at an international conference.

A scientist has taken reptile research to the next level, revealing at the Behaviour 2015 conference in Cairns this week that she masterminded a skink cage match in her laboratory, all in the name of science.

Macquarie University post-graduate researcher Fonti Kar has examined factors that influence dominance among

WRESTLE MANIA: Male eastern water skinks have been shown to fight for

The Cairns Post | 12 Aug 2015

A news article from The Cairns Post dated 12 August 2015. The article discusses a study by Fonti Kar on eastern water skinks. It includes a photograph of two skinks on a log.

HOW SMART CAN THEY BE?

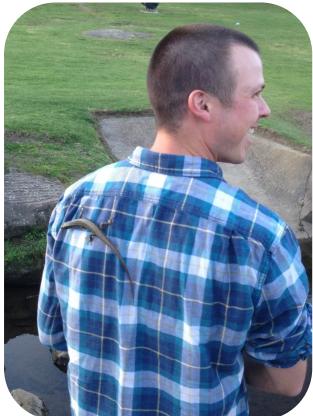
FONTI KAR

Proud sponsors

NEWSTEAD BREWING CO. LTD

WESTERN SYDNEY UNIVERSITY

A promotional graphic for a presentation or event. It features the text "HOW SMART CAN THEY BE?" and "FONTI KAR". Below this, it says "Proud sponsors NEWSTEAD BREWING CO. LTD WESTERN SYDNEY UNIVERSITY". There is also a small image of a person interacting with a lizard on a rock.



masters



- behavioural ecology + animal cognition
- R programming + git

phd

- evolutionary biology +
ecophysiology



Evidence
Synthesis
Hackathon

eshackathon.org



Quantifying species range and overlap with fire-burned areas using concave hulls

Calculating range overlap is an efficient way to estimate the impact of natural disasters on biodiversity. Here we'll use curated datasets to compute concave hulls to visualise the spatial distribution of *Apidae* (Bees) and *Daviesia* (Bitterpeas) and their overlap with burned areas of the Black Summer fires of 2019-2020.

EUKARYOTA ANIMALIA PLANTAE SUMMARIES MAPS R

Author

Fonti Kar
Margot Schneider

Date

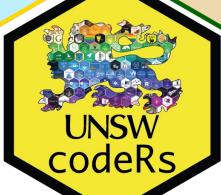
11 April 2023



INVERTEBRATES AUSTRALIA



THE CARPENTRIES



Part I: function writing for researchers



Part I: Overview

- A case for writing functions
- Split-combine-apply 
- Function anatomy 
- Hi, have you met purrr?

Whole group discussion



~7 mins

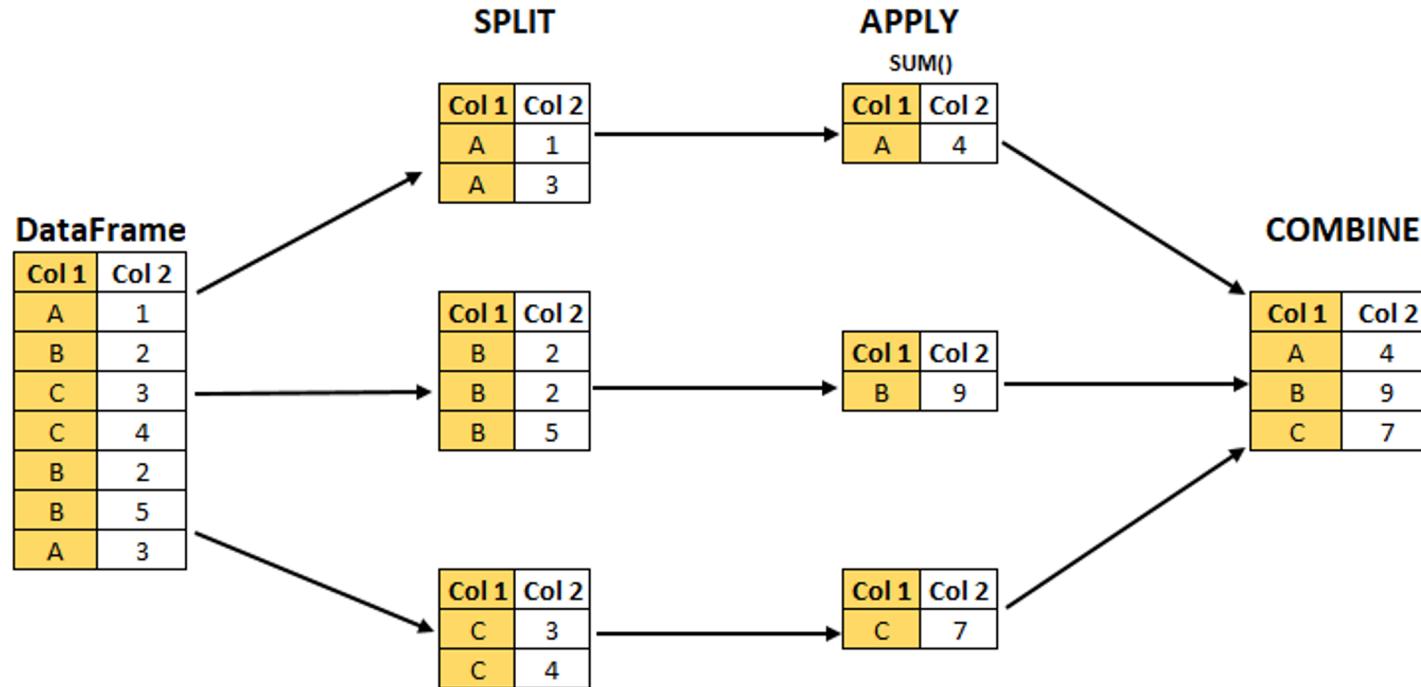
- What research tasks do you do that can be supported by functions?
 - No need to bog down on details (yet)
- What keywords/themes does your task fall under?
 - (Big-ish) data import and export
 - Data processing/wrangling
 - Data analysis
 - Data visualisation
 - Export outputs
 - Reporting/Communication of results

Why write functions?

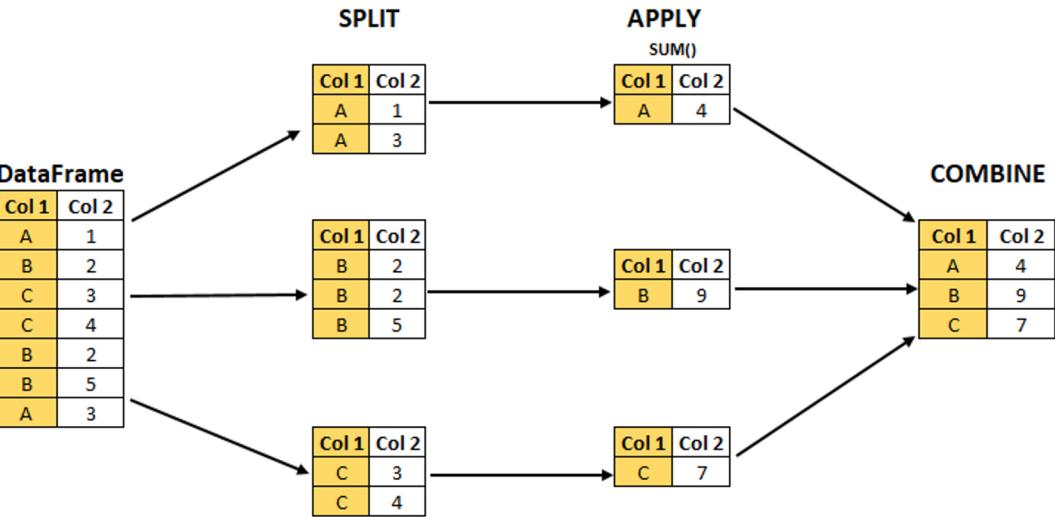
- Reduces duplication
 - If you have to repeat yourself more than twice... you should put it in a function
- Tidy code
- Make changes in one location
- Opens up more tools for your arsenal



Split-combine-apply



Split-combine-apply



👤 : What are some examples of split-combine-apply in your work?

👤 : How are you implementing these at the moment?



a few (warm up) coding challenges

Function anatomy



```
clean_data <- function(data){  
  # body of function  
  data |>  
    tidyr::drop_na(sex) |> # Remove missing values  
    dplyr::mutate(sex = case_match(sex, # Make sex a logical  
                           "male" ~ 1,  
                           "female" ~ 0),  
                  species = tolower(species), # Make lowercase  
                  island = tolower(island)) # Make lowercase  
}
```

Function writing tips



- A good declarative name
- Input names + defaults are intuitive
- Comments within function
- Dependencies are explicit using ::

```
get_latest_download <- function(path_to_galah_data = 'data/galah/'){
  # Grab all files in folder
  all_downloads <- list.files(path_to_galah_data)

  # Grab the dates only
  dates <- stringr::str_extract(all_downloads,
                                pattern = regex("[0-9]{4}--[0-9]{2}--[0-9]{2}"))

  # Determine the most recent date
  most_recent <- max(lubridate::ymd(dates)) %>% as.character()

  # Identify the file name that is the most recent
  most_recent_file <- stringr::str_subset(all_downloads, most_recent)

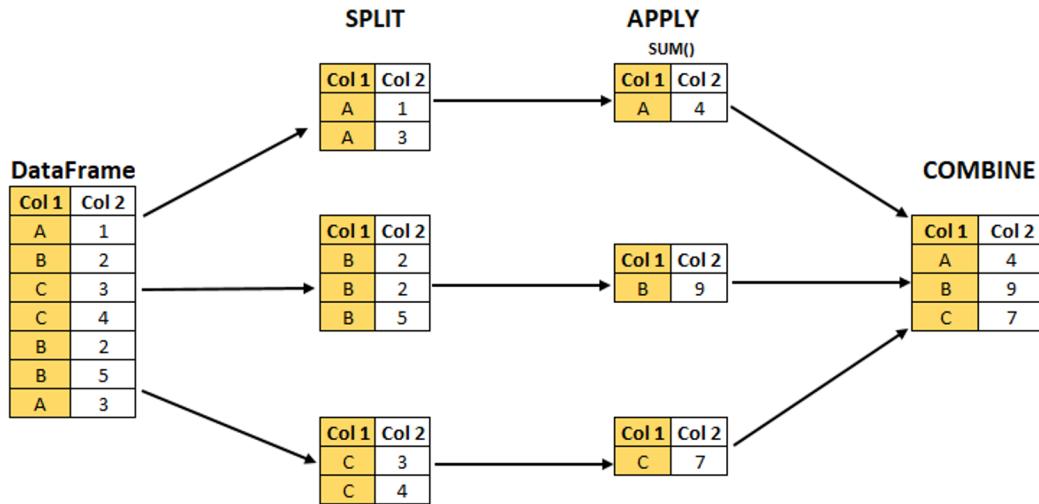
  # Get path to most recent file
  paste0(path_to_galah_data, most_recent_file)
}
```





a few more coding challenges

Have you met purrr?

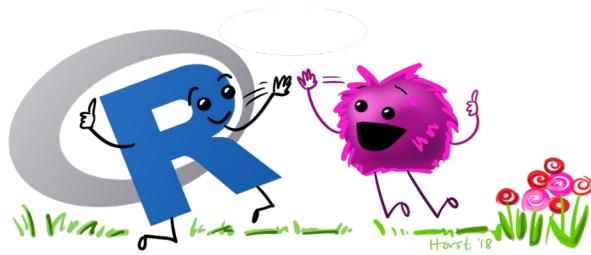


purrr::

- `map()` / `walk()`
- `map2()` / `walk2()`
- `imap()` / `iwalk()`
- `list_rbind()`

Feedback: 1 up and 1 down in collab notes

Part II: git for collaboration



housekeeping



| | Time | Duration (mins) | Content |
|------------------------------|-------------|--------------------|---------------------|
| ● <u>Code of Conduct</u> | 12:45-1:45 | 60 | Session 2 - Part 1 |
| ● Important resources | 1:45-1:55 | 10 | Quick break |
| ○ <u>Collaborative notes</u> | 1:55-2:55 | 60 | Session 2 - Part 2 |
| ○ <u>Github repo</u> | | | |
| ● Sticky notes 🧩🧩 | 2:55 - 3:15 | 20 | Extra Question time |
| ● Review of Ups and Downs | 3:15 - 3:30 | 15 | Workshop feedback |
| | 12:45-1:45 | 60 | Session 2 - Part 1 |

Part II : Overview

- Whole group discussion about challenges with reproducibility 
- Learning the lingo
- Demos and follow along
- Breakout and collaborate on function writing challenges 

Challenges to working on code projects

With collaborators:

With research community:



Gitting with it



project directory

project-folder /
 data /
 raw /
 processed /
 R /
 functions /
 doc /
 downloads/
 output /
 ignore/

local repo

project-folder /
 data /
 raw /
 processed /
 R /
 functions /
 doc /
 output /



your kitchen

experimenting, testing, trying things

your recipe book

A curated location, where you update,
keep track of your ideas/experiments

on your computer

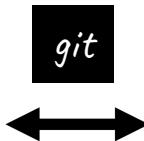


project directory

```
project-folder /  
  data /  
    raw /  
    processed /  
  R /  
  functions /  
  doc /  
  downloads/  
  output /  
  ignore /
```

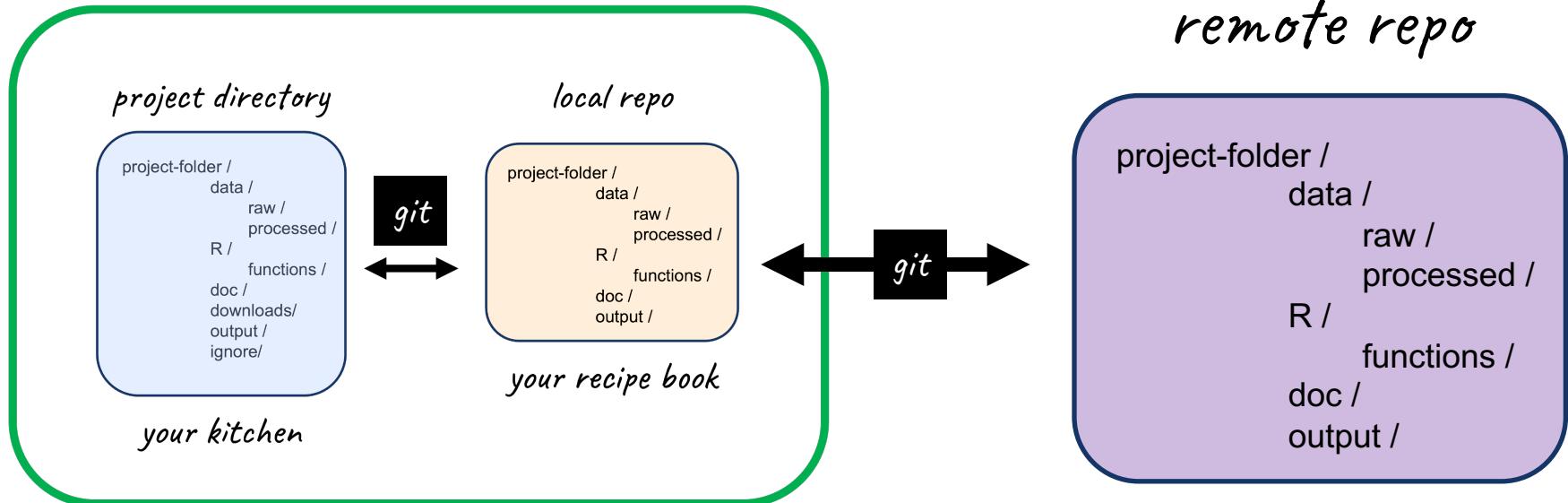
local repo

```
project-folder /  
  data /  
    raw /  
    processed /  
  R /  
  functions /  
  doc /  
  output /
```



your recipe book

your kitchen



remote repo



remote repo

project-folder /
 data /
 raw /
 processed /
 R /
 functions /
 doc /
 output /

CLONE

*make a copy of a
remote repo*



local repo

project-folder /
 data /
 raw /
 processed /
 R /
 functions /
 doc /
 output /

COMMIT

create a save point in your work



project directory

```
project-folder /  
    data /  
        raw /  
        processed /  
    R /  
        functions /  
    doc /  
    output /
```

local repo

```
project-folder /  
    data /  
        raw /  
        processed /  
    R /  
        functions /  
    doc /  
    output /
```





remote repo

project-folder /
 data /
 raw /
 processed /
 R /
 functions /
 doc /
 output /

PUSH

*sync your local changes
 remote*

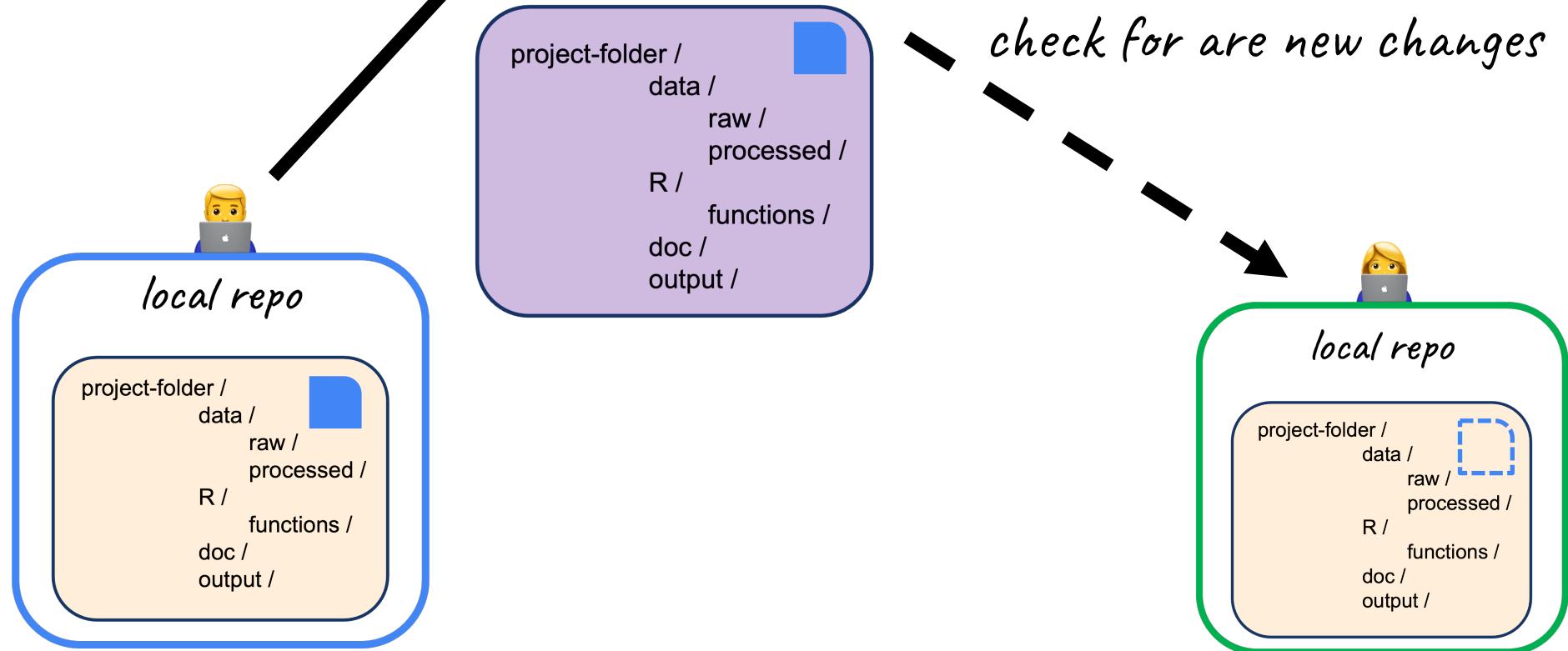


local repo

project-folder /
 data /
 raw /
 processed /
 R /
 functions /
 doc /
 output /



remote repo





remote repo

PULL

retrieve new changes



local repo

```
project-folder /  
  data /  
    raw /  
    processed /  
  R /  
    functions /  
  doc /  
  output /
```

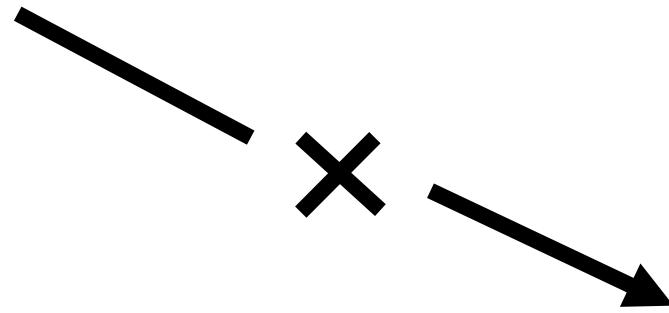
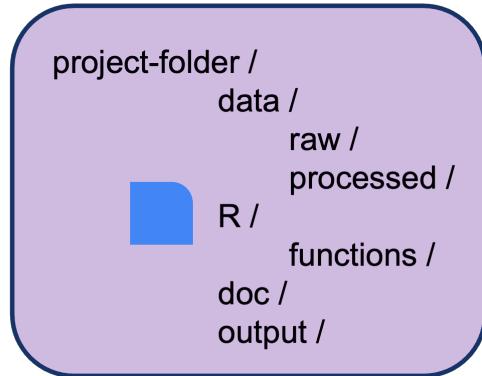


local repo

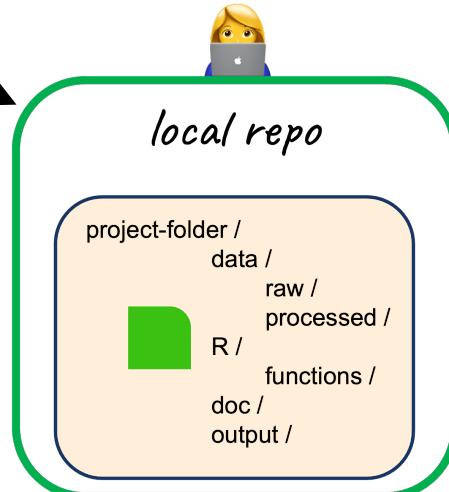
```
project-folder /  
  data /  
    raw /  
    processed /  
  R /  
    functions /  
  doc /  
  output /
```



CONFLICT

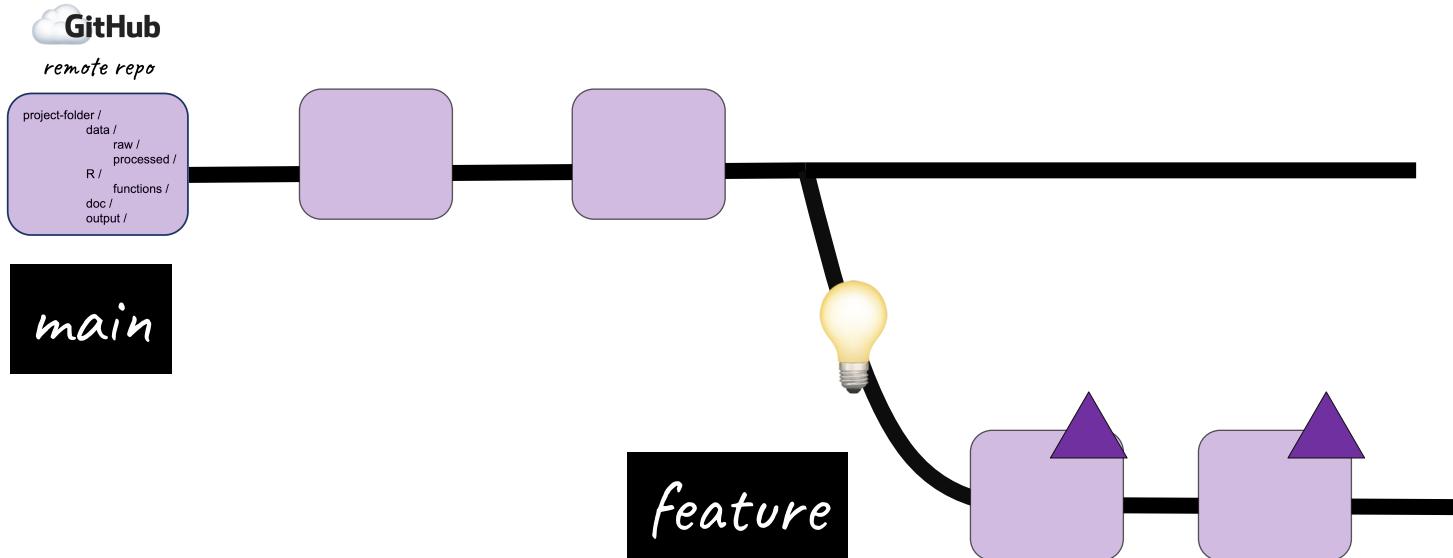


changes on the same line
= cannot merge



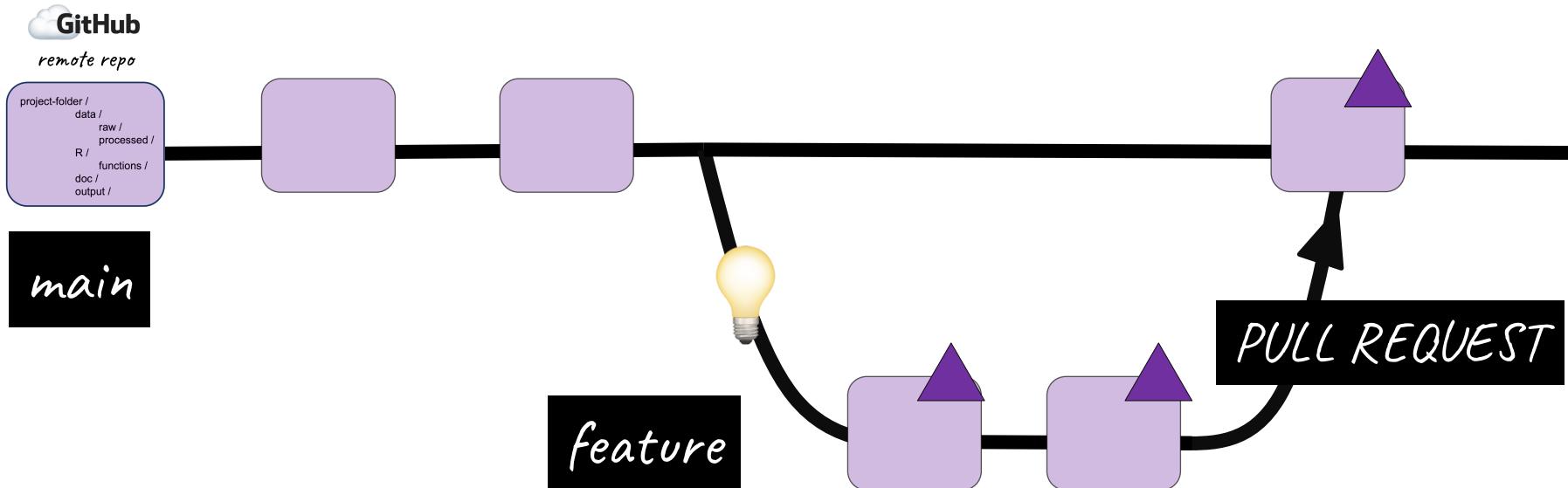
BRANCHES

independent benches to explore / collaborate



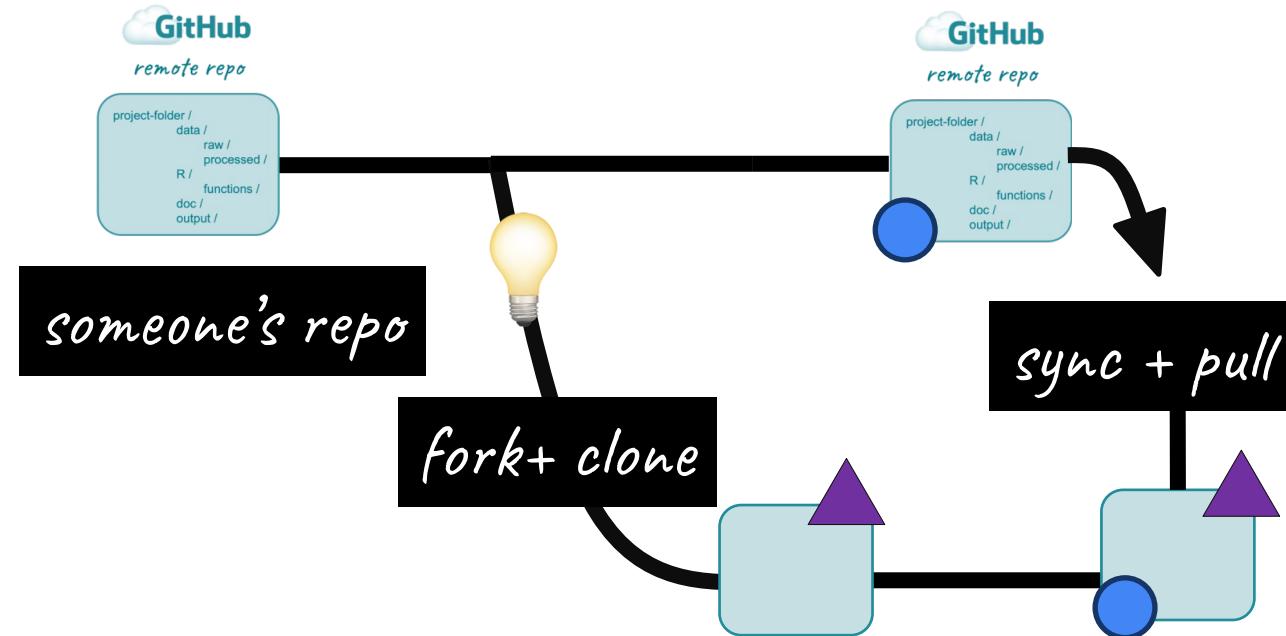
MERGE

consolidate ideas back to main body of work



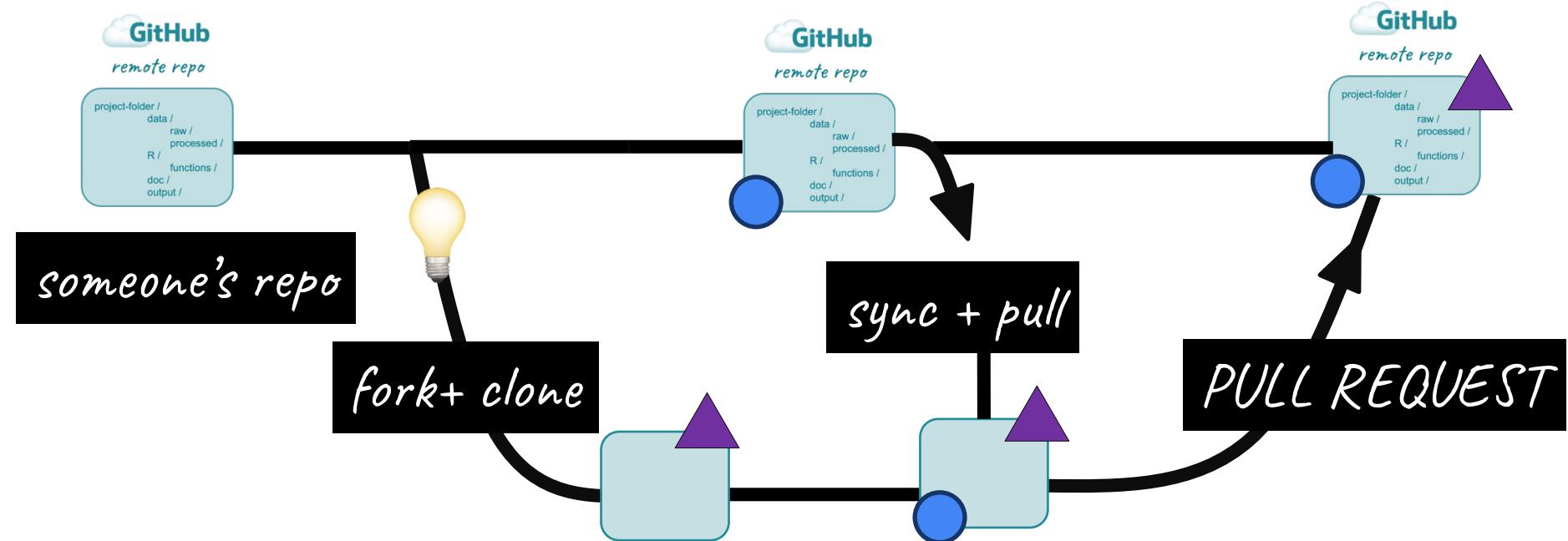
FORKS

your own copy of someone's idea to explore / collaborate



FORKS

your own copy of someone's idea to explore / collaborate



Learn more:

- <https://r4ds.hadley.nz/functions.html>
- <https://jennybc.github.io/purrr-tutorial/>
- <https://happygitwithr.com/>



let's connect

