

# **Foundational Open Science Skills (FOSS)**

**- GitHub webpages and Jupyter notebook on Google Colab -**

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Feb, 2022

# Introduce myself

- 3<sup>rd</sup> year PhD student in Epi
- Research topic: Malaria in Kenya (vector control & human behaviors)
- Join the Roots for Resilience in Data Science Scholarship Program in Fall 2021
  - CyVerse Foundational Open Science Skills (FOSS) training
  - Cohort meeting: discussion about FOSS training topics

# What I learned from FOSS

## *Before*

- Challenges
  - No idea on how to work on data analysis interactively
  - Share codes and outputs by email
    - Confused with which code was the latest version

## *After*

- New things I learned
  - **GitHub pages**
    - Create a personal website
  - **Jupyter notebook** on Google Colaboratory (Colab)
    - Analyze data in the interactive ways

Interactive collaboration tools

# Objective/Outline

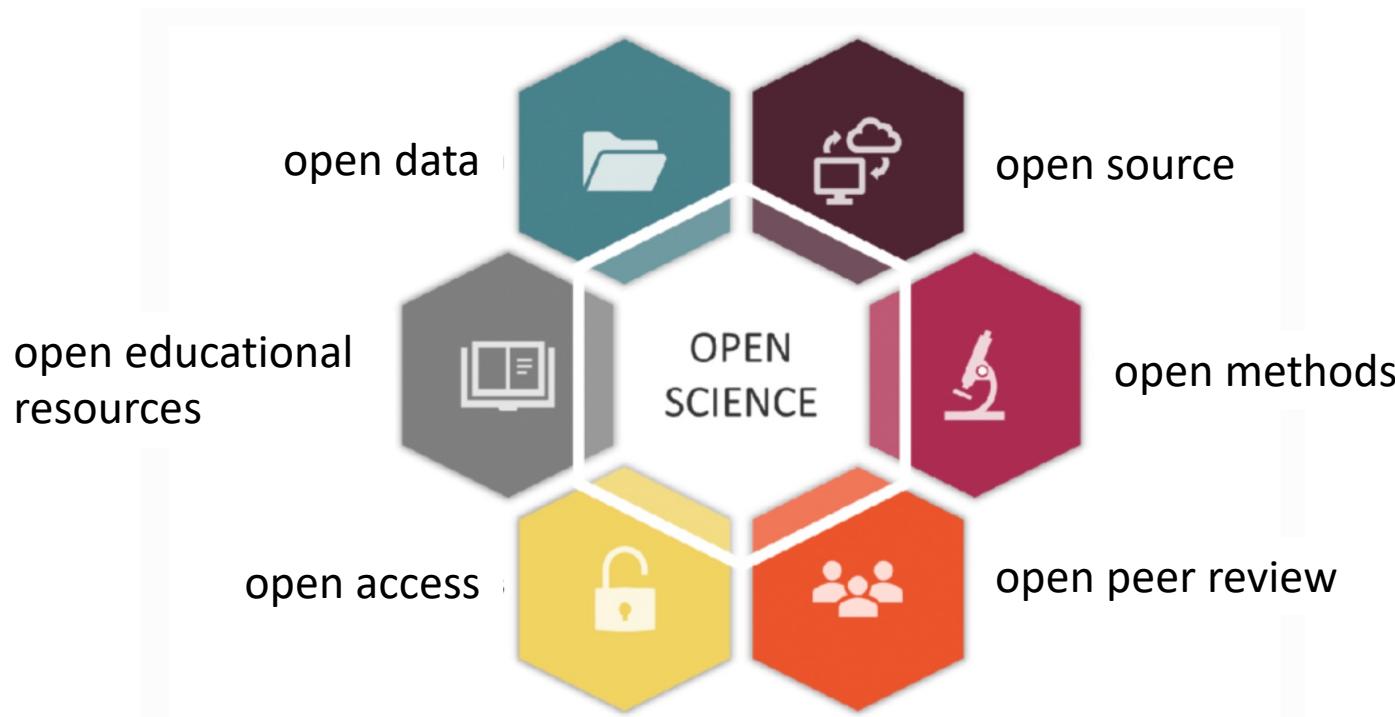
Share the knowledge and skills learned from the FOSS training

1. What is Open Science?
2. Why do Open Science?
3. Git vs GitHub
4. What is GitHub pages?
5. How to make **GitHub personal pages**
6. What is a Jupyter notebook on Google Colaboratory (Colab)?
7. How to use a **Jupyter notebook on Google Colab**
8. Future direction

Interactive collaboration tools

# 1. What is Open Science?

- A set of practices that increase the **transparency** and **accessibility** of scientific research.
- The concept is **changing** and **growing**.



Gallagher et al 2020; Nosek et al 2015; van der Zee & Reich, 2018

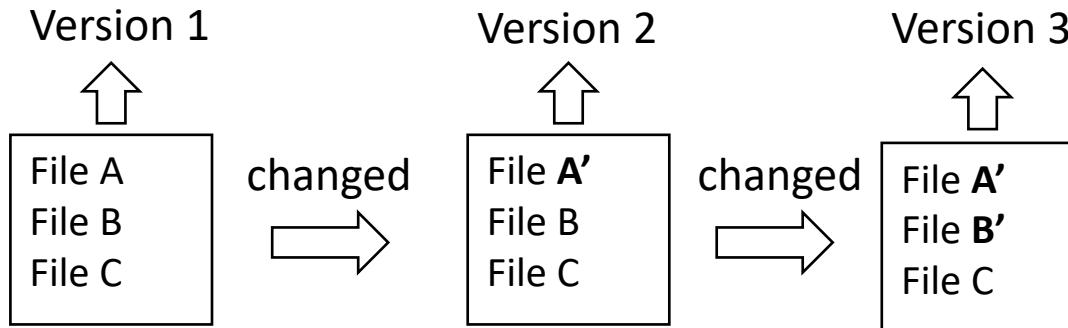
## 2. Why do Open Science?

5 schools underlying motivations:

<b>Democratic</b>	Scholarly work <b>freely available to everyone</b>
<b>Pragmatic</b>	<b>Improve the quality of scholarly work</b> by fostering collaboration and improving critiques
<b>Infrastructure</b>	Platforms, tools, and services necessary to <b>conduct efficient research, collaboration, and communication</b>
<b>Public</b>	<b>Societal impact of scholarly work</b>
<b>Measurement</b>	<b>Developing alternative measurements of scientific impact</b>

### 3. Git vs GitHub

- **Git:** Version control software (**command line**)
  - Save changes over time without overwriting previous versions



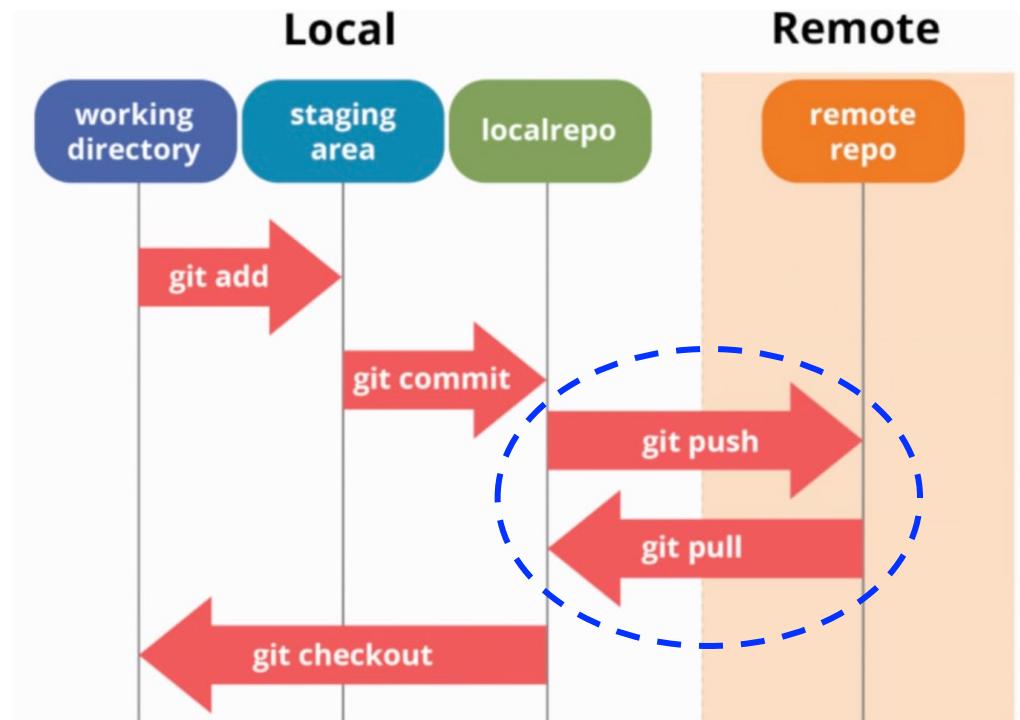
- **GitHub:** Collaboration platform (**Cloud-based** hosting service)
  - Interested parties can **review** the set of changes, and **discuss** potential modifications if necessary.

<https://github.com/git-guides>

## ***Set up***

1. Create SSH (secure shell) keys associated with your account.
2. Create personal access token
3. Set up Git (Configure username & email address)

<https://github.com/>



**Git**

<https://dev.to/mollynem/git-github--workflow-fundamentals-5496>

**GitHub**

# Git

- Mac: terminal
- Windows: BASH emulation

```
[noriko@Norikos-MBP ~ % mkdir FOSS_R
[noriko@Norikos-MBP ~ % cd FOSS_R
[noriko@Norikos-MBP FOSS_R % git init
Initialized empty Git repository in /Users/noriko/FOSS_R/.git/
[noriko@Norikos-MBP FOSS_R % git add FOSS.R
[noriko@Norikos-MBP FOSS_R % git status
On branch master

No commits yet

Changes to be committed:
(use "git rm --cached <file>..." to unstage)

    new file:   FOSS.R

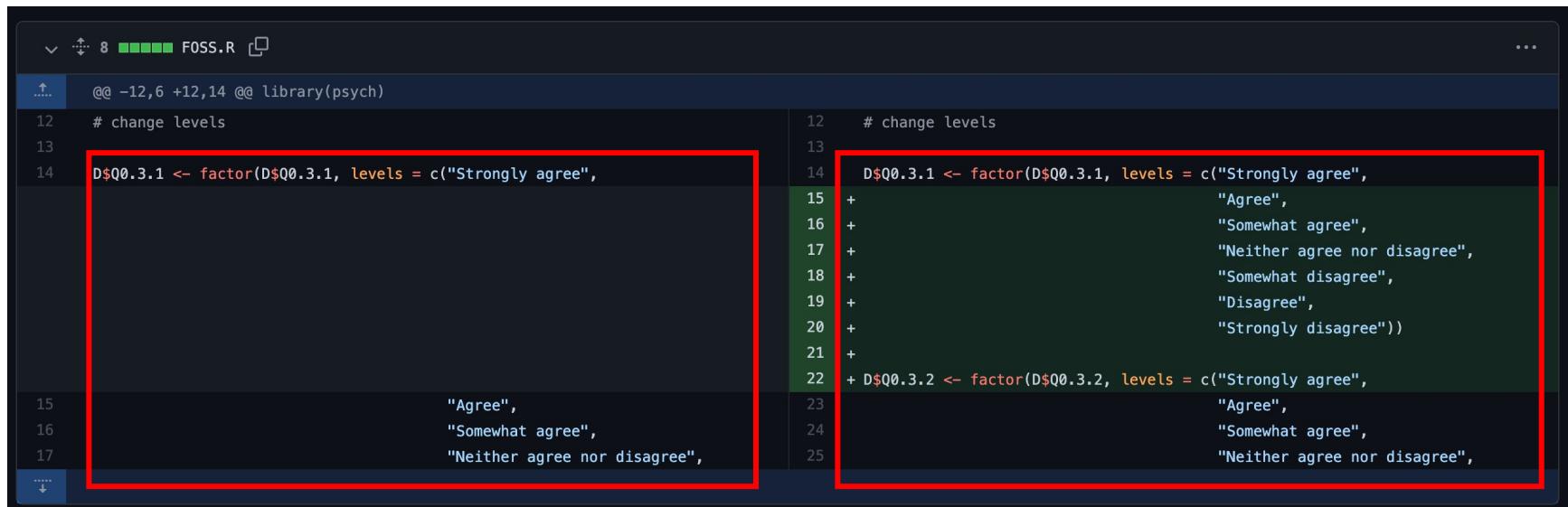
Untracked files:
(use "git add <file>..." to include in what will be committed)

    FOSS_v2.R

noriko@Norikos-MBP FOSS_R %
```

# GitHub

- You can see the changes



```
@@ -12,6 +12,14 @@ library(psych)
12 # change levels
13
14 D$Q0.3.1 <- factor(D$Q0.3.1, levels = c("Strongly agree",
15 "Agree",
16 "Somewhat agree",
17 "Neither agree nor disagree",
18 "Somewhat disagree",
19 "Disagree",
20 "Strongly disagree"))
21
22 + D$Q0.3.2 <- factor(D$Q0.3.2, levels = c("Strongly agree",
23 "Agree",
24 "Somewhat agree",
25 "Neither agree nor disagree",
```

## 4. What are GitHub pages?

- A static\* site hosting service
- Take HTML, CSS, and JavaScript files straight from a repository on GitHub
- **Optionally run the files through a build process, and publish a website**

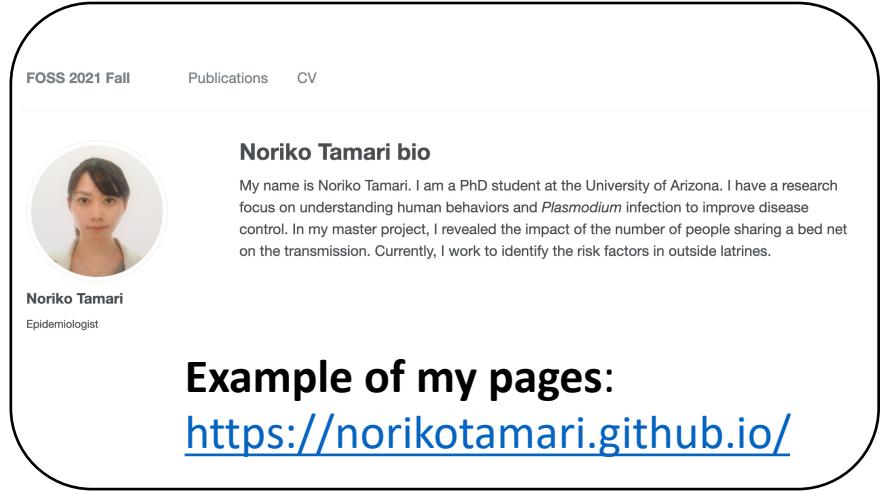
\*Static website: HTML based without dynamically interacting with a database

<https://docs.github.com/en/pages/getting-started-with-github-pages/about-github-pagesz>

# 5. How to make GitHub personal pages

## Procedures:

- 0) Sign up for GitHub (<https://github.com/>)
- 1) Fork (Copy) a repository for GitHub Pages
- 2) Customize the template



The screenshot shows a GitHub personal page for Noriko Tamari. At the top, there are navigation links: 'FOSS 2021 Fall', 'Publications', and 'CV'. Below these, there is a circular profile picture of Noriko Tamari, followed by her name 'Noriko Tamari' and title 'Epidemiologist'. To the right, there is a bio section titled 'Noriko Tamari bio' which includes a short description of her research focus and current work. Below the bio, the text 'Example of my pages:' is followed by a link '<https://norikotamari.github.io/>'.

Original template: <https://academicpages.github.io/>

## More information:

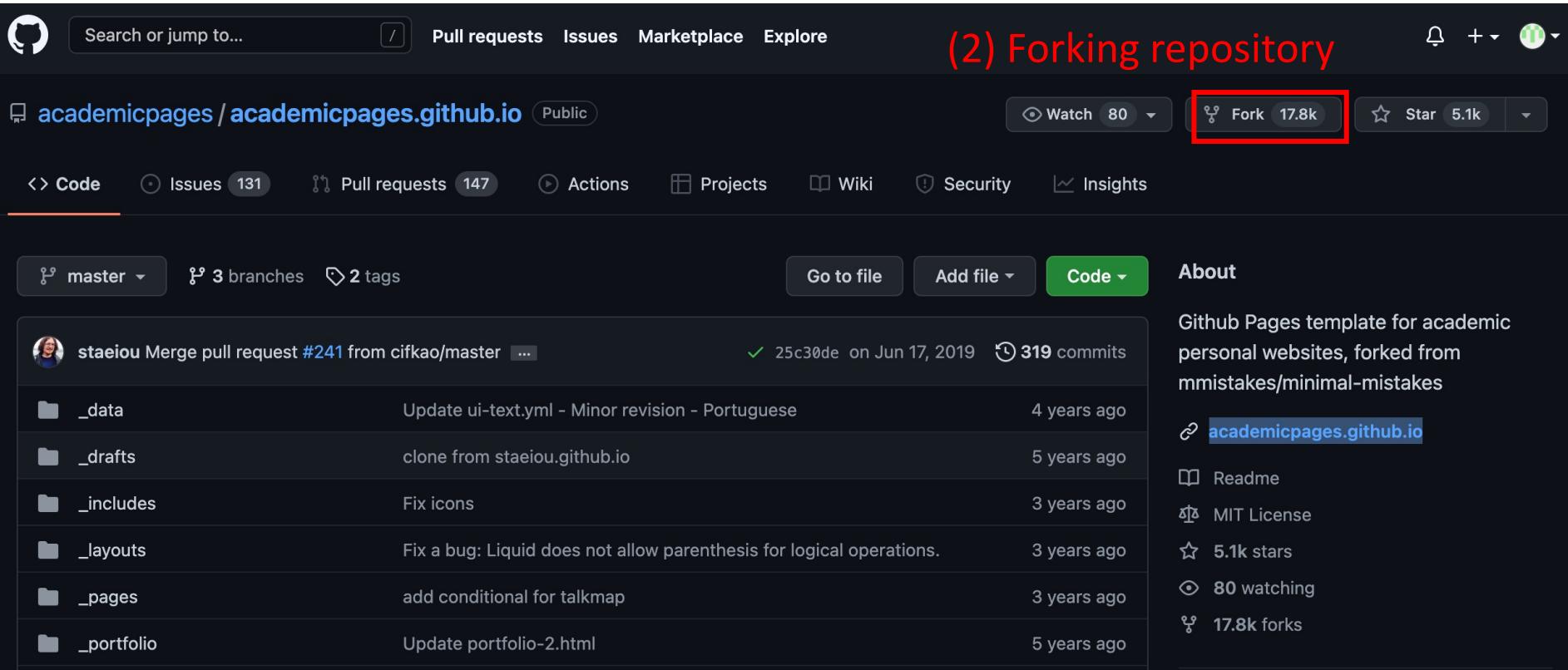
- CyVerse.org <https://youtu.be/o59w3AF8ImQ?t=2270s>
- Original template (<https://academicpages.github.io/>) > “Guide”

# 1) Fork a repository for GitHub Pages

## (1) Use GitHub Page templates

Access the URL below:

<https://github.com/academicpages/academicpages.github.io>



The screenshot shows the GitHub repository page for `academicpages / academicpages.github.io`. The page includes a navigation bar with links for Pull requests, Issues, Marketplace, and Explore. Below the navigation is a search bar and a 'Watch' button with 80 notifications. The main content area displays the repository's code, showing 3 branches and 2 tags. A list of recent commits is shown, with the most recent one being a merge from `cifkao/master`. On the right side, there is an 'About' section providing details about the repository, such as its purpose as a GitHub Pages template for academic personal websites, its fork history from `mmistakes/minimal-mistakes`, and its current status with 5.1k stars, 80 watchers, and 17.8k forks. The 'Fork' button in the top right corner is highlighted with a red box.

(2) Forking repository

academicpages / academicpages.github.io (Public)

Code Issues 131 Pull requests 147 Actions Projects Wiki Security Insights

master 3 branches 2 tags Go to file Add file ▾ Code ▾

staeiou Merge pull request #241 from cifkao/master ... ✓ 25c30de on Jun 17, 2019 319 commits

\_data Update ui-text.yml - Minor revision - Portuguese 4 years ago

\_drafts clone from staeiou.github.io 5 years ago

\_includes Fix icons 3 years ago

\_layouts Fix a bug: Liquid does not allow parenthesis for logical operations. 3 years ago

\_pages add conditional for talkmap 3 years ago

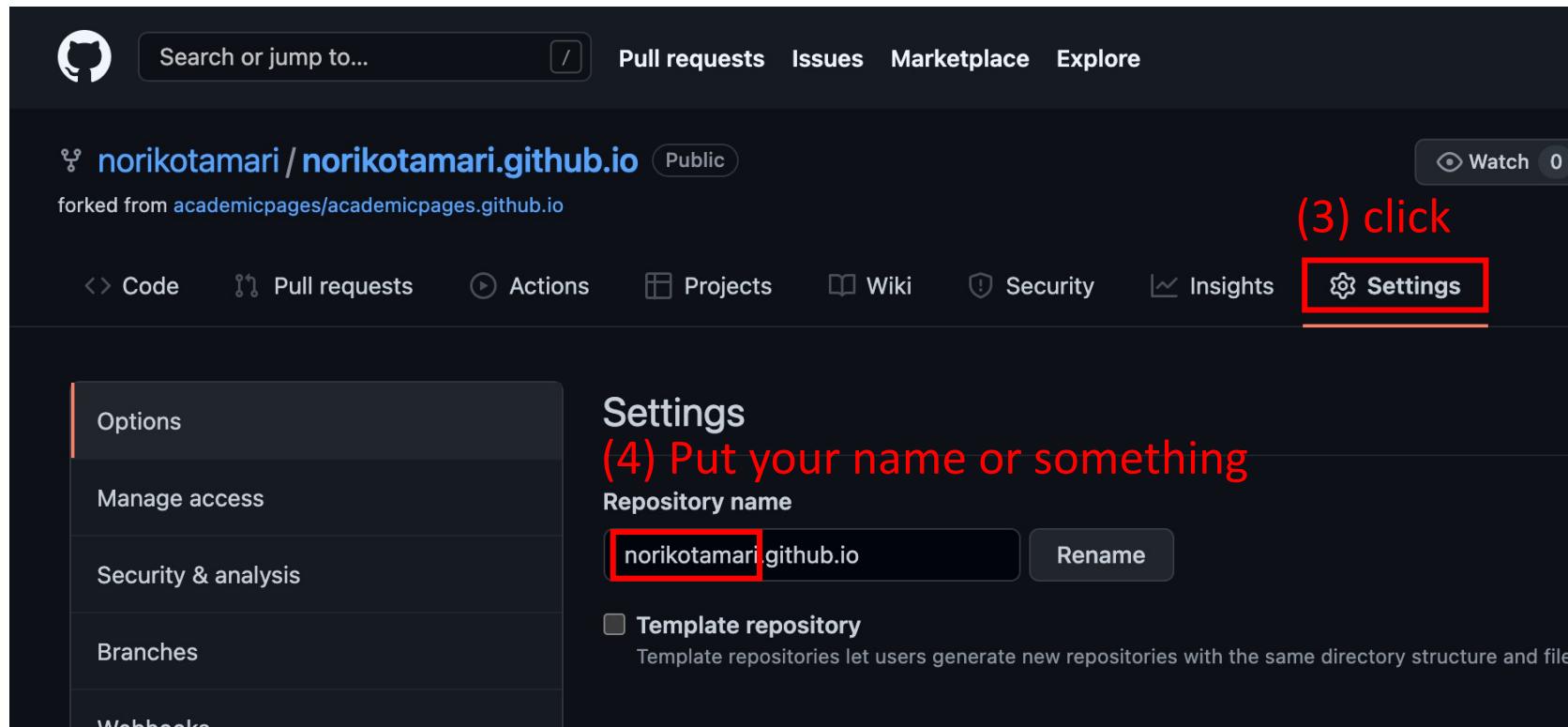
\_portfolio Update portfolio-2.html 5 years ago

About

Github Pages template for academic personal websites, forked from mmistakes/minimal-mistakes

academicpages.github.io

Readme MIT License 5.1k stars 80 watching 17.8k forks



A screenshot of a GitHub repository settings page. The repository is named "norikotamari/norikotamari.github.io" and is public. The "Settings" tab is selected, indicated by a red box around its icon. The sidebar on the left shows options like "Options", "Manage access", "Security & analysis", "Branches", and "Webhooks". The main area displays the repository name "norikotamari.github.io" in a field with a "Rename" button, and a checkbox for "Template repository". A large red annotation "(3) click" points to the "Settings" tab.

(3) click

norikotamari / norikotamari.github.io Public

forked from academicpages/academicpages.github.io

Code Pull requests Actions Projects Wiki Security Insights Settings

Options

Manage access

Security & analysis

Branches

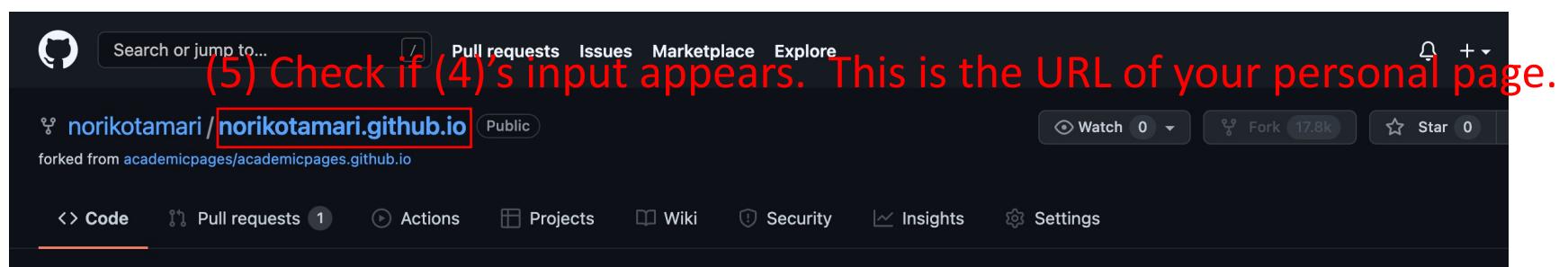
Webhooks

Repository name

Rename

Template repository

Template repositories let users generate new repositories with the same directory structure and file



A screenshot of the GitHub repository page for "norikotamari/norikotamari.github.io". The URL "norikotamari.github.io" is highlighted with a red box. The page shows basic repository statistics: 0 forks, 17.8k stars, and 0 issues. A large red annotation "(5) Check if (4)'s input appears. This is the URL of your personal page." is overlaid on the page.

norikotamari / norikotamari.github.io Public

forked from academicpages/academicpages.github.io

Watch 0 Fork 17.8k Star 0

Code Pull requests 1 Actions Projects Wiki Security Insights Settings

## 2) Customize the template – how to change the item names in navigation bar

The screenshot shows a GitHub repository page for `norikotamari / norikotamari.github.io`. A red arrow points from the top section to the navigation bar at the top of the page. The navigation bar includes links for "Your Name / Site Title", "Publications", "Talks", "Teaching", "Portfolio", "Blog Posts", "CV", and "Guide". Below the navigation bar, a large heading reads "academicpages is a ready-to-fork GitHub Pages template for academic personal websites". To the right of the heading is a detailed description of the template. In the center, there's a "Settings" button with a red box around it and the text "(1) click" above it. On the left, a sidebar lists repository settings like "Options", "Manage access", "Security & analysis", etc., with a "Pages" button highlighted by a red box and labeled "(2) click". At the bottom, a list of recent commits is shown, with the file `_config.yml` highlighted by a red box and labeled "(3) click".

This is the front page of a website that is powered by the [academicpages template](#) and hosted on a free service in which websites are built and hosted from your GitHub repository, automatically updating when a new commit is made. This template was forked from the [Minimal Mistakes Jekyll Theme](#) and extended to support the kinds of content that academics need: a portfolio, blog posts, and a dynamically-generated CV. You can modify the configuration and markdown files, add your own images, and host your own site for free, with no ads! An older version of this website is available at [stuartgeiger.com](#), which uses [this GitHub Pages template](#).

**norikotamari / norikotamari.github.io** Public  
forked from [academicpages / academicpages.github.io](#)

Code Pull requests Actions Projects Wiki Security Insights Settings (1) click

**Settings**

Repository name: norikotamari.github.io Rename

**Template repository**  
Template repositories let users generate new repositories with the same directory structure and files. [Learn more](#)

**Social preview**  
Upload an image to customize your repository's social media preview.  
Images should be at least 640x320px (1280x640px for best display). [Download template](#)

Pages (2) click

File	Description	Date
README.md	add Gemfile.lock notice	4 years ago
_config.dev.yml	clone from staeiou.github.io	5 years ago
<b>_config.yml</b> (3) click	update site URL, repo, and name	3 months ago
package.json	clone from staeiou.github.io	5 years ago
talkmap.ipynb	move talkmap.ipynb out of _talks	5 years ago

311 lines (285 sloc) | 7.91 KB

Raw Blame   

```
1 # Welcome to Jekyll!
2 #
3 # This config file is meant for settings that affect your entire site, values
4 # which you are expected to set up once and rarely need to edit after that.
```

(4) click

311 lines (285 sloc) | 7.92 KB

```
1 # Welcome to Jekyll!
2 #
3 # This config file is meant for settings that affect your entire site, values
4 # which you are expected to set up once and rarely need to edit after that.
5 # For technical reasons, this file is *NOT* reloaded automatically when you use
6 # `jekyll serve`. If you change this file, please restart the server process.
7
8 # Site Settings
9 locale : "en-US"
10 title : "Your Name / Site Title"
11 title_separator : "-"
12 name : &name "Your Name"
13 description : &description "personal description"
```

(5) Edit as necessary

Correspond here

Your Name / Site Title

Publications Talks Teaching Portfolio Blog Posts CV Guide



Your Sidebar Name

Your biography for the left-hand sidebar

## academicpages is a ready-to-fork GitHub Pages template for academic personal websites

This is the front page of a website that is powered by the [academicpages template](#) and hosted on GitHub pages. [GitHub pages](#) is a free service in which websites are built and hosted from code and data stored in a GitHub repository, automatically updating when a new commit is made to the repository. This template was forked from the [Minimal Mistakes Jekyll Theme](#) created by Michael Rose, and then extended to support the kinds of content that academics have: publications, talks, teaching, a portfolio, blog posts, and a dynamically-generated CV. You can fork [this repository](#) right now, modify the configuration and markdown files, add your own PDFs and other content, and have a completely unique academic personal website.



norikotamari update site URL, repo, and name ✓

Latest commit c872651 on Oct 20, 2021 ⏲ History

8 contributors



311 lines (285 sloc) | 7.91 KB

[Raw](#) [Blame](#)   

```
1 # Welcome to Jekyll!
2 #
3 # This config file is meant for settings that affect your entire site, values
4 # which you are expected to set up once and rarely need to edit after that.
5 # For technical reasons, this file is *NOT* reloaded automatically when you use
6 # `jekyll serve`. If you change this file, please restart the server process.
7
8 # Site Settings
9 locale : "en-US"
10 title : "FOSS 2021 Fall"
11 title_separator : "-"
12 name : &name "Your Name"
13 description : &description "personal description"
14 url : https://norikotamari.github.io # the base hostname & protocol for your site e.g. "https://mmistakes.github.io"
15 baseurl : "" # the subpath of your site, e.g. "/blog"
16 repository : "norikotamari/norikotamari.github.io"
17 teaser : # filename of teaser fallback teaser image placed in /images/, .e.g. "500x300.png"
18 breadcrumbs : false # true, false (default)
19 words_per_minute : 160
20 future : true
```

(6) Put your URL

(7) Put your repository

308 compress\_html:  
309 clippings: all  
310 ignore:  
311 envs: development  
312



## Commit changes

update site URL, repo, and name

Add an optional extended description...

 -o- Commit directly to the master branch. ↗ Create a new branch for this commit and start a pull request. [Learn more about pull requests.](#)[Commit changes](#)[Cancel](#)

(8) click

## 2) Customize the template – how to change the image

This screenshot shows a GitHub repository page for the 'academicpage' template. At the top, there's a navigation bar with 'Code', 'Pull requests', 'Actions', 'Projects', 'Wiki', and other options. Below the navigation bar, it says '(9) click'. A red box highlights the 'Code' button. Underneath, there are buttons for 'master', '3 branches', and '2 tags'. A message states 'This branch is 4 commits ahead of academicpages:master.' To the right, there's a placeholder for a profile picture with a red box around it. Below the picture, the text 'Your Sidebar Name' and 'Your biography for the left-hand sidebar' are displayed.

academicpage  
template for a

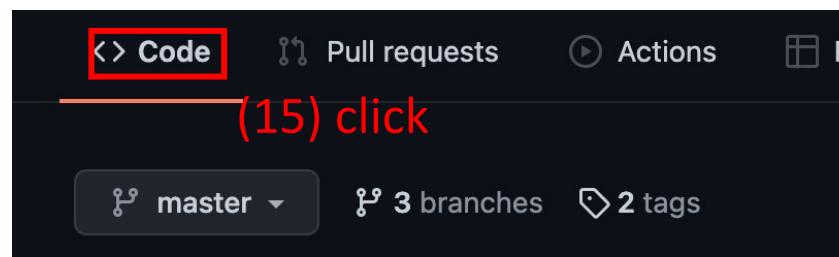
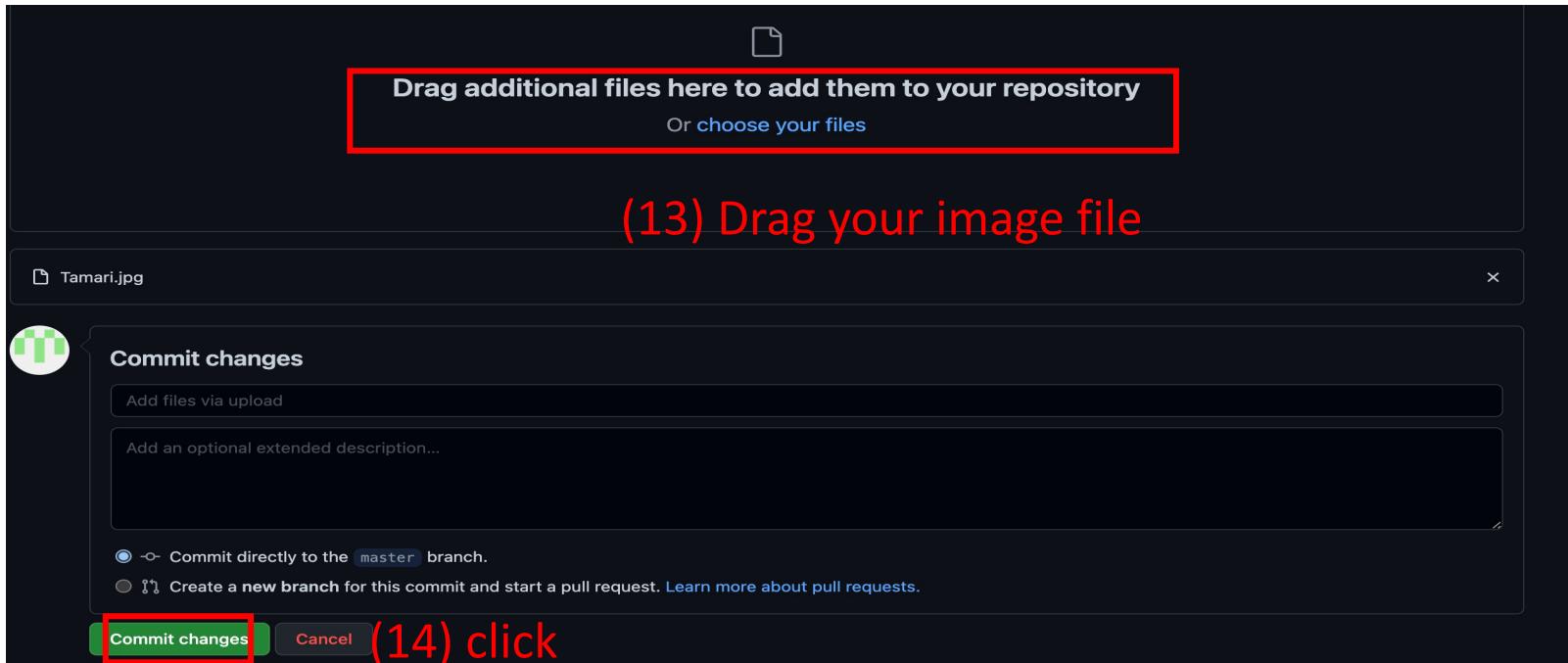
This is the front page of  
on GitHub pages. [GitHub](#)  
code and data stored in  
made to the repository  
created by Michael Ros  
have: publications, talks  
can fork [this repository](#)

This screenshot shows the 'files' section of a GitHub repository. It lists three items: 'assets' (updated fontawesome), 'files' (rename publications to files), and 'images' (Add files via upload). A red box highlights the 'images' folder. To the right, the text 'updated fontawesome', 'rename publications to files', and 'Add files via upload' are shown respectively.

(10) click

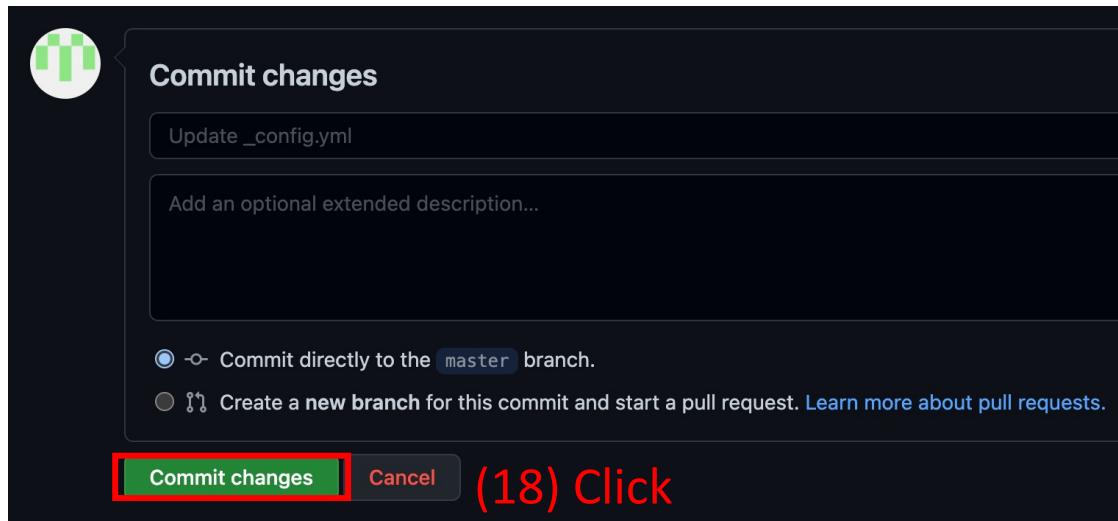
This screenshot shows the 'files' section of a GitHub repository. It lists three items: 'assets' (updated fontawesome), 'files' (rename publications to files), and 'images' (Add files via upload). A red box highlights the 'images' folder. To the right, there's a file upload interface with 'Go to file', 'Add file', 'Create new file', and 'Upload files' buttons. A red box highlights the 'Upload files' button. Below the interface, it says '(11) click'. At the bottom, it says '(12) Select "Upload files"'.

63a4648 on Feb 14, 2017 History



	_config.dev.yml	clone from staeiou.github.io	5 years ago
	<b>_config.yml</b> (16) click	update site URL, repo, and name	3 months ago
	package.json	clone from staeiou.github.io	5 years ago
	talkmap.ipynb	move talkmap.ipynb out of _talks	5 years ago
	talkmap.py	.py version of talkmap.ipynb	5 years ago

```
75  
80  
81 # Site Author  
82 author:  
83   name          : "Your Sidebar Name"  
84   avatar        : "Tamari.jpg" (17) Put your file name here  
85   bio           : "Your biography for the left-hand sidebar"  
86   location      : "Location"
```



## 2) Customize the template – Upload the PDF

The screenshot shows a GitHub repository interface. At the top, there's a navigation bar with links for Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. The 'Code' button is highlighted with a red box. Below the navigation bar, the repository name '(19) Click' is displayed. A status message indicates that the branch is 4 commits ahead of academicpages:master. On the right side, there are buttons for Go to file, Add file, and Code.

This branch is 4 commits ahead of academicpages:master.

(19) Click

Go to file Add file Code

This branch is 4 commits ahead of academicpages:master.

Contribute Fetch upstream

**norikotamari Merge pull request #1 from LucianoRogerio/patch-1** e72c289 7 hours ago 323 commits

Commit	Message	Date
_data	Test-pro	3 months ago
_drafts	clone from staeiou.github.io	5 years ago
_includes	Fix icons	3 years ago
_layouts	Fix a bug: Liquid does not allow parenthesis for logical operations.	3 years ago
_pages	New subtitle for the Introduction page	3 months ago
_portfolio	Update portfolio-2.html	5 years ago
_posts	Create 2199-01-01-future-post.md	4 years ago
_publications	modify examples to reflect output of new markdown_generator scripts	5 years ago
_sass	sidebar: Let avatar height vary	3 years ago
_talks	modify examples to reflect output of new markdown_generator scripts	5 years ago
_teaching	Update 2015-spring-teaching-2.md	5 years ago
assets	updated fontawesome	3 years ago
files	rename publications to files	5 years ago

(20) Click

(21) Click

This screenshot shows a GitHub repository page for 'norikotamari.github.io/files/'. The top navigation bar includes links for Code, Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. A dropdown menu for the 'master' branch is open, showing options like Go to file, Add file (with a red box around it), Create new file, and Upload files (also with a red box around it). Below the menu, a message states 'This branch is 4 commits ahead of academicpages:master.' The main content area displays a commit history with three files: paper1.pdf, paper2.pdf, and paper3.pdf, all committed by 'staeiou' and renamed 'publications to files' 5 years ago.

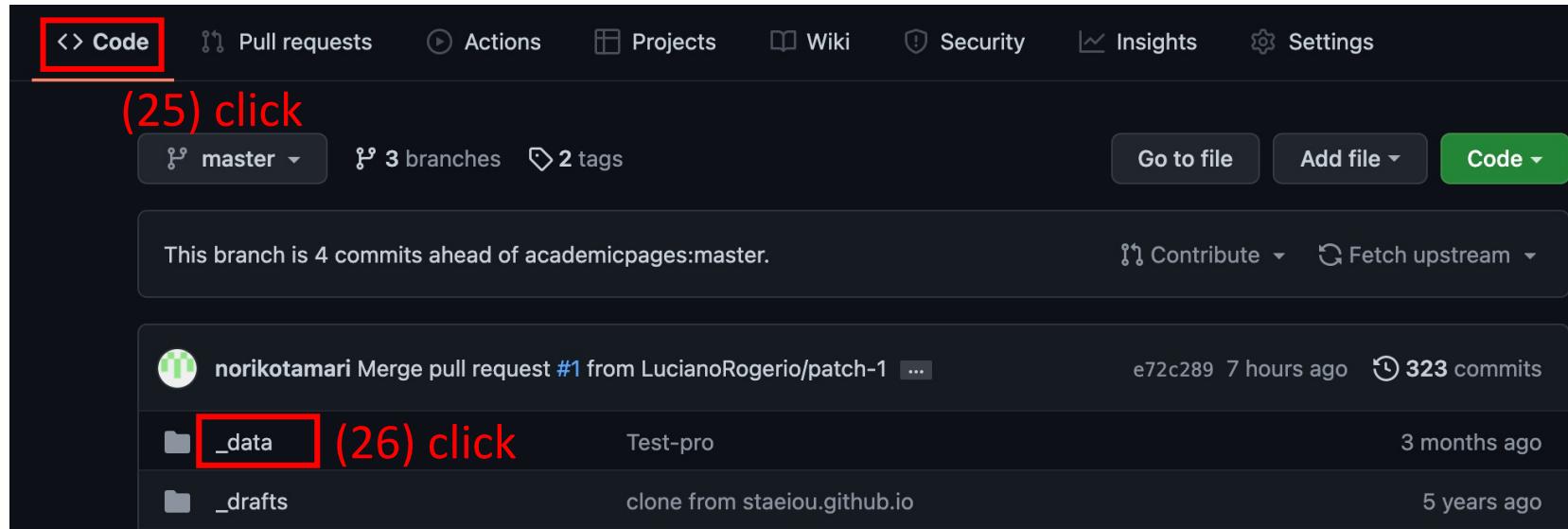
(22) Select “Upload files”

(23) Drag your image file

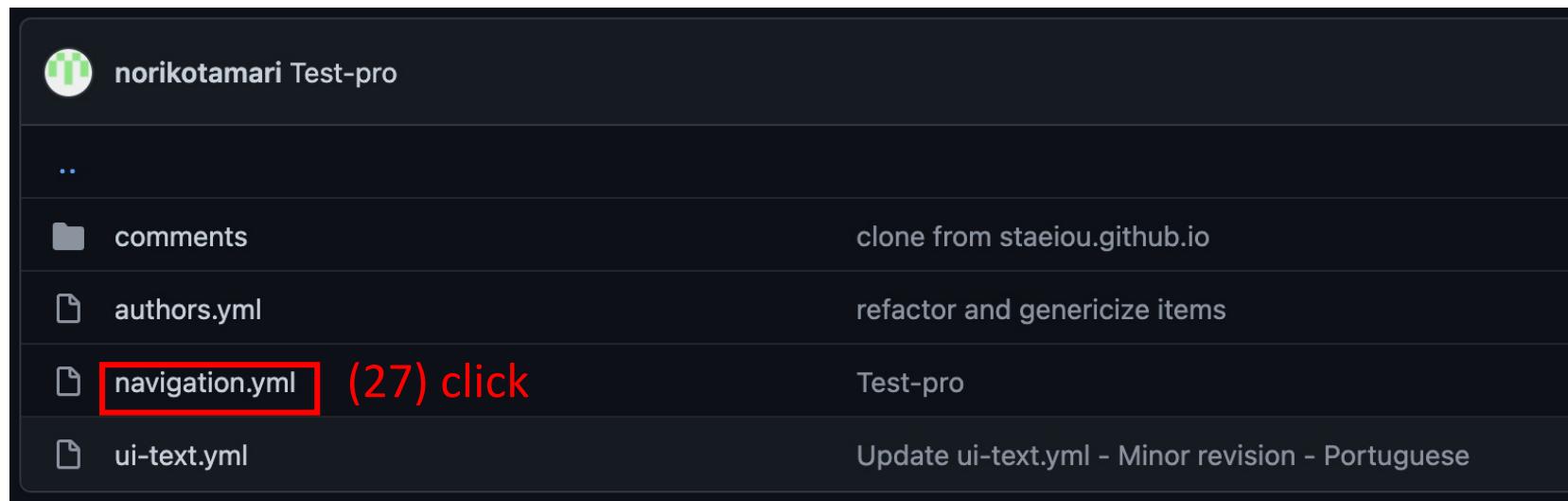
This screenshot shows the 'Commit changes' dialog for the same GitHub repository. It features a large central area with a red box around the text 'Drag additional files here to add them to your repository' and 'Or choose your files'. Below this, a file named 'Tamari.jpg' is listed. At the bottom of the dialog, there is a 'Commit changes' button with a red box around it, and a 'Cancel' button.

(24) click

### 3) Customize the template – Change the directory



The screenshot shows a GitHub repository page for the branch 'master'. The 'Code' tab is highlighted with a red box. Below it, the text '(25) click' is overlaid in red. The repository summary indicates 3 branches and 2 tags. A message states: 'This branch is 4 commits ahead of academicpages:master.' There are three commit cards: 1. norikotamari Merge pull request #1 from LucianoRogerio/patch-1 ... e72c289 7 hours ago 323 commits 2. \_data (26) click Test-pro 3 months ago 3. \_drafts clone from staeiou.github.io 5 years ago



The screenshot shows a GitHub repository page for the file 'navigation.yml'. The file is highlighted with a red box. Below it, the text '(27) click' is overlaid in red. The file content is shown as follows:

```
norikotamari Test-pro
..
comments clone from staeiou.github.io
authors.yml refactor and genericize items
navigation.yml (27) click Test-pro
ui-text.yml Update ui-text.yml - Minor revision - Portuguese
```

22 lines (16 sloc) | 350 Bytes

Raw Blame ⌂ ⌂ ⌂



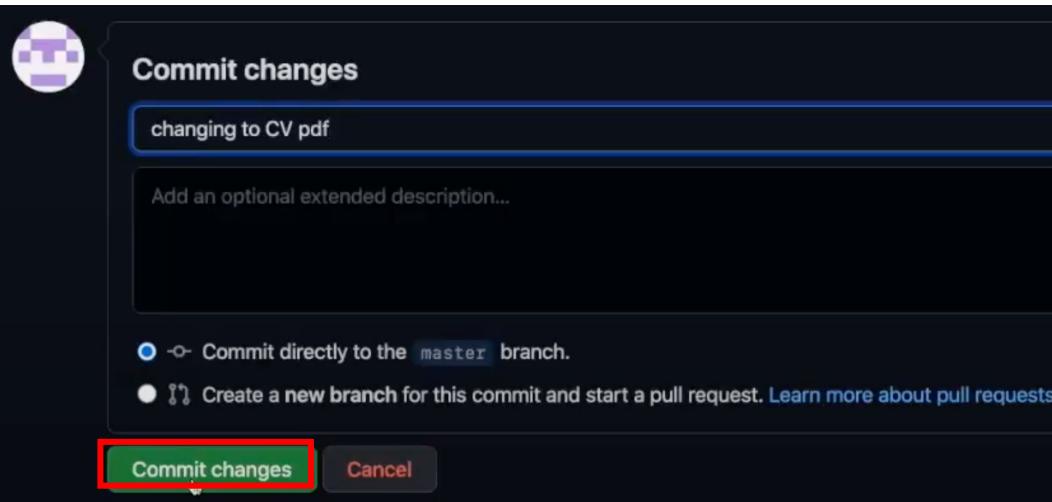
(28) click

```
1 # main links links
2 main:
3   - title: "Publications"
4     url: /publications/
5
6   - title: "Talks"
7     url: /talks/
8
9   - title: "Teaching"
10    url: /teaching/
11
12  - title: "Cool Project"
13    url: /Test-Pro/
14
15  - title: "Blog Posts"
16    url: /year-archive/
17
18  - title: "CV"
19    url: /cv/
```

17  
18 - title: "CV"  
19 url: /files/cv.pdf

(29) Change the directory

File name



(30) click

More information:

- CyVerse.org <https://youtu.be/o59w3AF8ImQ?t=2270s>
- Original template (<https://academicpages.github.io/>) > “Guide”

The screenshot shows a website interface. At the top, there is a navigation bar with links: Your Name / Site Title, Publications, Talks, Teaching, Portfolio, Blog Posts, CV, and Guide. The 'Guide' link is highlighted with a red box and a red arrow points from the 'Guide' link in the list above to this red box. Below the navigation bar is a sidebar with a placeholder profile picture and the text 'Your Sidebar Name'. Underneath this are social media links: Location (location pin icon), Twitter (Twitter bird icon), Github (GitHub octocat icon), Google Scholar (book icon), PubMed (PubMed logo icon), and ORCID (ORCID ID icon). The main content area contains a section titled 'Markdown' and another titled 'Locations of key files/directories'. The 'Locations of key files/directories' section is also enclosed in a red box and has a red arrow pointing from the 'Locations of key files/directories' link in the list above to it. The content within this section is a bulleted list of file and directory locations.

## Markdown

### Locations of key files/directories

- Basic config options: \_config.yml
- Top navigation bar config: \_data/navigation.yml
- Single pages: \_pages/
- Collections of pages are .md or .html files in:
  - \_publications/
  - \_portfolio/
  - \_posts/
  - \_teaching/
  - \_talks/
- Footer: \_includes/footer.html
- Static files (like PDFs): /files/
- Profile image (can set in \_config.yml): images/profile.png

# 6. What is a Jupyter notebook on Google Colab?

- **Jupyter notebook:**
  - web-based interactive development environment
  - Combine notebooks, code, and data
- **Colab:**
  - Write and execute **Python/R** code through the browser
  - A hosted Jupyter notebook service
  - No require the download to use
  - Free access

The screenshot shows the Google Colab interface. At the top, there are two tabs: "COVID WATCH app" (highlighted with a red box) and "Markdown". Below the tabs, a code cell contains R code for generating a bar plot. The code is as follows:

```
table(z$age2)
table(z$Q2.2)

par(mfrow=c(1, 1), mar=c(4, 4, 4, 4))
pQ2.2_age2<-prop.table(table(z$Q2.2, z$age2), margin = 2) * 100
barplot(pQ2.2_age2,
        main = "Idea for the state to adopt COVID watch",
        xlab = "Age",
        col=rev(cm.colors(5)),
        legend=TRUE,
        args.legend = list(x = "topright", bty = "n", inset=c(-0.15, 0)),
        beside = TRUE)
```

To the right of the code cell, the word "code" is written in red. Below the code cell, the output section displays a bar chart titled "Idea for the state to adopt COVID watch". The chart shows the percentage of responses for five age groups (18-34, 35-44, 45-59, 60-74, 75+) across five categories: Great idea, Good idea, Neither, Bad idea, and Very bad idea. The "Neither" category is represented by light gray bars, while the other four categories are represented by colored bars (Great idea: pink, Good idea: purple, Bad idea: teal, Very bad idea: light blue). The "output" word is written in red next to the chart.

Age Group	Great idea (%)	Good idea (%)	Neither (%)	Bad idea (%)	Very bad idea (%)
18-34	27	37	27	5	3
35-44	29	30	25	5	3
45-59	27	34	23	8	7
60-74	23	33	31	7	7
75+	20	37	30	3	6

<https://research.google.com/colaboratory/faq.html>

# 7. How to use a Jupyter notebook on Google Colab

## R in Google Colab

- 1) Go to this URL: <https://colab.to/r>
- 2) Set up to insert the dataset from Google Drive

Use the codes in the URL below:

- <https://towardsdatascience.com/access-google-drive-using-google-colab-running-an-r-kernel-3736db7835>
- <https://towardsdatascience.com/how-to-use-r-in-google-colab-b6e02d736497>

# *The codes for the set up (1)*

```
R.version.string  
print(installed.packages())  
  
# Check if is running in Colab and redefine is_interactive()  
if (file.exists("/usr/local/lib/python3.7/dist-packages/google/colab/_ipython.py")) {  
  install.packages("R.utils")  
  library("R.utils")  
  library("httr")  
  my_check <- function() {return(TRUE)}  
  reassessInPackage("is_interactive", pkgName = "httr", my_check)  
  options(rlang_interactive=TRUE)  
}  
# If ts not available we need to install . put other packages if you need.  
packages <- c("googledrive", "googlesheets4")  
if (length(setdiff(packages, rownames(installed.packages()))) > 0) {  
  install.packages(setdiff(packages, rownames(installed.packages())))  
}  
  
library("googledrive")  
library("googlesheets4")  
install.packages("httpuv")  
library("httpuv")
```

# *The codes for the set up (2)*

```
drive_auth(use_oob = TRUE, cache = FALSE)
```

```
drive_auth(use_oob = TRUE, cache = FALSE)

Please point your browser to the following 1.click
https://accounts.google.com/o/oauth2/auth?client\_id=41AX4XfWim30a5SsujAVtSw8IlgMc\_6ZRkr7gmfWoQy&redirect\_uri=https://www.google.com/&response\_type=code&scope=https://www.googleapis.com/auth/drive

Enter authorization code: 2.yosJfbezScDJm6Tyzbd
```

3. paste

Google

Sign in

2. copy

Please copy this code, switch to your application and paste it there:

4/1AX4XfWim30a5SsujAVtSw8IlgMc\_6ZRkr7gmfWoQy



```
x <- drive_get("~/D_cleaned_20210727.csv")
drive_download(x) Data File name
```

```
z <- read.csv("/content/D_cleaned_20210727.csv")
head(z) Data File name
```

## 8. Future direction

- Learn more about Git and GitHub
- Use Git, GitHub and Jupyter notebook in my research project
- Share the basic knowledge with my collaborators

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