

Introduction to Git & GitHub

Terminal, RStudio

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AG Landscape Ecology

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Why Git?

- Version control software
- Modern software development
 - most R-packages
- Git is the **software**
- GitHub is the **platform**



Other Platforms

- GitLab: <https://about.gitlab.com>
- BitBucket: <https://bitbucket.org>

Install Git

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

On Linux Ubuntu

```
sudo apt update  
sudo apt install git-all
```

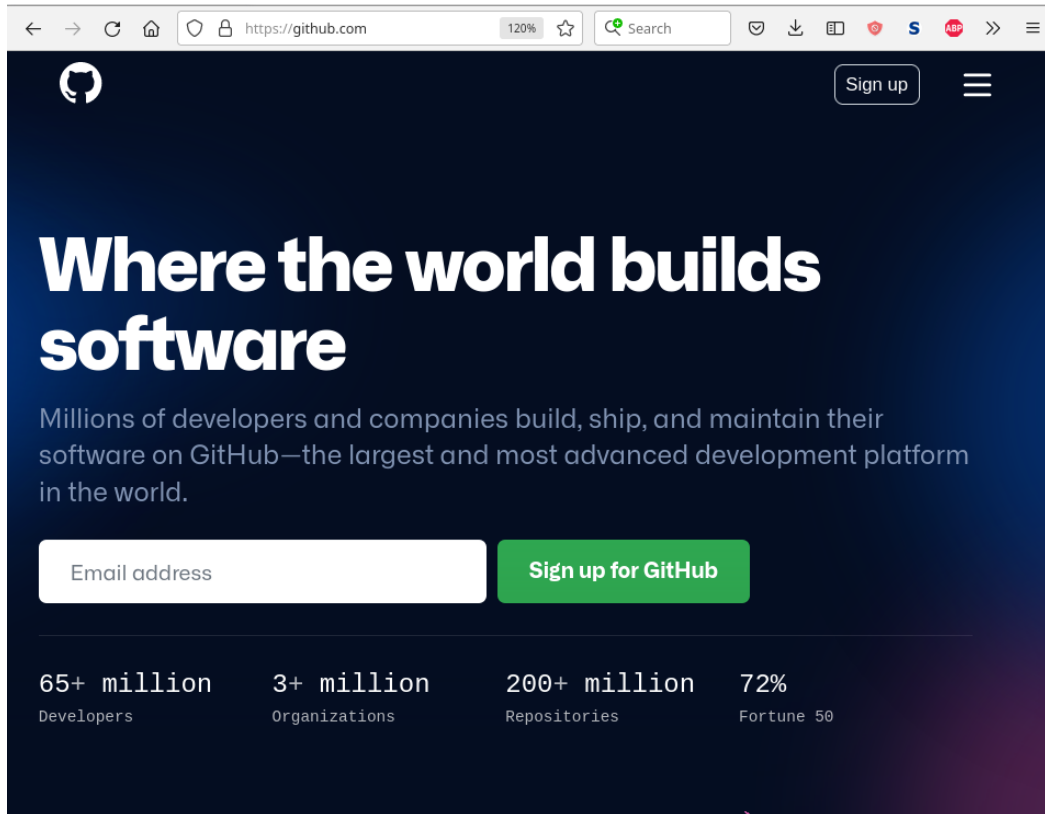
On windows

Download manually

Setup Local Git Repository

```
cd my_root_directory  
git init
```

Create a GitHub account



The screenshot shows the GitHub homepage in a web browser. The browser's address bar displays "https://github.com" with a 120% zoom level and a search bar. The GitHub logo is in the top left, and a "Sign up" button is in the top right. The main heading reads "Where the world builds software". Below this, a paragraph states: "Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world." A sign-up form is centered, featuring a white input field labeled "Email address" and a green "Sign up for GitHub" button. At the bottom, four statistics are listed: "65+ million Developers", "3+ million Organizations", "200+ million Repositories", and "72% Fortune 50".

https://github.com 120% Search

Sign up

Where the world builds software

Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world.

Email address Sign up for GitHub

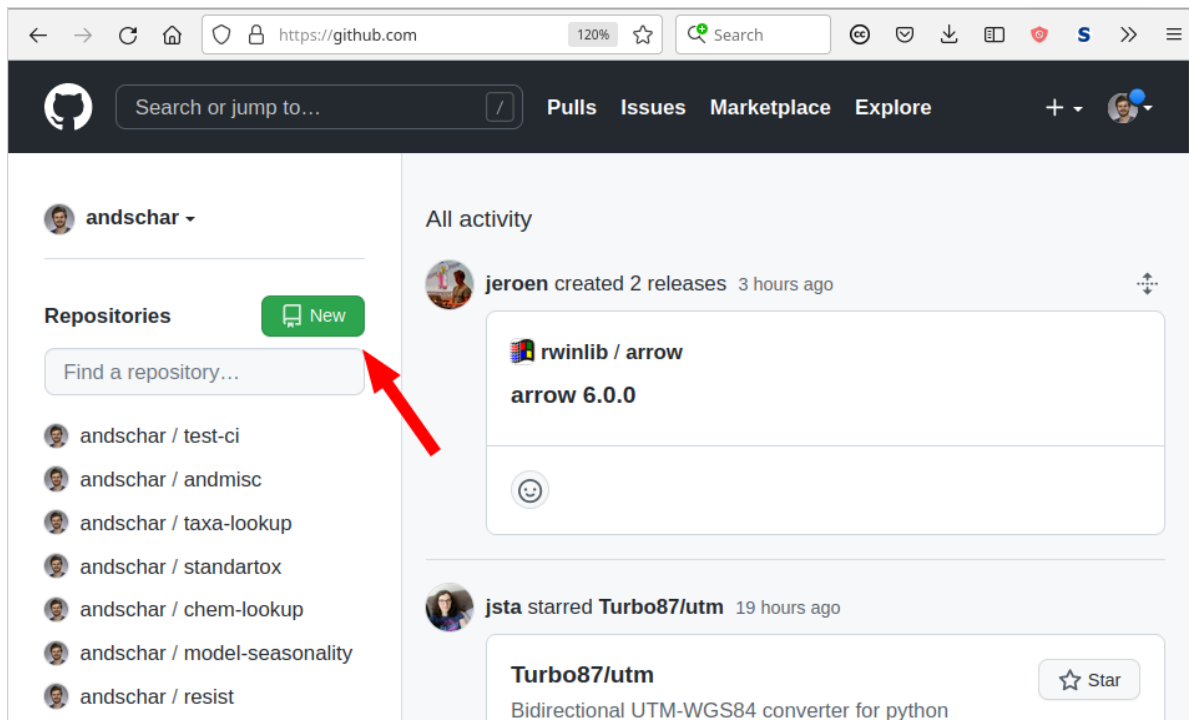
65+ million Developers	3+ million Organizations	200+ million Repositories	72% Fortune 50
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Create (initialize) repository

Locally

```
git init
```

Remote



The screenshot shows the GitHub homepage. The left sidebar contains the user profile 'andschar' and a 'Repositories' section. In the 'Repositories' section, there is a green 'New' button with a computer icon. Below it is a search bar labeled 'Find a repository...'. A red arrow points to this search bar. Below the search bar is a list of repositories owned by 'andschar':

- andschar / test-ci
- andschar / andmisc
- andschar / taxa-lookup
- andschar / standartox
- andschar / chem-lookup
- andschar / model-seasonality
- andschar / resist

The main content area shows 'All activity'. The first activity item is 'jeroen created 2 releases 3 hours ago', which includes a card for 'rwinlib / arrow' with the version 'arrow 6.0.0'. The second activity item is 'jsta starred Turbo87/utm 19 hours ago', which includes a card for 'Turbo87/utm' with the description 'Bidirectional UTM-WGS84 converter for python' and a 'Star' button.

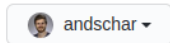
Create (initialize) repository

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere?

[Import a repository.](#)

Owner *



Repository name *

/

Great repository names are short and memorable. Need inspiration? How about **psychic-invention**?

Description (optional)



Public

Anyone on the internet can see this repository. You choose who can commit.



Private

You choose who can see and commit to this repository.

Initialize this repository with:

Skip this step if you're importing an existing repository.



Add a README file

This is where you can write a long description for your project. [Learn more.](#)



Add .gitignore

Choose which files not to track from a list of templates. [Learn more.](#)



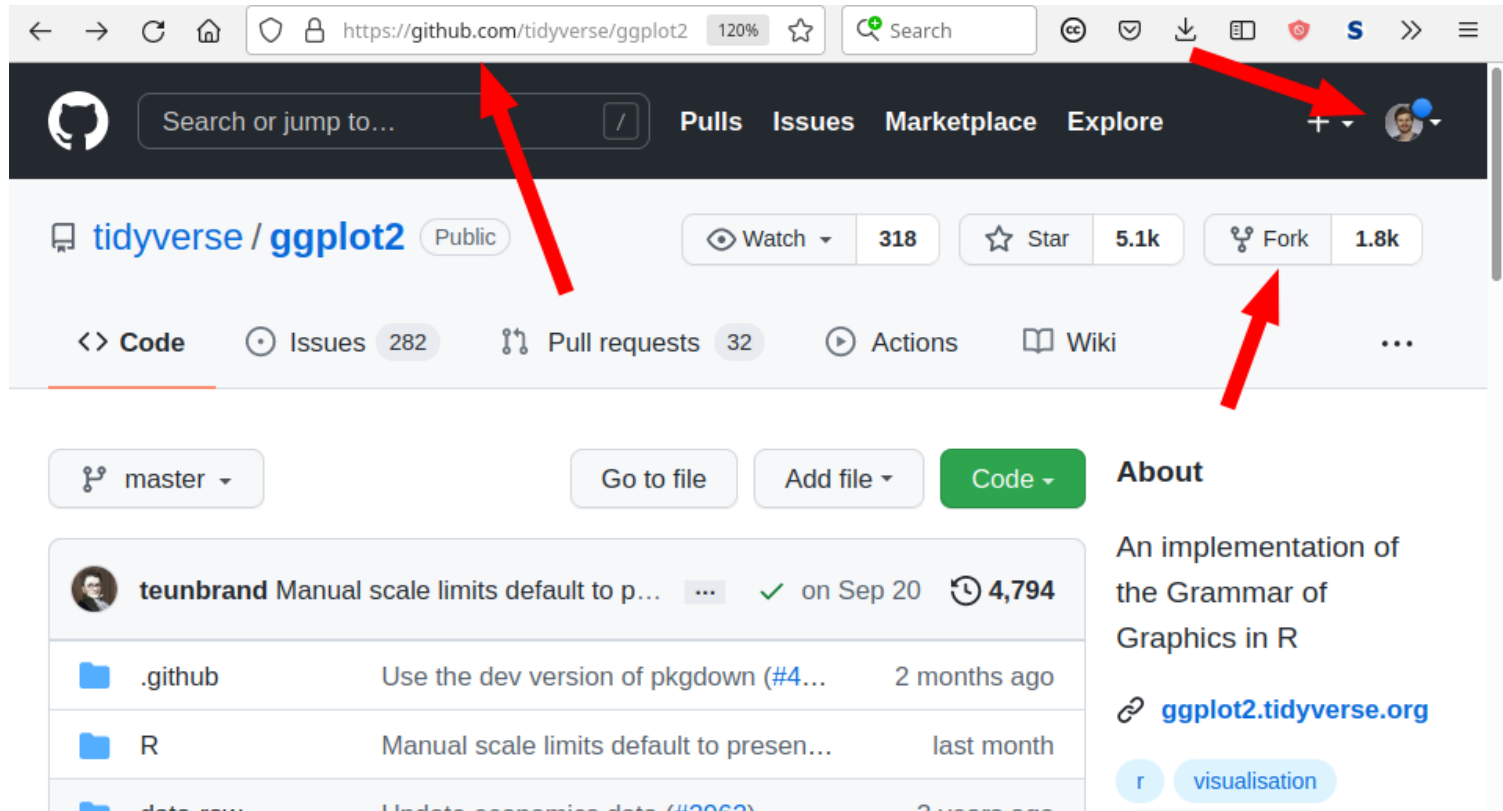
Choose a license

A license tells others what they can and can't do with your code. [Learn more.](#)

Create repository

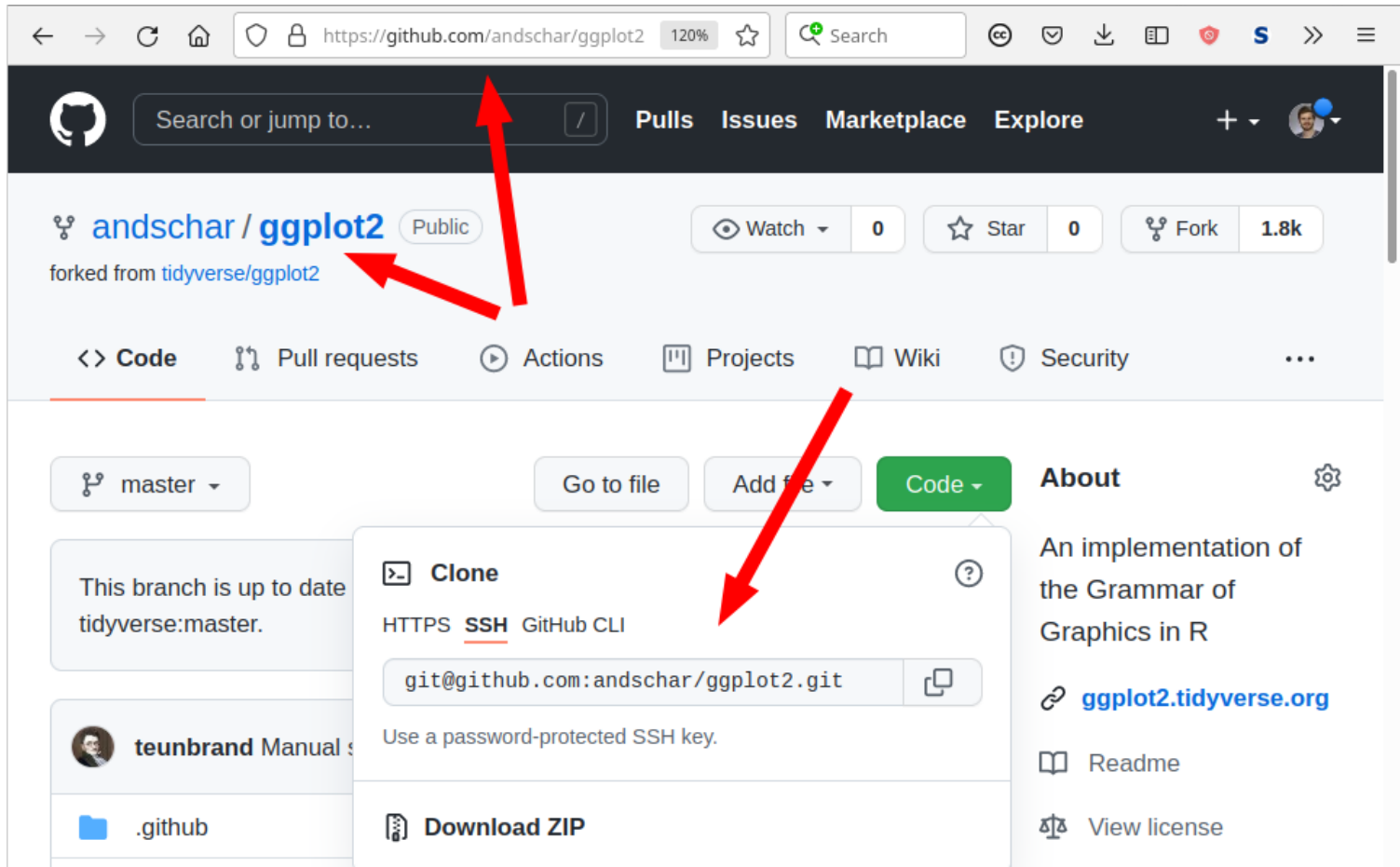
Fork a repository

- Fork someone's repo to your GitHub account



Clone a repository

- Clone **your** fork (i.e. version) to your local machine

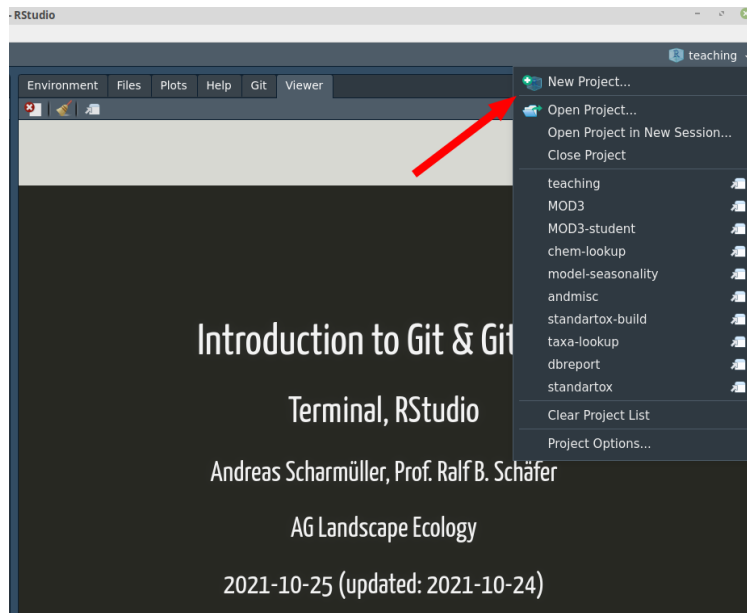


Clone a repository

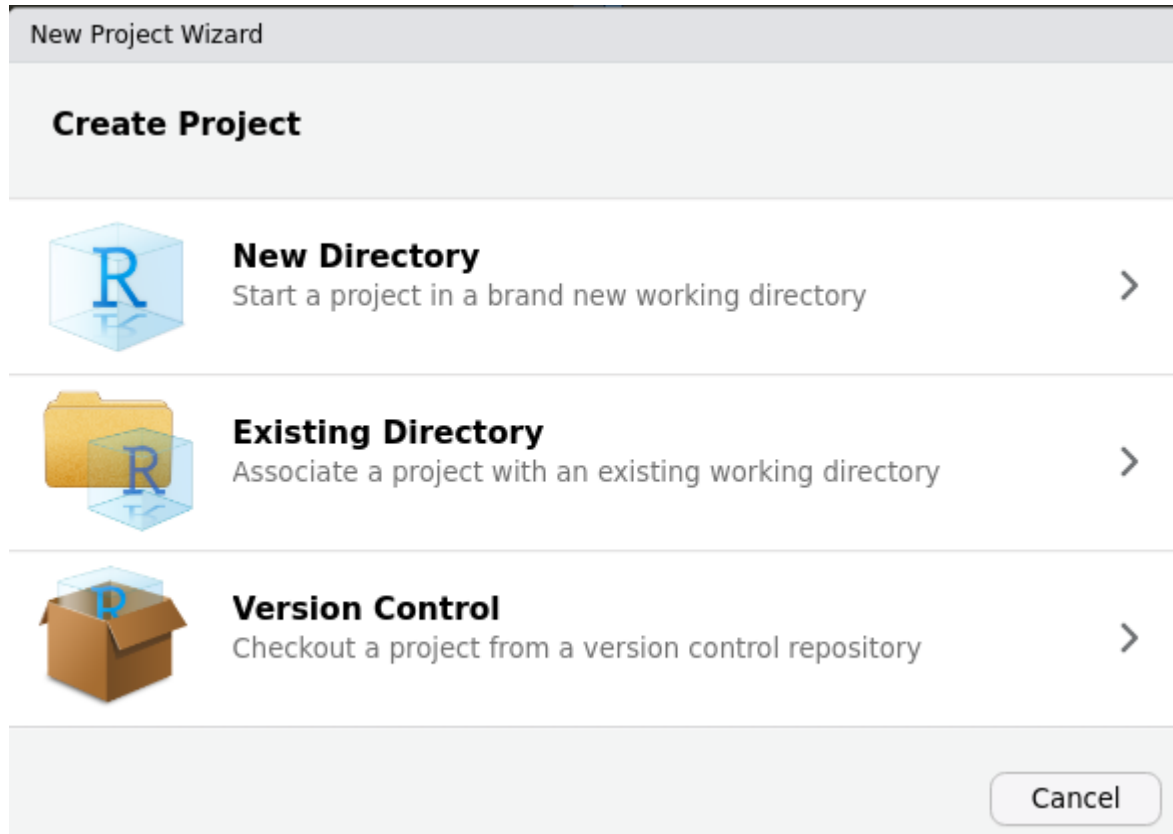
Command line

```
cd Projects  
git clone git@github.com:andschar/MOD3.git # SSH  
git clone https://github.com/andschar/MOD3.git # HTTPS
```

RStudio




RStudio



RStudio

New Project Wizard

Back **Clone Git Repository**



Repository URL:

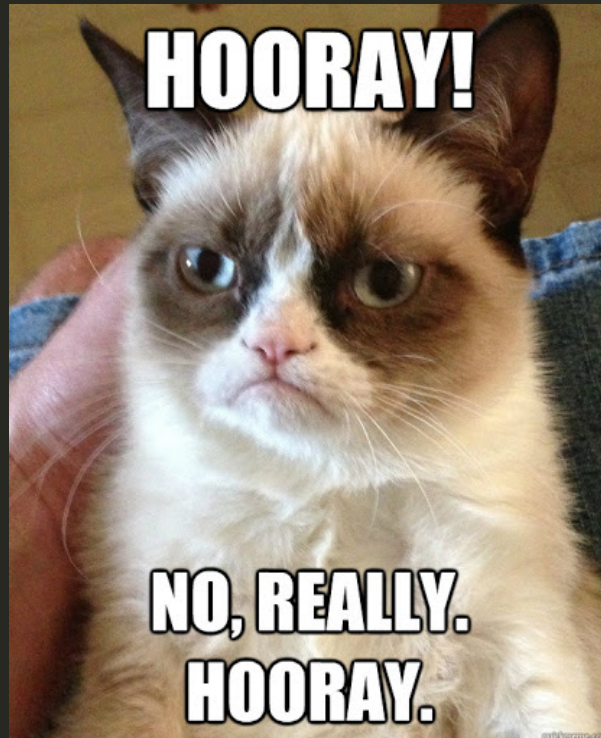
Project directory name:

Create project as subdirectory of:
 Browse...

☐ Open in new session

Create Project **Cancel**

First repository (i.e. fork) !!



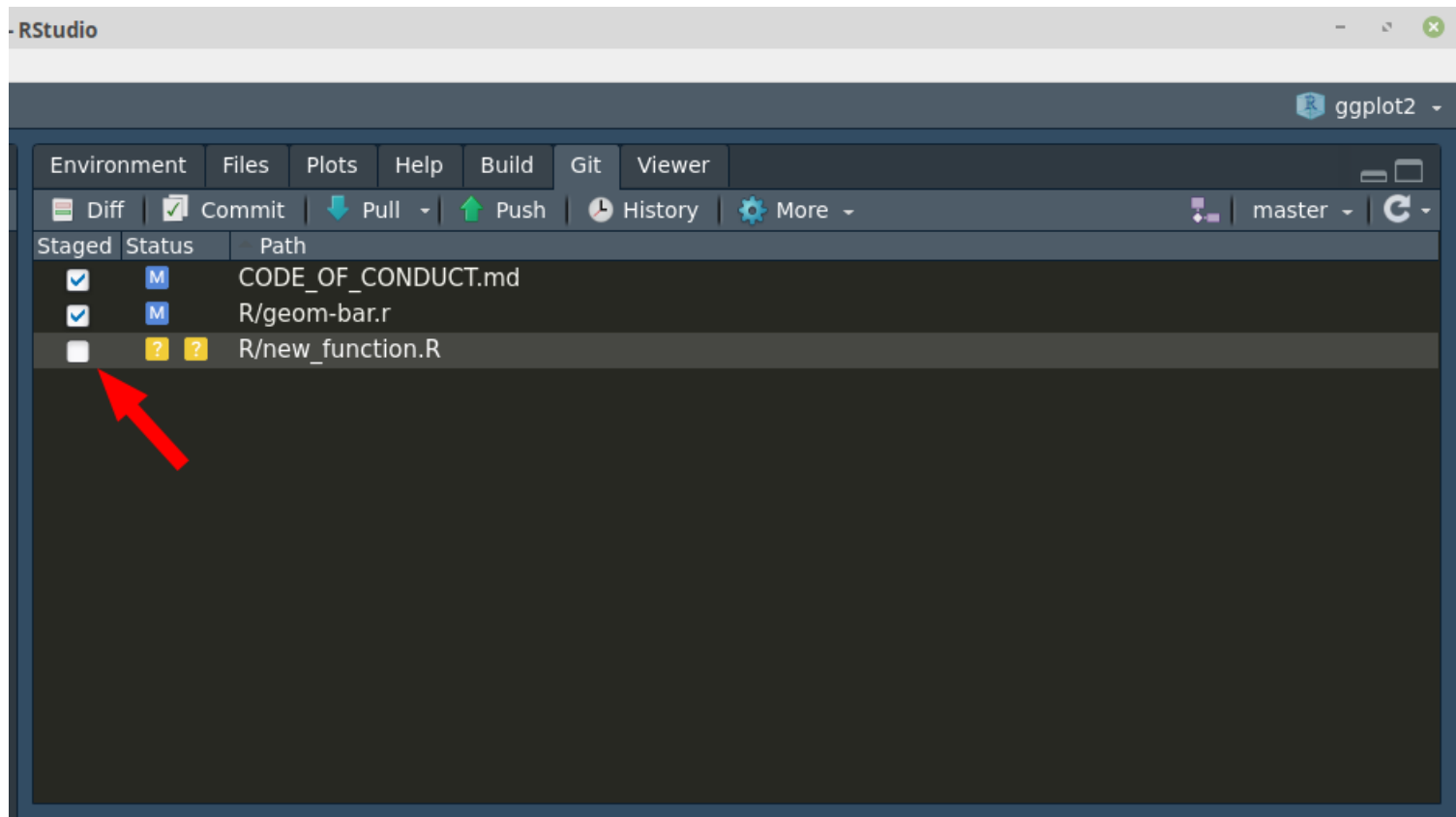
Local changes

Make changes to the .txt, .R, .python or to whatever file...



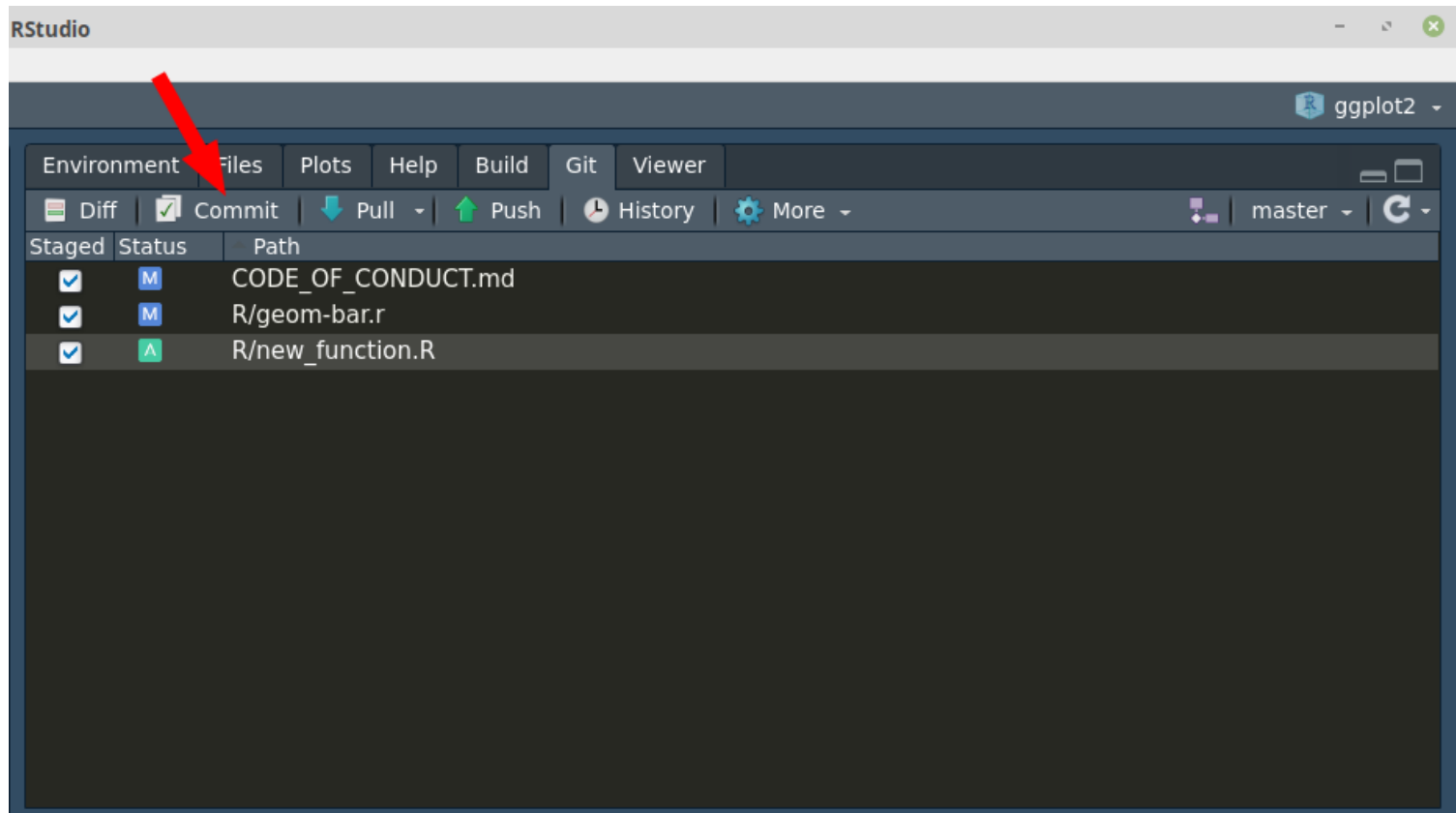
Stage your changes

```
git add file.txt  
git add *.txt  
git add -A
```



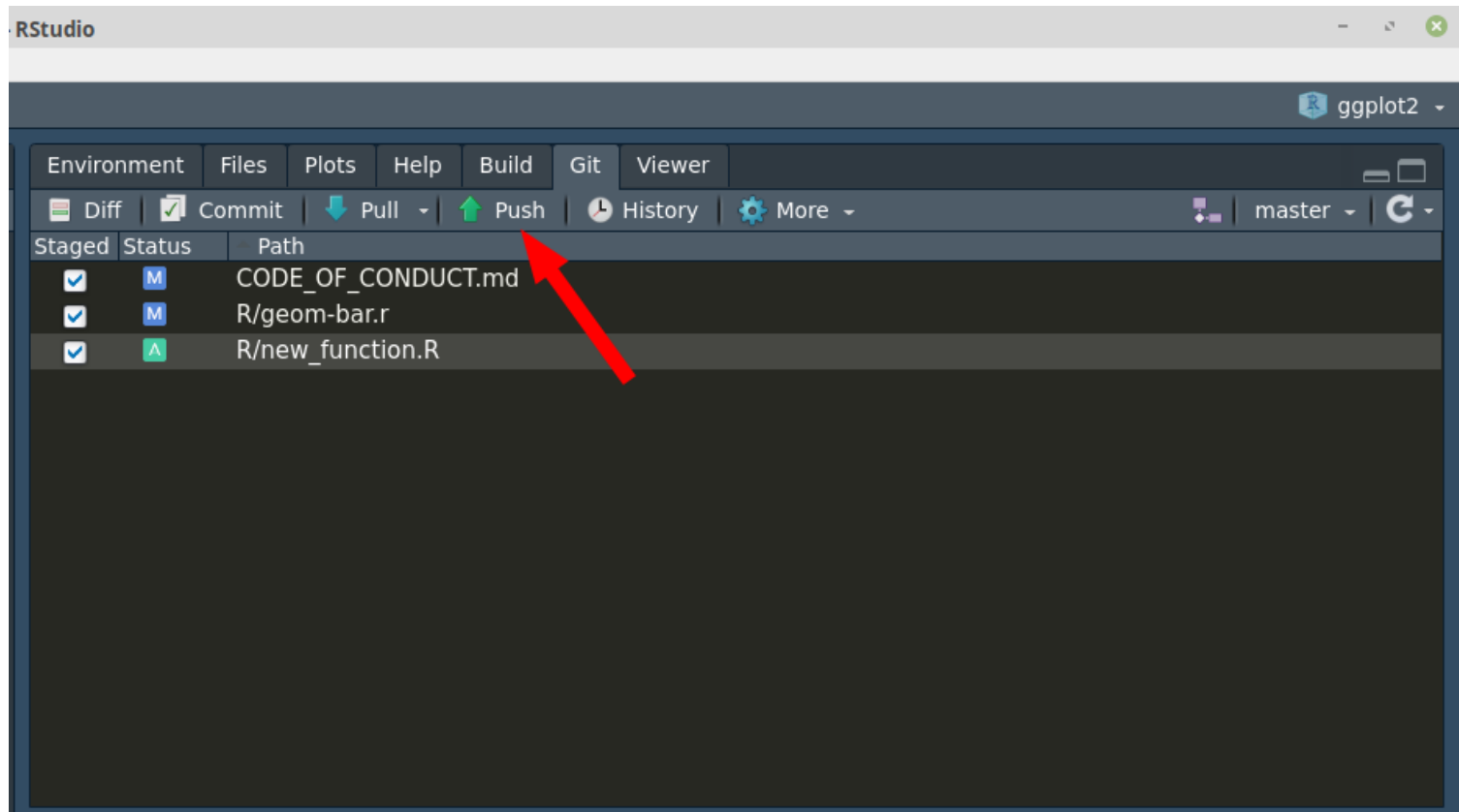
Commit changes

```
git commit -m 'Patch-1'
```



Push to your repo (origin)

```
git push origin master  
git push origin main
```



Pull Request

From your main branch to the remote main branch

The screenshot shows the GitHub interface for the repository `andschar / ggplot2`, which is a public fork of `tidyverse/ggplot2`. The repository is currently on the `master` branch, which is 1 commit ahead of the upstream `tidyverse:master`. A red arrow points to the text "This branch is 1 commit ahead of tidyverse:master." Another red arrow points to the "Open pull request" button in a tooltip that appears when hovering over the status message. The tooltip also contains the text "This branch is 1 commit ahead of tidyverse:master. Open a pull request to contribute your changes upstream." The repository's file list shows folders for `.github`, `R`, and `data-raw`. The commit history on the right shows 4,795 commits, with the most recent commit made 2 minutes ago.

andschar / ggplot2 (Public)
forked from tidyverse/ggplot2

<> Code Pull requests Actions Projects Wiki Security Insights Settings

master 51 branches 34 tags Go to file Add file Code

This branch is 1 commit ahead of tidyverse:master. Contribute Fetch upstream

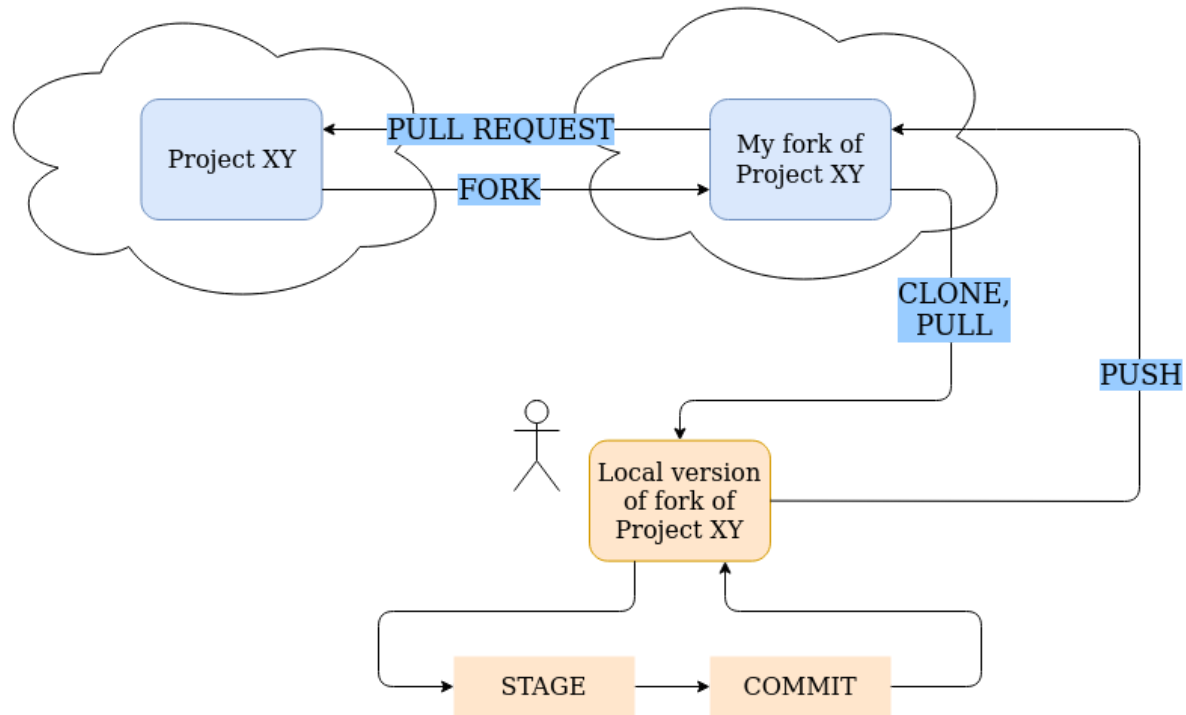
andschar Patch-1

.github Use the
R Patch-1
data-raw Update

This branch is 1 commit ahead of tidyverse:master.
Open a pull request to contribute your changes upstream.
Open pull request

ago 4,795 commits
2 months ago
2 minutes ago
3 years ago

Git/Github Workflow



Git/Github Workflow

1. Create or Fork a repo
2. Clone the repo to local machine
3. Local changes
4. Stage (i.e. add) & Commit changes to Git tree
5. Push to origin
6. Create a Pull-Request against the remote repository

Branches

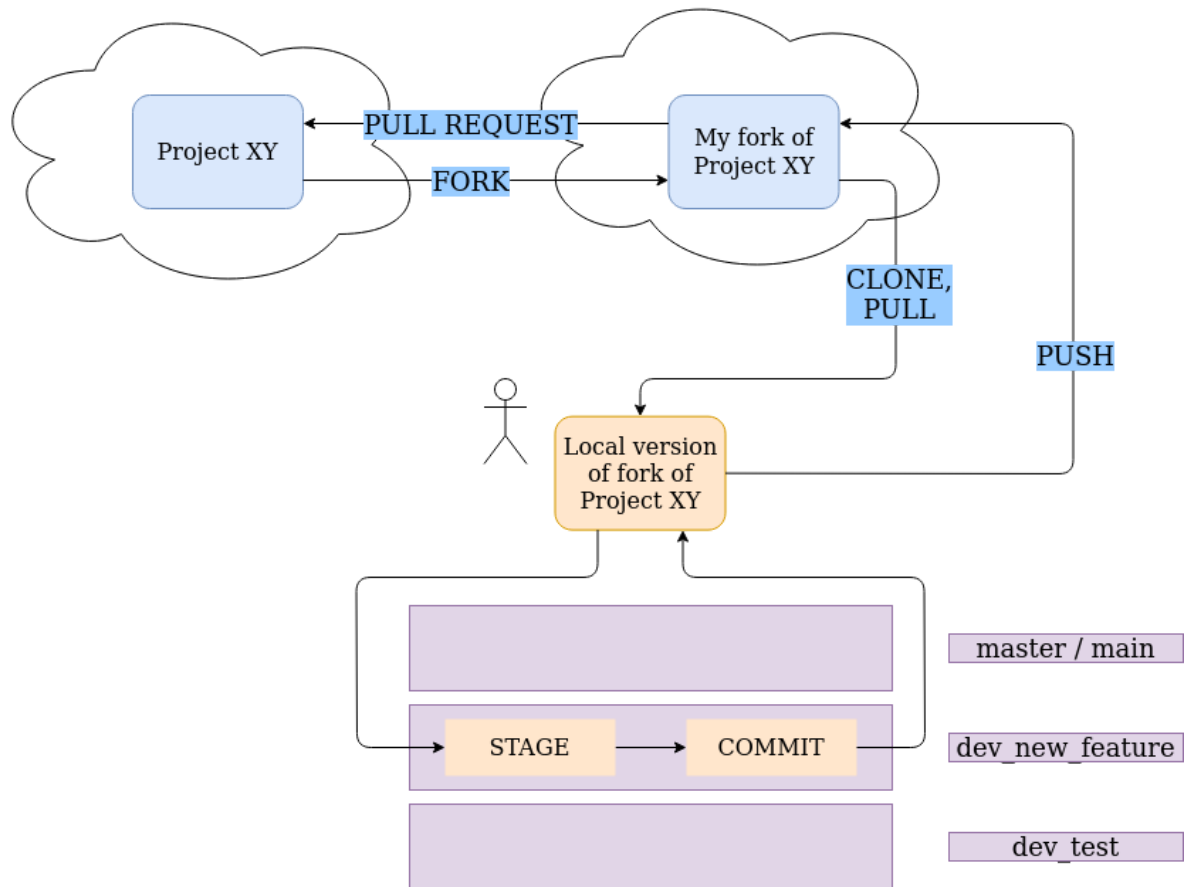


Branch

Create/Switch Branch

```
git checkout -b dev_new_feature  
git checkout master  
git status  
git branch
```

Branch



Branch

Merge Branch

```
git checkout master  
git merge dev_new_feature
```

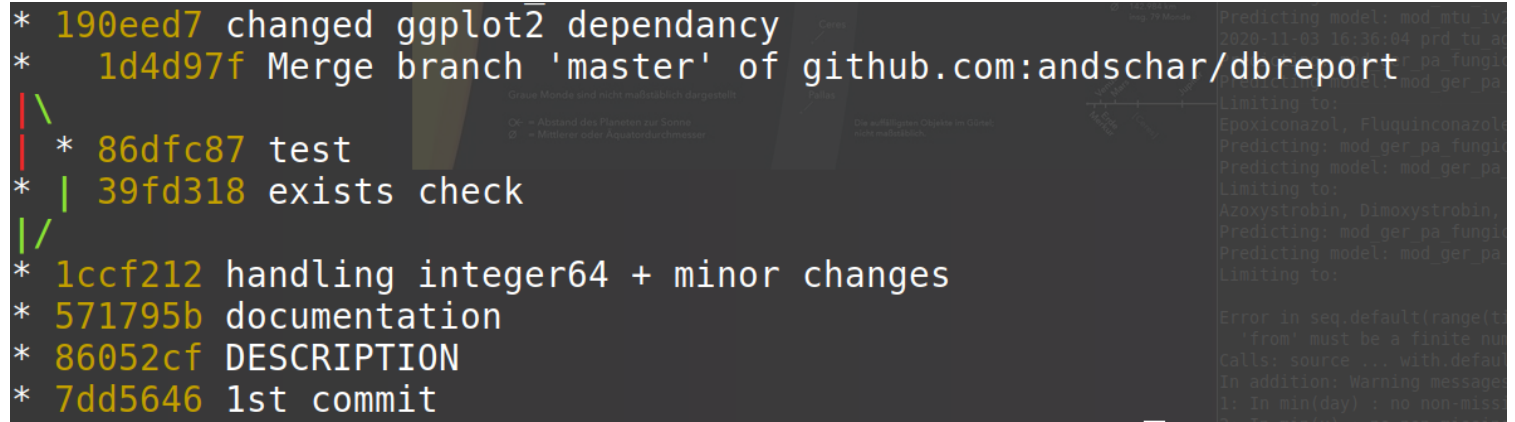
Branch

Merge example

First 8 commits of my R-package repo: **andschar/dbreport**

```
git log --all --decorate --oneline --graph
```

```
* 190eed7 changed ggplot2 dependancy
* 1d4d97f Merge branch 'master' of github.com:andschar/dbreport
| \
| * 86dfc87 test
| * | 39fd318 exists check
|/
* 1ccf212 handling integer64 + minor changes
* 571795b documentation
* 86052cf DESCRIPTION
* 7dd5646 1st commit
```



Branch

Pull / Merge Request

From your dev_XXX branch to a new remote dev_XXX branch

The screenshot shows the GitHub interface for the repository 'andschar/ggplot2'. The browser address bar shows the URL 'https://github.com/andschar/ggplot2'. The repository is public and forked from 'tidyverse/ggplot2'. The main navigation bar includes links for Code, Pull requests, Actions, Projects, Wiki, Security, Insights, and Settings. A yellow banner at the top indicates that the 'dev_new_feature' branch has recent pushes less than a minute ago, with a green 'Compare & pull request' button. Below this, the current branch is 'master', which is 1 commit ahead of 'tidyverse:master'. The commit history shows three commits: 'Patch-1' (32a6a15, 8 minutes ago, 4,795 commits), 'Use the dev version of pkgdown (tidyverse#4543)' (2 months ago), and 'Update economics data (tidyverse#2962)' (3 years ago). Two red arrows point to the 'dev_new_feature' branch name and the 'Compare & pull request' button.

dev_new_feature had recent pushes less than a minute ago [Compare & pull request](#)

master 51 branches 34 tags [Go to file](#) [Add file](#) [Code](#)

This branch is 1 commit ahead of tidyverse:master. [Contribute](#) [Fetch upstream](#)

andschar Patch-1 32a6a15 8 minutes ago 4,795 commits

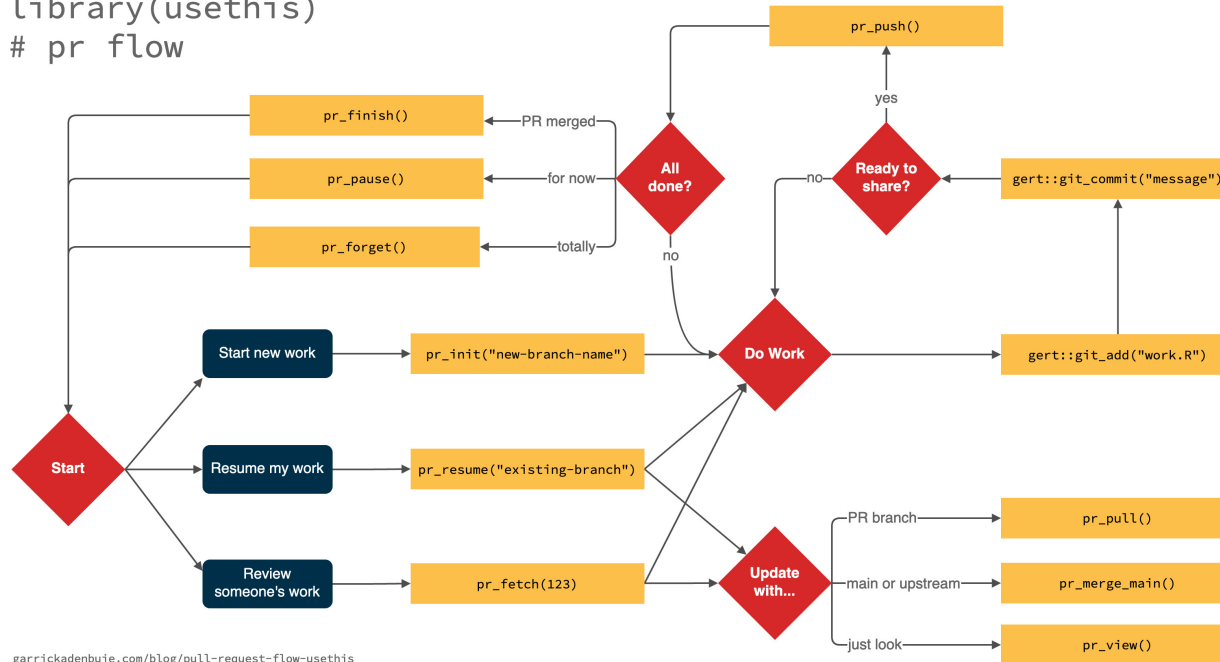
.github	Use the dev version of pkgdown (tidyverse#4543)	2 months ago
R	Patch-1	8 minutes ago
data-raw	Update economics data (tidyverse#2962)	3 years ago

R solutions

{usethis} & {gert} package

```
gert::git_commit()  
usethis::pr_pull()  
usethis::pr_push()
```

```
library(usethis)  
# pr flow
```

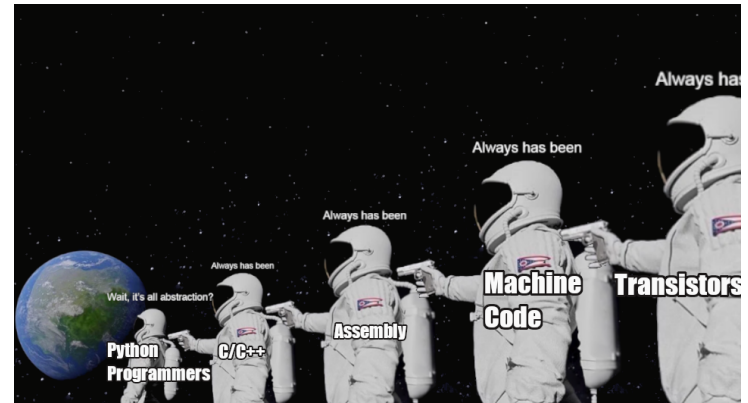


[garrickadenbuie.com/blog/pull-request-flow-usethis](https://www.garrickadenbuie.com/blog/pull-request-flow-usethis)

{usethis} & {gert} package

```
gert::git_commit()  
usethis::pr_pull()  
usethis::pr_push()
```

- Convenience **wrapper** around git
- Advantage:
 - Easier to use
- Disadvantage:
 - More software to maintain
 - Might break something in the future
 - You might not always use R in your career





Material

- OpenOlat
- StackOverflow
- YouTube
- <https://guides.github.com/activities/hello-world>
- <https://support.rstudio.com/hc/en-us/articles/200532077-Version-Control-with-Git-and-SVN>
- <https://ohshitgit.com>
- <https://www.garrickadenbuie.com/blog/pull-request-flow-use-this>

Made with

- <https://github.com/rstudio/rmarkdown>
- <https://github.com/yihui/knitr>
- <https://github.com/yihui/xaringan>

Task RMarkdown & Git

- **Fork** the MOD3 test repo: <https://github.com/andschar/MOD3>
- **Clone** the repo to your local machine
- Create a new branch named dev_YOURSURNAME
- Change the file *task.Rmd* according to the steps described in the file
- Create (i.e. knit) a .html out of the .Rmd file
- **Stage & Commit** both files in the new branch
- **Push** your local changes to your repo (HINT: this might cause some trouble ;))
- Create a **Pull Request** against my original repo

Introduction to Git & GitHub

Thank you for your attention

Slides: <https://andschar.github.io/teaching/GIT>

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