Intro to Git for Version Control

Hunter Wade York

06/10/2022

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- Rising third-year PhD student in Sociology at Princeton, Office of Population Research Affiliate

Me!

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- Interests: Stratification, culture, quant

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  - There are a lot of tutorials out there that won't be useful to you because they primarily teach the collaborative part of git as opposed to the version control part of git. This collaborative part is what holds up entire tech platforms: facebook, google, etc. all use a version of git.
- If you have questions or want a demonstration during the presentation, STOP ME! No question is too simple, and I can do a few examples on the fly.

Useful Links/Resources

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- GUIs for Macs; Windows; and a tutorial for RStudio's built-in client
- This presentation! (Will be on my Github and Xi Song will circulate)

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- In this presentation, there will be some repos that still use the old terminology because they were initiated before the change.
- Some borrowed material may also make the slight.
- Github gives you instructions for making your default "main" when you create a new repo, and it's easy in Git as well.

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  - Backtracking, branching (Single User)
  - Collaboration/tweaking an existing project (Mulitple Users)

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  - To check open Terminal/Command Line and type "git"
- Software is available here
- Git can be used in the terminal or with some GUIs (linked earlier). I little/no experience with these.

Git

Why use git?

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- It is explicit in a way that dropbox/automatic versioning is not.
  - Alternatives have no potential for branching structure or intentional cooperation.

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Why not to use git?

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- Hard to troubleshoot if you're not a pro.
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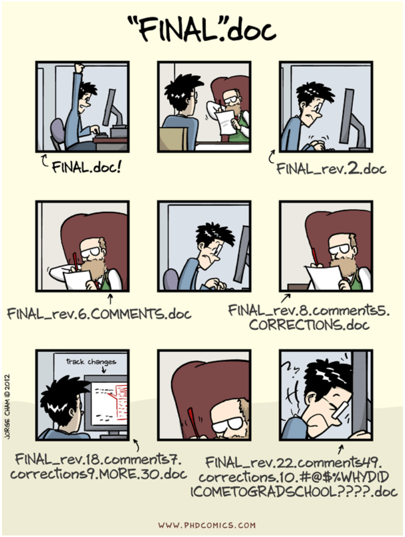
  - Stackexchange is your friend!

Why use git?



www.phdcomics.com

What is Github?

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- Built in GUI (Graphical user interface)
- Allows permanent record of code (for publishing papers for example)

GitHub

Github!

Questions?

Before you use git, a note on Projects

Project-based design

- Knowing where your files are allows you to spend more time doing what's important: writing code!

Faizal Rosly
@ijaicool

After watching one episode of Tidying Up with Marie Kondo on Netflix:

Organize!

Project-based design

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    - Allows you to easily publish code for pubs!

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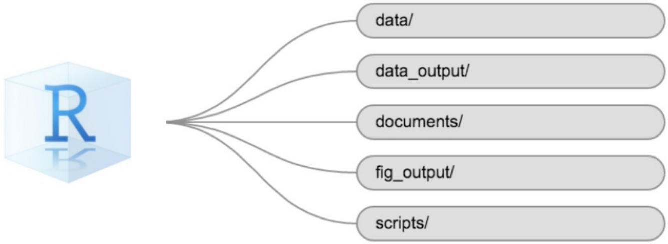
- I almost always start it in the parent directory and then only `git add` (I'll teach this in a second) the code subdirectory. This gives me the flexibility to also keep track of "/ref" in case my codebase ends up relying heavily on it.

Workflows



Another Example Directory Setup

Questions?

Git overview - Starting a repo

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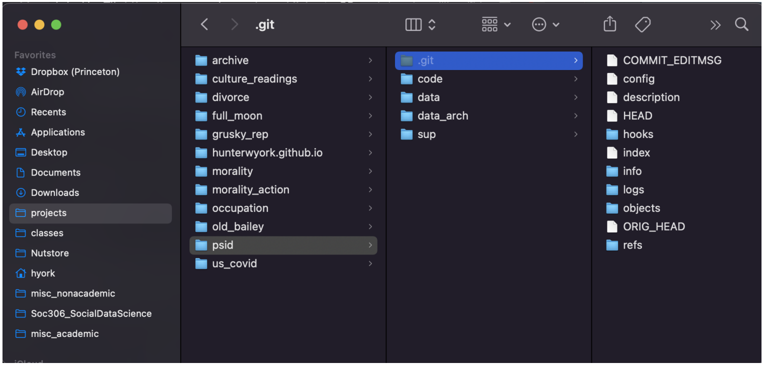
  - Git works by keeping track of insertions and deletions of your code and associating them with commit messages. More on this later.

Git init



archive
culture_readings
divorce
full_moon
grusky_rep
hunterwyork.github.io
morality
morality_action
occupation
old_bailey
psid
us_covid

.git
code
data
data_arch
sup

COMMIT_EDITMSG
config
description
HEAD
hooks
index
info
logs
objects
ORIG_HEAD
refs

File Structure Showing .git folder

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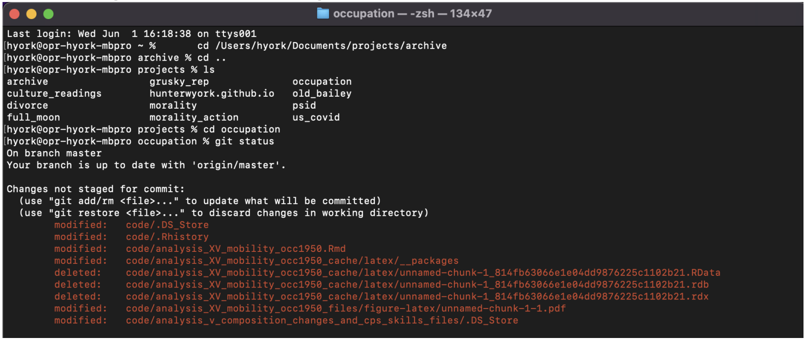
- The below output shows what it might look like.
- Here I have some unsaved changes in my "/code" subdirectory, including some changes in an RMarkdown file, and some associated file changes from knitting to pdf.



```
Last login: Wed Jun  1 16:18:38 on ttys001
hyork@opr-hyork-mbpro ~ %       cd /Users/hyork/Documents/projects/archive
hyork@opr-hyork-mbpro archive % cd ..
hyork@opr-hyork-mbpro projects % ls
archive                 grusky_rep              occupation
culture_readings        hunterwyork.github.io   old_bailey
divorce                 morality                psid
full_moon               morality_action         us_covid
hyork@opr-hyork-mbpro projects % cd occupation
hyork@opr-hyork-mbpro occupation % git status
On branch master
Your branch is up to date with 'origin/master'.

Changes not staged for commit:
  (use "git add/rm <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   code/.DS_Store
        modified:   code/.Rhistory
        modified:   code/analysis_XV_mobility_occ1950.Rmd
        modified:   code/analysis_XV_mobility_occ1950_cache/latex/__packages
        deleted:    code/analysis_XV_mobility_occ1950_cache/latex/unnamed-chunk-1_814fb63066e1e04dd9876225c1102b21.RData
        deleted:    code/analysis_XV_mobility_occ1950_cache/latex/unnamed-chunk-1_814fb63066e1e04dd9876225c1102b21.rdb
        deleted:    code/analysis_XV_mobility_occ1950_cache/latex/unnamed-chunk-1_814fb63066e1e04dd9876225c1102b21.rdx
        modified:   code/analysis_XV_mobility_occ1950_files/figure-latex/unnamed-chunk-1-1.pdf
        modified:   code/analysis_v_composition_changes_and_cps_skills_files/.DS_Store
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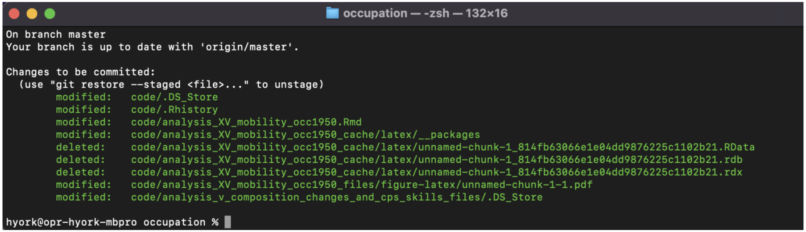
- Adding is as simple as typing `git add filename.R`
- To add all files in a directory, type `git add .`
- You can also add an entire subdirectory.
- You can also set files to be ignored every time, so that you can use `git add .` without having it actually pay attention to unimportant files. Just google "gitignore" to learn this trick!

Git Add

- Here we can see that once I've run `git add .`, all the unstaged changes are now staged for a commit.



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On branch master
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
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hyork@opr-hyork-mbpro occupation %
```

Example output

Git Commit & Push

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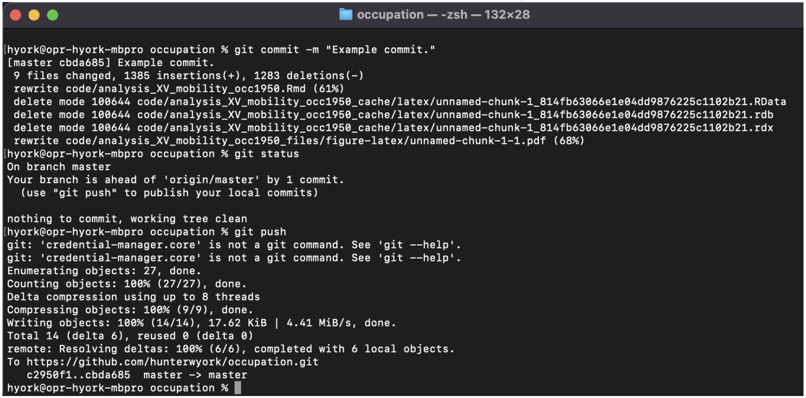
- Git push finalizes the commit by pushing local commits.



occupation — -zsh — 132×28

```
hyork@opr-hyork-mbpro occupation % git commit -m "Example commit."
[master cbda685] Example commit.
 9 files changed, 1385 insertions(+), 1283 deletions(-)
 rewrite code/analysis_XV_mobility_occ1950.Rmd (61%)
 delete mode 100644 code/analysis_XV_mobility_occ1950_cache/latex/unnamed-chunk-1_814fb63066e1e04dd9876225c1102b21.RData
 delete mode 100644 code/analysis_XV_mobility_occ1950_cache/latex/unnamed-chunk-1_814fb63066e1e04dd9876225c1102b21.rdb
 delete mode 100644 code/analysis_XV_mobility_occ1950_cache/latex/unnamed-chunk-1_814fb63066e1e04dd9876225c1102b21.rdx
 rewrite code/analysis_XV_mobility_occ1950_files/figure-latex/unnamed-chunk-1-1.pdf (68%)
hyork@opr-hyork-mbpro occupation % git status
On branch master
Your branch is ahead of 'origin/master' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
hyork@opr-hyork-mbpro occupation % git push
git: 'credential-manager.core' is not a git command. See 'git --help'.
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Enumerating objects: 27, done.
Counting objects: 100% (27/27), done.
Delta compression using up to 8 threads
Compressing objects: 100% (9/9), done.
Writing objects: 100% (14/14), 17.62 KiB | 4.41 MiB/s, done.
Total 14 (delta 6), reused 0 (delta 0)
remote: Resolving deltas: 100% (6/6), completed with 6 local objects.
To https://github.com/hunterwyork/occupation.git
   c2950f1..cbda685  master -> master
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- Enter, Github!

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- An example command would be something like `git remote add origin https://github.com/hunterwyork/occupation.git`

Git Remotes

- After or before `git init`, the first thing I like to do is sync git with github.
  - This only has to be done once, and then all other git commands automatically duplicate changes locally to the remote when you push.
- On www.github.com, you can follow the simple directions to set up a remote repo. You can then follow the given instructions to sync your local repo with the remote.
- An example command would be something like `git remote add origin https://github.com/hunterwyork/occupation.git`
- You can set up SSH keys so you don't have to enter you github username and password every time. THIS IS WORTH IT!

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- By now, you have all that you need to have a basic, single-user version control system for keeping track of a project.

Example

Questions?

Git overview - Backtracking, Branching

Backtracking

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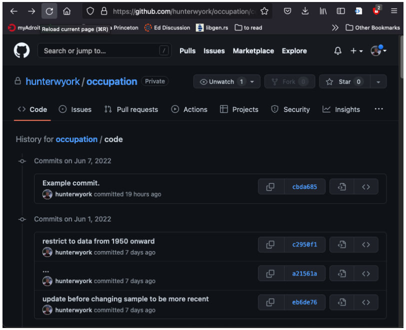
- This is where `git checkout` and `git branch` enter the picture.

Backtracking

- Each commit is associated with a hash.



History for occupation / code

Commits on Jun 7, 2022

Example commit.
hunterwyork committed 19 hours ago — cbda685

Commits on Jun 1, 2022

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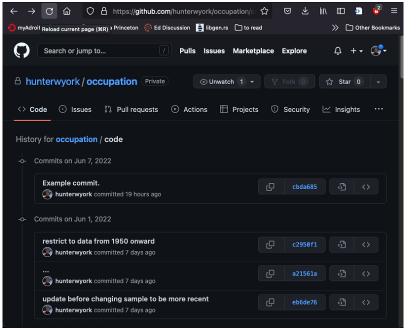

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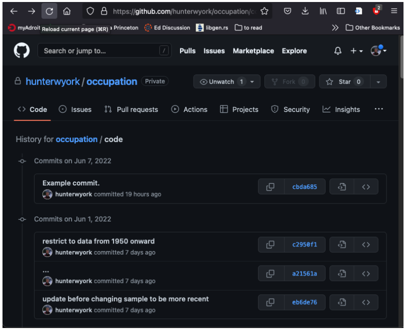

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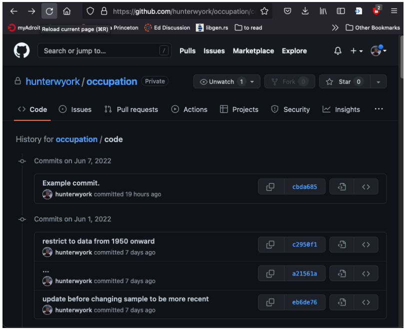

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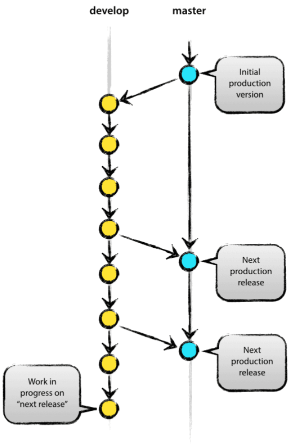
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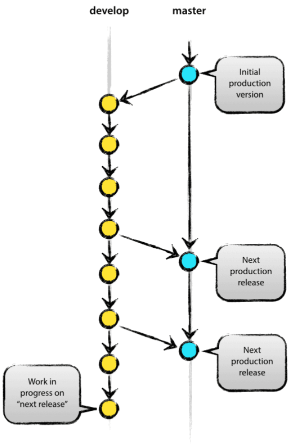
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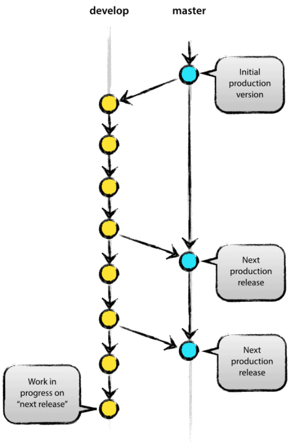
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- Keys: norms, coordination, and communication.

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- Also, if you think a change you've made is wort incorporating into the master branch, you can initiate a pull request!

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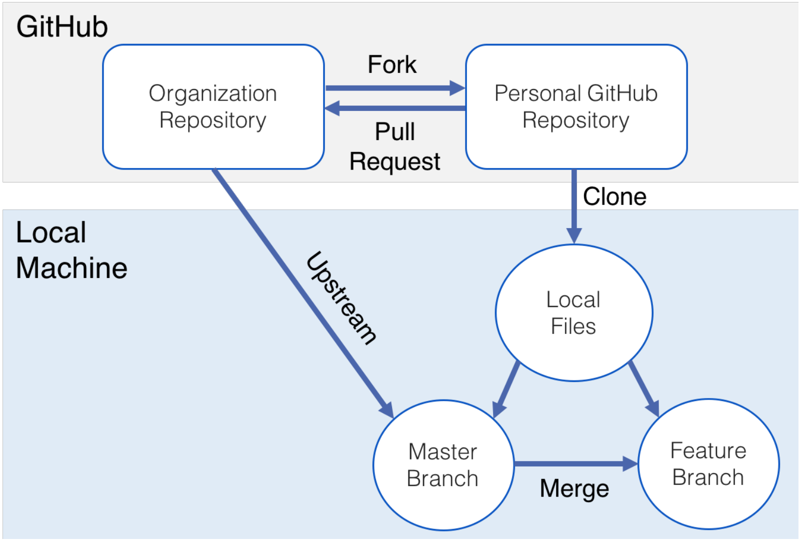

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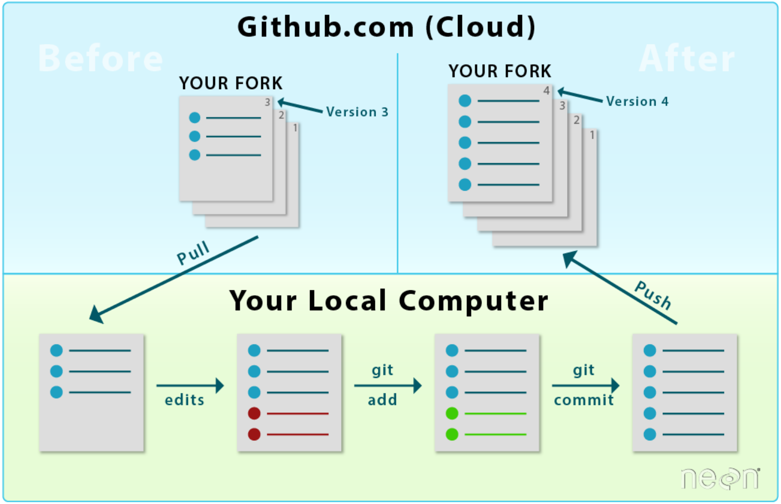

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  - For pulling someone elses repo to your local machine from github.

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- Another Cheatsheet - https://elischei.com/wp-content/uploads/2021/06/git-cheat-sheet-large-scaled.jpg

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https://medium.com/@lulu.ilmaknun.q/kompilasi-meme-git-e2fe49c6e33e

Questions, comments?

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