Introduction to Git and GitHub

General Assembly – Data Science

Agenda

I. Introduction
II. Exploring GitHub
III. Using Git with GitHub
IV. Contributing on GitHub
V. Bonus Content

I. Introduction

Why learn version control?

- Version control is useful when you write code, and data scientists write code
- Enables teams to easily collaborate on the same codebase
- Enables you to contribute to open source projects
- Attractive skill for employment

What is Git?

- Version control system that allows you to track files and file changes in a repository (“repo”)
- Primarily used by software developers
- Most widely used version control system
  - Alternatives: Mercurial, Subversion, CVS
- Runs from the command line (usually)
- Can be used alone or in a team

What is GitHub?

- A website, not a version control system
- Allows you to put your Git repos online
  - Largest code host in the world
  - Alternative: Bitbucket
- Benefits of GitHub:
  - Backup of files
  - Visual interface for navigating repos
  - Makes repo collaboration easy
- “GitHub is just Dropbox for Git”
- Note: Git does not require GitHub

Git can be challenging to learn

- Designed (by programmers) for power and flexibility over simplicity
- Hard to know if what you did was right
- Hard to explore since most actions are “permanent” (in a sense) and can have serious consequences
- We’ll focus on the most important 10% of Git

II. Exploring GitHub

GitHub setup

- Create an account at github.com
- There's nothing to install
  - "GitHub for Windows" & "GitHub for Mac" are GUI clients (alternatives to command line)

Navigating a GitHub repo (1 of 2)

- Example repo: github.com/justmarkham/DAT4
- Account name, repo name, description
- Folder structure
- Viewing files:
  - Rendered view (with syntax highlighting)
  - Raw view
- README.md:
  - Describes a repo
  - Automatically displayed
  - Written in Markdown

Navigating a GitHub repo (2 of 2)

- Commits:
  - One or more changes to one or more files
  - Revision highlighting
  - Commit comments are required
  - Most recent commit comment shown by filename
- Profile page

Creating a repo on GitHub

- Click “Create New” (plus sign):
  - Define name, description, public or private
  - Initialize with README (if you’re going to clone)
- Notes:
  - Nothing has happened to your local computer
  - This was done on GitHub, but GitHub used Git to add the README.md file

Basic Markdown

- Easy-to-read, easy-to-write markup language
- Usually (always?) rendered as HTML
- Many implementations (aka “flavors”)
- Let’s edit README.md using GitHub!
- Common syntax:
  - ## Header size 2
  - *italics* and **bold**
  - [link to GitHub](https://github.com)
  - * bullet
  - `inline code` and ```code blocks```
- Valid HTML can also be used within Markdown

III. Using Git with GitHub

Git installation and setup

- Installation: tiny.cc/installgit
- Open Git Bash (Windows) or Terminal (Mac/Linux):
  - git config --global user.name “YOUR FULL NAME”
  - git config --global user.email “YOUR EMAIL”
- Use the same email address you used with your GitHub account
- Generate SSH keys: tiny.cc/gitssh
  - Not required, but more secure that HTTPS

Cloning a GitHub repo

- Cloning = copying to your local computer
  - Like copying your Dropbox files to a new machine
- First, change your working directory to where you want the repo to be stored: cd
- Then, clone the repo: git clone <URL>
  - Get HTTPS or SSH URL from GitHub (ends in .git)
  - Clones to a subdirectory of the working directory
  - No visual feedback when you type your password
- Navigate to the repo (cd) then list the files (ls)

Checking your remotes

- A “remote alias” is a reference to a repo not on your local computer
  - Like a connection to your Dropbox account
- “origin” remote was set up by “git clone”
- View remotes: git remote -v
- Note: Remotes are repo-specific

Making changes, checking your status

- Making changes:
  - Modify README.md in any text editor
  - Create a new file: touch <filename>
- Check your status:
  - git status
- File statuses (possibly color-coded):
  - Untracked (red)
  - Tracked and modified (red)
  - Staged for committing (green)
  - Committed

Committing changes

- Stage changes for committing:
  - Add a single file: git add <filename>
  - Add all “red” files: git add .
- Check your status:
  - Red files have turned green
- Commit changes:
  - git commit -m “message about commit”
- Check your status again!
- Check the log: git log

Pushing to GitHub

- Everything you've done to your cloned repo (so far) has been local
- You've been working in the "master" branch
- Push committed changes to GitHub:
  - Like syncing local file changes to Dropbox
  - git push <remote> <branch>
  - Often: git push origin master
- Refresh your GitHub repo to check!

Quick recap of what you've done

- Created a repo on GitHub
- Cloned repo to your local computer (git clone)
  - Automatically sets up your "origin" remote
- Made two file changes
- Staged changes for committing (git add)
- Committed changes (git commit)
- Pushed changes to GitHub (git push)
- Inspected along the way (git remote, git status, git log)

Let’s do it again!

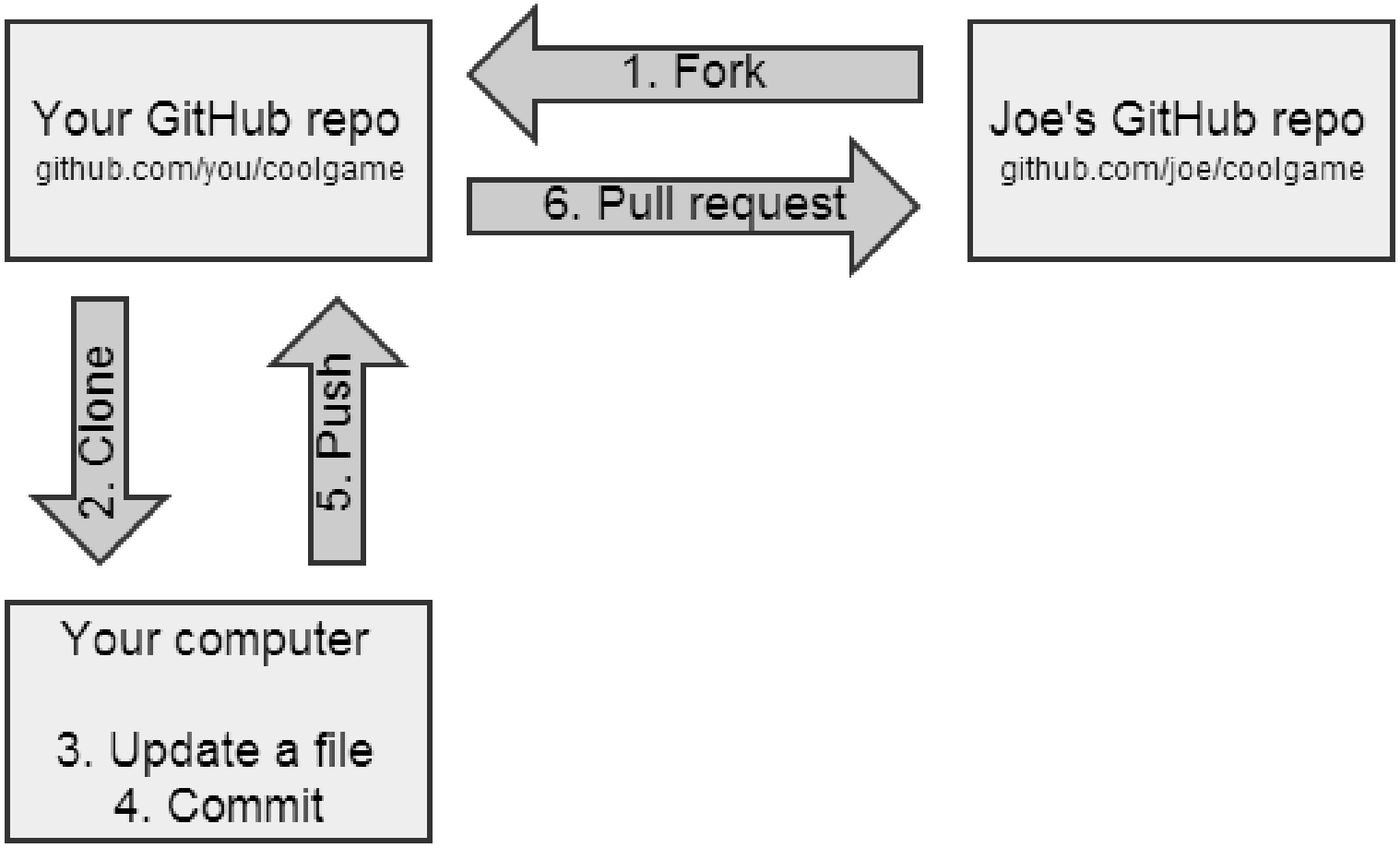
- Modify or add a file, then git status
- git add ., then git status
- git commit -m “message”
- git push origin master
- Refresh your GitHub repo

IV. Contributing on GitHub

Forking a repo on GitHub

- What is forking?
  - Copy a repo to your account (including history)
  - Does not stay in sync with the “upstream”
  - Do it! github.com/justmarkham/DAT4-students
- Why fork?
  - You want to make modifications
  - You want to contribute to the upstream
- Clone your fork: git clone <your URL>
  - Don’t clone inside your other local repo

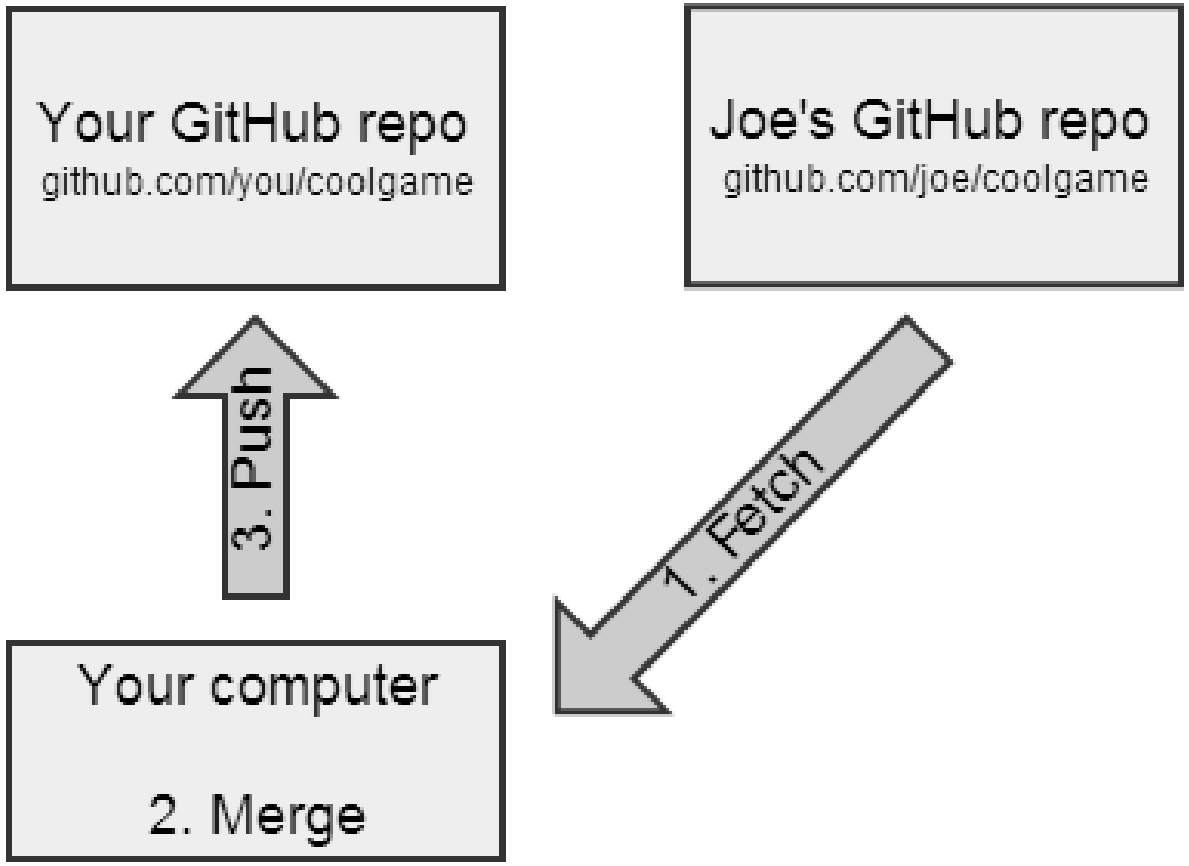
GitHub flow for contributing



Contribute to DAT4-students

- Create a subdirectory in DAT4-students with your first name (lowercase): mkdir <name>
- Change to that subdirectory: cd <name>
- Create a file named “about.md”
- Write something using Markdown
- Using Git: add, commit, push
- Create a pull request: “I request that you pull changes from my repo into your repo”

GitHub flow for syncing a fork



Sync your “DAT4-students” fork

- Files have been added to DAT4-students
- Add an “upstream” remote (one-time operation):
  - git remote add upstream <Kevin’s URL>
  - Check that it worked: git remote -v
- Pull the changes from the upstream:
  - Like updating your local files from Dropbox
  - git pull upstream master
  - Pull = fetch + merge (basically)
- Push the changes up to GitHub (optional):
  - git push origin master

Recipe for submitting homework

1. git pull upstream master
2. Copy your homework file(s) to your folder
3. git add . or git add <filename>
4. git status
5. git commit -m “message”
6. git push origin master
7. Create pull request on GitHub

V. Bonus Content

Two ways to initialize Git

- Initialize on GitHub:
  - Create a repo on GitHub (with README)
  - Clone to your local machine
- Initialize locally:
  - Initialize Git in existing local directory: git init
  - Create a repo on GitHub (without README)
  - Add remote: git remote add origin <URL>

Deleting or moving a repo

- Deleting a GitHub repo:
  - Settings, then Delete
- Deleting a local repo:
  - Just delete the folder!
- Moving a local repo:
  - Just move the folder!

Excluding files from a repo

- Create a ".gitignore" file in your repo: touch .gitignore
- Specify exclusions, one per line:
  - Single files: pip-log.txt
  - All files with a matching extension: *.pyc
  - Directories: env/
- Templates: github.com/github/gitignore

Gists: lightweight repos

- You have access to Gist: gist.github.com
- Add one or more files
- Supports cloning, forking, commenting, committing
- Can be public or secret (not private)
- Useful for snippets, embedding, IPython nbviewer, etc.

Useful to learn next

- Working with branches
- Rolling back changes
- Resolving merge conflicts
- Fixing LF/CRLF issues