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/sinanuozdemir/sfdat22
- 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

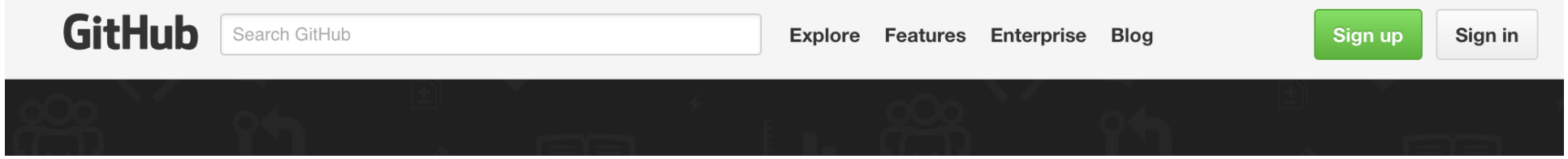
Navigating a GitHub repo (2 of 2)

- 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 profile

- Click on the signup button on the top-right

- Choose a plan (one of them is free)



- **Remember your email and password!!!! You will need it again soon!!!!**

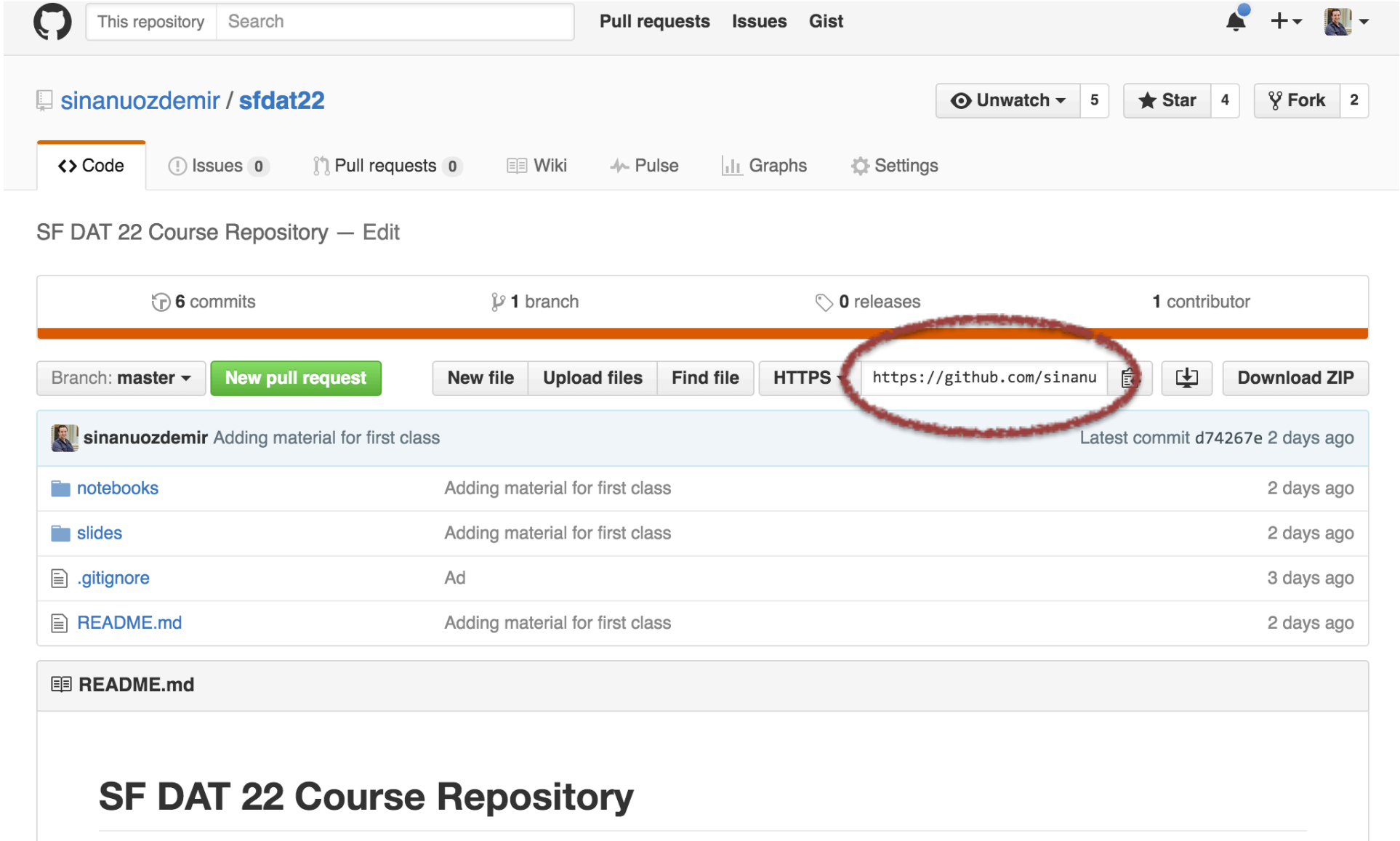
III. Using Git with GitHub

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 you created 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 into the repo (cd) then list the files (ls)

The url is on the repo page



First Clone

- First we will clone the main class repo!

- You will need to do this to stay up to date with all of class info

Before Cloning

- Move into a Directory that you want to store the info for the next 10 weeks

Before Cloning

```
[Sinans-MacBook-Pro:Desktop sinanozdemir$ pwd
 /Users/sinanozdemir/Desktop
[Sinans-MacBook-Pro:Desktop sinanozdemir$ ls
 saved_texts.rtf
 Sinans-MacBook-Pro:Desktop sinanozdemir$
```

During Cloning

```
[Sinans-MacBook-Pro:Desktop sinanozdemir$ git clone https://github.com/sinanuozdemir/sfdat22.git
Cloning into 'sfdat22'...
remote: Counting objects: 30, done.
remote: Compressing objects: 100% (19/19), done.
remote: Total 30 (delta 8), reused 30 (delta 8), pack-reused 0
Unpacking objects: 100% (30/30), done.
Checking connectivity... done.
Sinans-MacBook-Pro:Desktop sinanozdemir$
```

git clone https://github.com/sinanuozdemir/sfdat22.git

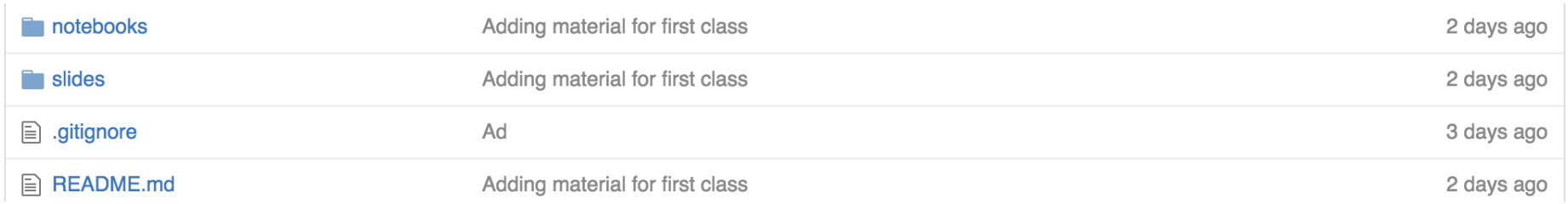
After Cloning

```
[Sinans-MacBook-Pro:Desktop sinanozdemir$ ls
 saved_texts.rtf sfdat22
 Sinans-MacBook-Pro:Desktop sinanozdemir$
```

- You have a new folder!

Same as on Github!

```
[Sinans-MacBook-Pro:Desktop sinanozdemir$ cd sfdat22/
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ ls
 README.md        notebooks        slides
 Sinans-MacBook-Pro:sfdat22 sinanozdemir$
```



notebooks	Adding material for first class	2 days ago
slides	Adding material for first class	2 days ago
.gitignore	Ad	3 days ago
README.md	Adding material for first class	2 days ago

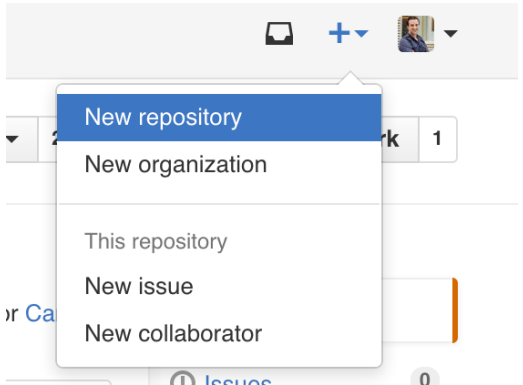
- **cd** into it and **ls**
- **Try this now! (take 5 minutes)**
- **The .gitignore file is "ignored" and is only there to prevent cross-platform failures**

Second Clone

- Now we will clone your new repo!
- First we have to make one

Creating a repo on GitHub

- Click the plus sign and then “New respository” on your profile:
  - Define name, description, public or private
  - Initialize with README (if you’re going to clone)
  - Please call it **sfdat22_work**
  - Nothing has happened to your local computer
  - This was done on GitHub, the website



Preview of what you're about to do

- Copy ("**clone**") your new GitHub repo to your computer
- Make some file changes locally
- Save those changes locally ("**add**" and "**commit**" them)
- Update your GitHub repo with those changes ("**push**")

Preview of what you're about to do

- Copy ("**clone**") your new GitHub repo to your computer

- Try this now! (take 5-10 minutes)

- **SUPER IMPORTANT:**
  - Make sure that you **LEAVE sfdat22** before cloning the new repo
  - cd ..
  - Never clone a git repo inside of another git repo!!!
    - Unless you are a satanist and wish to call upon minions of the darkness. In which case please contact Vanessa

Making changes, checking your status

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

- Try this now! (take 1 minute)

```
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ touch test.txt
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ ls
README.md       notebooks       slides          test.txt
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ git status
On branch master
Your branch is ahead of 'origin/master' by 2 commits.
  (use "git push" to publish your local commits)
Untracked files:
  (use "git add <file>..." to include in what will be committed)

        test.txt

nothing added to commit but untracked files present (use "git add" to track)
Sinans-MacBook-Pro:sfdat22 sinanozdemir$
```

Note: Make sure you are in sfdat22_work and **NOT** sfdat22

Committing changes

- Stage changes for committing:
  - Add all “red” files: git add .
- Check your status:
  - git status
  - Red files have turned green
- Commit changes:
  - git commit -m “message about commit”
- Check your status again!

- Try this now! (take 3 minutes)

```
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ git add .
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ git commit -m "Added test.txt"
 [master e7642ff] Added test.txt
  1 file changed, 0 insertions(+), 0 deletions(-)
  create mode 100644 test.txt
[Sinans-MacBook-Pro:sfdat22 sinanozdemir$ git status
On branch master
Your branch is ahead of 'origin/master' by 3 commits.
  (use "git push" to publish your local commits)
nothing to commit, working directory clean
Sinans-MacBook-Pro:sfdat22 sinanozdemir$
```

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!

```
Sinans-MacBook-Pro:sfdat22 sinanozdemir$ git push origin master
Counting objects: 5, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (4/4), done.
Writing objects: 100% (5/5), 509 bytes | 0 bytes/s, done.
Total 5 (delta 2), reused 0 (delta 0)
To https://github.com/sinanuozdemir/sfdat22.git
   d74267e..e7642ff  master -> master
Sinans-MacBook-Pro:sfdat22 sinanozdemir$
```

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)

Before you leave

- Install Git on your machine
- Make a Github Profile on the web
- Create your own repo, call it “sfdat22” and clone it to your machine
- Clone the class repo

IV. Bonus Content

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 (optional): tiny.cc/gitssh
  - More secure that HTTPS
  - Only necessary if HTTPS doesn’t work for you

Checking your remotes

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

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