

SJSU Robotics Team

Intelligent Systems Division
Summer 2020

Version Control with **git** and GitHub

Summary

Version control allows you to track and rollback changes to your code repository. Pushing your code repository to GitHub allows you to share your code with others.

Here are examples for using git to version control your work in the curriculum repositories.

- [ros-curriculum](#)
- [ml-curriculum](#)

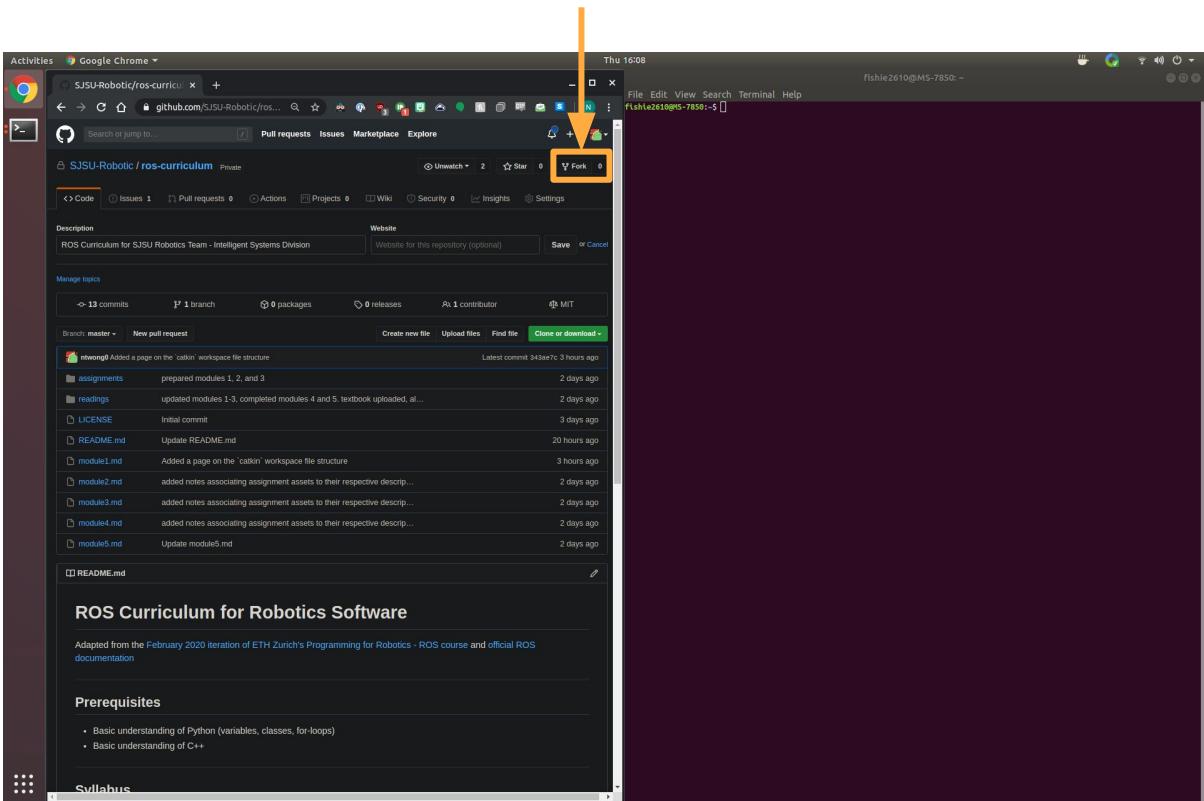
ros-curriculum

ros-curriculum

You can use the course repo as a container for your ROS workspace.

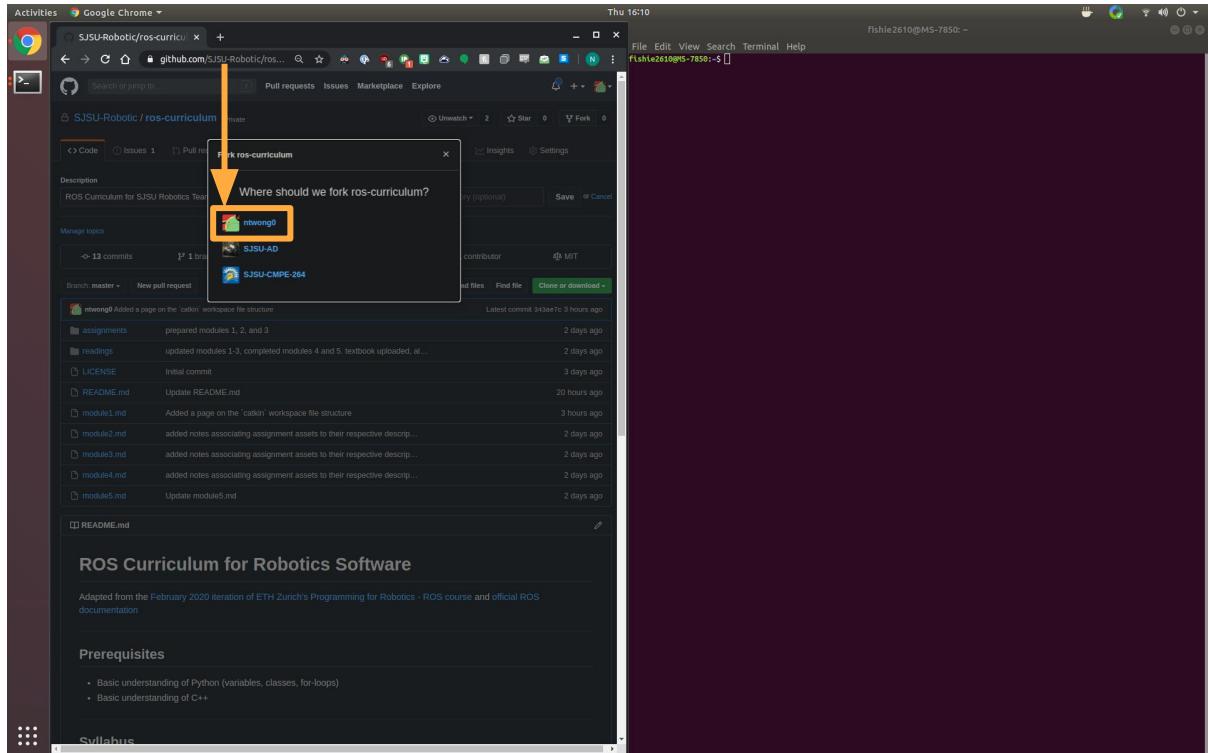
First, we start with the repo page on the left, and a terminal window on the right.

[Create a fork of the repo](#) to your GitHub account by selecting the [Fork] button.



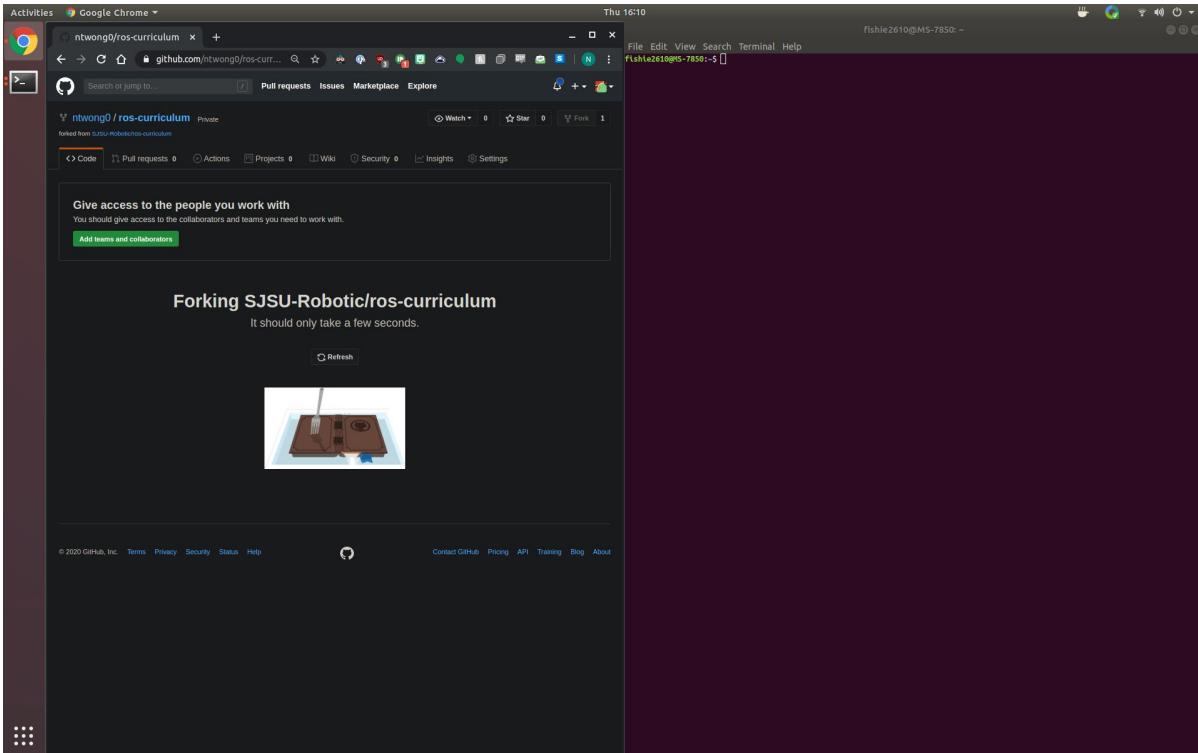
ros-curriculum

Select your account as the fork destination.



ros-curriculum

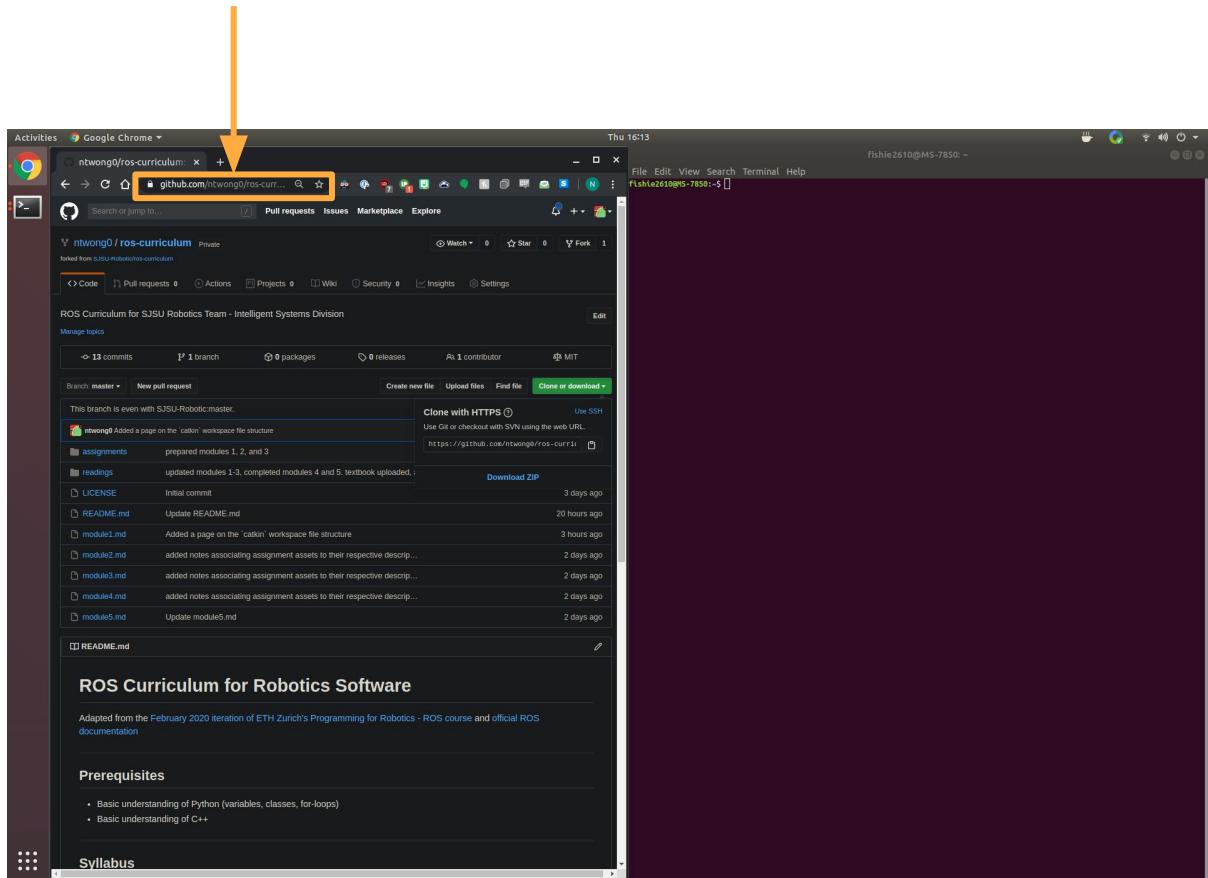
Forking will take a few seconds.



ros-curriculum

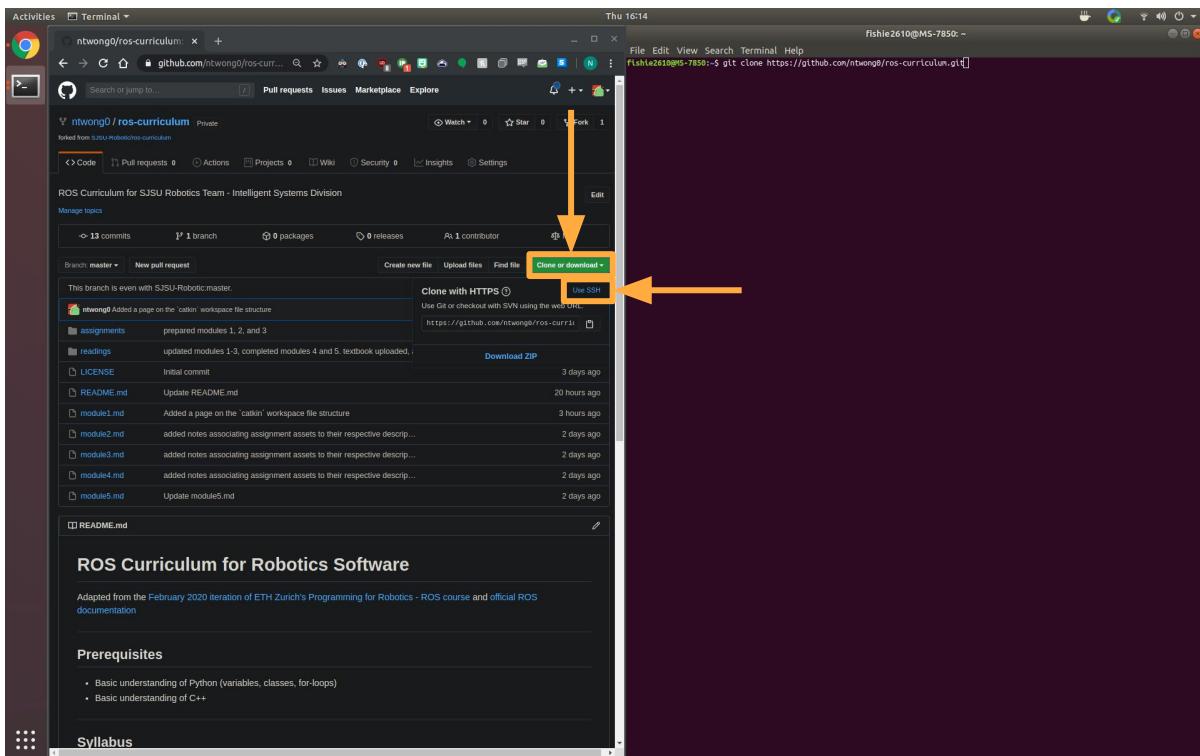
The fork is now complete, and it is now accessible at

github.com/<yourAcct>/ros-curriculum



ros-curriculum

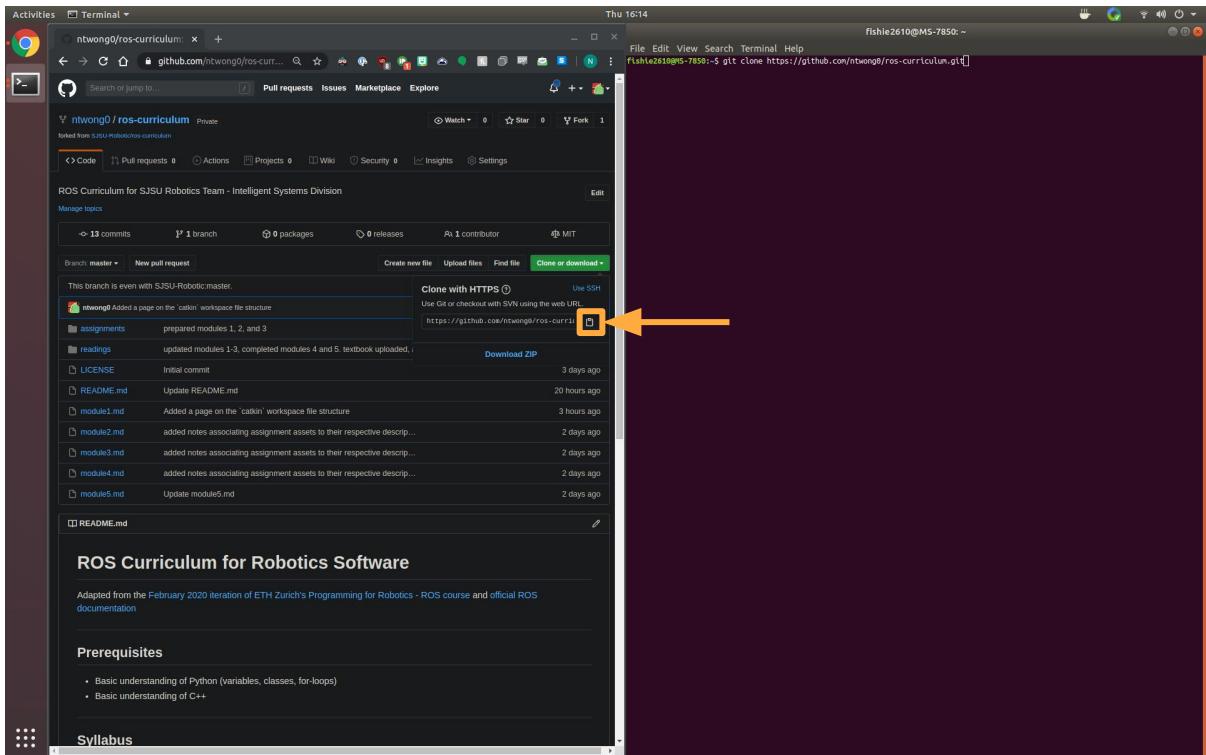
Select [Clone or download], then select [Use HTTPS] to reveal the URL.



ros-curriculum

Select [Clone or download], then select [Use HTTPS] to reveal the URL.

Copy the URL to your clipboard.



ros-curriculum

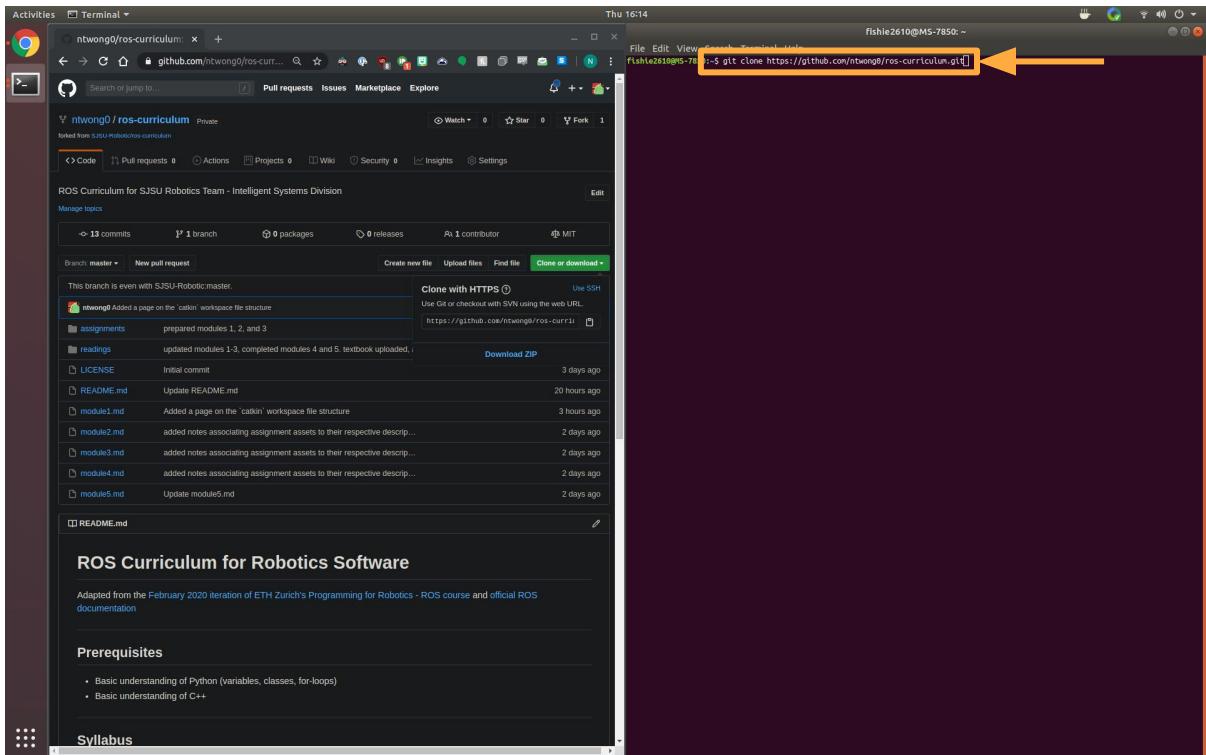
Select [Clone or download], then select [Use HTTPS] to reveal the URL.

Copy the URL to your clipboard.

In the terminal window, type

`git clone`

then paste the URL, and hit enter.



ros-curriculum

The repo is cloned into a folder at the current working directory. If you use the `ls` command to list the working directory's contents, the `ros-curriculum` folder is listed

A screenshot of a Linux desktop environment. On the left, a terminal window shows the command `git clone git@github.com:ntwong0/ros-curriculum.git` being run, followed by the output of the cloning process. On the right, a browser window displays the GitHub repository page for `ntwong0/ros-curriculum`. The repository page shows the repository details, a list of 13 commits, and the contents of the `README.md` file, which includes sections for Prerequisites and Syllabus.

```
fishie2610@MS-7850:~$ git clone git@github.com:ntwong0/ros-curriculum.git
Cloning into 'ros-curriculum'...
Warning: Permanently added 'github.com:192.30.255.112' (RSA key for IP address '192.30.255.112') to the list of known hosts.
remote: Counting objects: 108K (79/79), done.
remote: Compressing objects: 100% (67/67), done.
remote: Writing objects: 100% (108/108), pack-reused 0
Receiving objects: 100% (72/72), 38.43 MB | 16.17 MB/s, done.
Resolving deltas: 100% (28/28), done.
fishie2610@MS-7850:~$ ls
Desktop Documents Downloads examples.desktop Music Pictures Public ros-curriculum
fishie2610@MS-7850:~$
```

Terminal Output:

```
fishie2610@MS-7850:~$ git clone git@github.com:ntwong0/ros-curriculum.git
Cloning into 'ros-curriculum'...
Warning: Permanently added 'github.com:192.30.255.112' (RSA key for IP address '192.30.255.112') to the list of known hosts.
remote: Counting objects: 108K (79/79), done.
remote: Compressing objects: 100% (67/67), done.
remote: Writing objects: 100% (108/108), pack-reused 0
Receiving objects: 100% (72/72), 38.43 MB | 16.17 MB/s, done.
Resolving deltas: 100% (28/28), done.
fishie2610@MS-7850:~$ ls
Desktop Documents Downloads examples.desktop Music Pictures Public ros-curriculum
fishie2610@MS-7850:~$
```

GitHub Repository Page:

Branch: master

This branch is even with SJSU-Robotics:master.

Commits:

- ntwong0 Added a page on the 'catkin' workspace file structure 2 days ago
- ntwong0 updated modules 1, 2, and 3 2 days ago
- ntwong0 updated modules 1-3, completed modules 4 and 5, textbook uploaded, al... 2 days ago
- ntwong0 Initial commit 3 days ago
- ntwong0 Update README.md 20 hours ago
- ntwong0 Added a page on the 'catkin' workspace file structure 3 hours ago
- ntwong0 added notes associating assignment assets to their respective descrip... 2 days ago
- ntwong0 added notes associating assignment assets to their respective descrip... 2 days ago
- ntwong0 added notes associating assignment assets to their respective descrip... 2 days ago
- ntwong0 Update module5.md 2 days ago

README.md

ROS Curriculum for Robotics Software

Adapted from the February 2020 iteration of ETH Zurich's Programming for Robotics - ROS course and official ROS documentation

Prerequisites

- Basic understanding of Python (variables, classes, for-loops)
- Basic understanding of C++

Syllabus

ros-curriculum

If you haven't created the workspace, you can do that now.

Here, we follow the example from the [ROS tutorial for configuring your ROS environment...](#)

...with a twist. In this case, we are using **catkin-tools** instead of **catkin_make/catkin_create_pkg**

The screenshot shows a Linux desktop environment with a terminal window and a web browser window. The terminal window displays the output of a catkin build process, indicating a successful build with all packages succeeded. The GitHub repository page for 'ntwong0/ros-curriculum' is open, showing the repository's activity, code, and configuration files. The configuration files include 'catkin_ws/buildspace.yaml' and 'catkin_ws/catkin_tools.yaml', which define the workspace structure and build settings using 'catkin-tools' conventions.

```
[fishie2610@MS-7850: ~] ros-curriculum$ catkin build
[build] No packages were found in the source space '/home/fishie2610/ros-curriculum/catkin_ws/src'.
[build] No packages to be built.
[build] Package table is up to date.
Starting build [1.7 seconds]
  <> catkin_tools_prebuild
[build]   Summary: All 1 packages succeeded!
[build]   Warnings: None.
[build]   Abandoned: None.
[build]   Errors: None.
[build] Runtime: 1.7 seconds total.
[fishie2610@MS-7850: ~] ros-curriculum$
```

The GitHub repository page for 'ntwong0/ros-curriculum' shows the following details:

- Branch:** master
- Commits:** 13 commits
- Branches:** 1 branch
- Packages:** 0 packages
- Releases:** 0 releases
- Contributors:** 1 contributor
- Licenses:** MIT
- Profile:** default
- Extending:** [env] /home/fishie2610/Workspaces/ros-curriculum/catkin_ws/devel:/opt/ros/melodic
- Workspace:** /home/fishie2610/Workspaces/ros-curriculum/catkin_ws
- Build Space:** [missing] /home/fishie2610/ros-curriculum/catkin_ws/build
- Devel Space:** [missing] /home/fishie2610/ros-curriculum/catkin_ws/devel
- Install Space:** [missing] /home/fishie2610/ros-curriculum/catkin_ws/install
- Log Space:** [missing] /home/fishie2610/ros-curriculum/catkin_ws/logs
- Source Space:** [exists] /home/fishie2610/ros-curriculum/catkin_ws/src
- DESTDIR:** [unused] None
- Devel Space Layout:** linked
- Install Space Layout:** None
- Additional Cmake Args:** None
- Additional C++ Args:** None
- Additional catkin Make Args:** None
- Internal Make Job Server:** True
- Cache Job Environments:** False
- Whitelisted Packages:** None
- Blacklisted Packages:** None
- Workspace configuration appears valid.**

The configuration files shown are:

- catkin_ws/buildspace.yaml**:

```
build_space: [missing] /home/fishie2610/Workspaces/ros-curriculum/catkin_ws/build
devel_space: [exists] /home/fishie2610/Workspaces/ros-curriculum/catkin_ws/devel
install_space: [missing] /home/fishie2610/Workspaces/ros-curriculum/catkin_ws/install
log_space: [missing] /home/fishie2610/Workspaces/ros-curriculum/catkin_ws/logs
source_space: [exists] /home/fishie2610/Workspaces/ros-curriculum/catkin_ws/src
destdir: [unused] None
```
- catkin_ws/catkin_tools.yaml**:

```
build_space_layout: linked
install_space_layout: None
additional_cmake_args: None
additional_cxx_args: None
additional_catkin_make_args: None
internal_make_job_server: true
cache_job_environments: false
whitelisted_packages: None
blacklisted_packages: None
```

The GitHub repository page also includes sections for **ROS Curriculum for Robotics Software**, **Prerequisites** (listing basic Python and C++ understanding), and **Syllabus**.

ros-curriculum

Note that catkin-tools does NOT append to `$ROS_PACKAGE_PATH` if your workspace has no packages in it, unlike `catkin_make`.

The screenshot shows a Linux desktop environment with a terminal window open in the background. The terminal window displays the output of a `catkin config` command, which includes configuration parameters like workspace paths and build/install spaces. An orange arrow points from the terminal window down to the workspace configuration section of the terminal output.

```
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ catkin config
[profile]
  default:
    [env] /opt/ros/melodic
    workspace: /home/fishie2610/ros-curriculum/catkin_ws
[Build Space]
  exists: /home/fishie2610/ros-curriculum/catkin_ws/build
[Install Space]
  unused: /home/fishie2610/ros-curriculum/catkin_ws/install
  log: /home/fishie2610/ros-curriculum/catkin_ws/logs
[Source Space]
  exists: /home/fishie2610/ros-curriculum/catkin_ws/src
[DESTDIR]
  unused: None

[Devel Space Layout]
  linked
[Install Space Layout]
  None
[Additional Cmake Args]
  None
[Additional Make Args]
  None
[Additional Parallel Make Args]
  None
[Internal Make Server]
  True
[Cache Job Environments]
  False
[Whitelisted Packages]
  None
[Blacklisted Packages]
  None
[Workspace configuration appears valid]

fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ printenv | grep ROS
ROS_ETC_DIR=/opt/ros/melodic/etc/ros
ROS_ROOT=/opt/ros/melodic/share/ros
ROS_MASTER_URI=http://localhost:11311
ROS_VERSION=1
ROS_PYTHON_VERSION=2
ROS_PACKAGE_PATH=/opt/ros/melodic/share/roslisp:/opt/ros/melodic/share
ROS_DISTRO=melodic
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ source devel/setup.bash
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo $ROS_PACKAGE_PATH
/opt/ros/melodic/share
```

The foreground window is a GitHub repository page for "ntwong0/ros-curriculum". The repository has 13 commits, 1 branch, 0 packages, 0 releases, and 1 contributor. The README.md file is visible, containing the title "ROS Curriculum for Robotics Software" and a "Prerequisites" section. A yellow arrow points from the GitHub interface down to the "Syllabus" link at the bottom of the page.

ros-curriculum

Note that catkin-tools does NOT append to **\$ROS_PACKAGE_PATH** if your workspace has no packages in it, unlike **catkin_make**.

If we create a package inside of `catkin_ws` and build it, we will see that `source devel/setup.bash` will now update **\$ROS_PACKAGE_PATH**

The screenshot shows a Linux desktop environment with a terminal window and a web browser window.

Terminal Window:

```
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ printenv | grep ROS
ROS_ETC_DIR=/opt/ros/melodic/etc/ros
ROS_ROOT=/opt/ros/melodic/share/ros
ROS_MASTER_URI=http://localhost:11311
ROS_VERSION=1
ROS_PYTHON_VERSION=2
ROS_DISTRO=melodic
ROS_WS=/home/fishie2610/ros-curriculum/catkin_ws
ROS_PACKAGE_DIRECTORIES=/home/fishie2610/ros-curriculum/catkin_ws/source-devel/setup.bash
ROS_PACKAGE_PATH=/home/fishie2610/ros-curriculum/catkin_ws/echo $ROS_PACKAGE_PATH
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo $ROS_PACKAGE_PATH
/home/fishie2610/ros-curriculum/catkin_ws/source-devel/setup.bash
```

Browser Window (GitHub Repository):

The GitHub page for the `ntwong0/ros-curriculum` repository shows the following details:

- Branch:** master
- Commits:** 13
- Branches:** 1
- Packages:** 0
- Releases:** 0
- Contributors:** 1
- Licenses:** MIT

The repository contains several files and folders:

- `assignments`: prepared modules 1, 2, and 3
- `readings`: updated modules 1-3, completed modules 4 and 5, textbook uploaded, etc.
- `LICENSE`: Initial commit
- `README.md`: Update README.md
- `module1.md`: Added a page on the 'catkin' workspace file structure
- `module2.md`: added notes associating assignment assets to their respective descrip...
- `module3.md`: added notes associating assignment assets to their respective descrip...
- `module4.md`: added notes associating assignment assets to their respective descrip...
- `module5.md`: Update module5.md

Content of `README.md`:

ROS Curriculum for Robotics Software

Adapted from the February 2020 iteration of ETH Zurich's Programming for Robotics - ROS course and official ROS documentation

Prerequisites

- Basic understanding of Python (variables, classes, for-loops)
- Basic understanding of C++

Syllabus

The terminal window also shows the output of a `catkin build` command, which successfully built the `beginner_tutorials` package.

ros-curriculum

Note that catkin-tools does NOT append to `$ROS_PACKAGE_PATH` if your workspace has no packages in it, unlike `catkin_make`.

If we create a package inside of `catkin_ws` and build it, we will see that `source devel/setup.bash` will now update `$ROS_PACKAGE_PATH`

One more note

- `reset` re-initializes the terminal, and
- `clear` clears out text in the terminal

The screenshot shows a desktop environment with a terminal window open. The terminal window title is "File Edit View Search Terminal Help". It displays the output of several commands related to ROS workspace setup:

```
Thu 16:34
fishie2610@MS-7850:~/ros-curriculum/catkin_ws
File Edit View Search Terminal Help
Additional CMake Args: None
Additional CXX Args: None
Additional Link Args: None
Internal Make Job Server: True
Cache Job Environments: False
Whitelisted Packages: None
Blacklisted Packages: None
Workspace configuration appears valid.

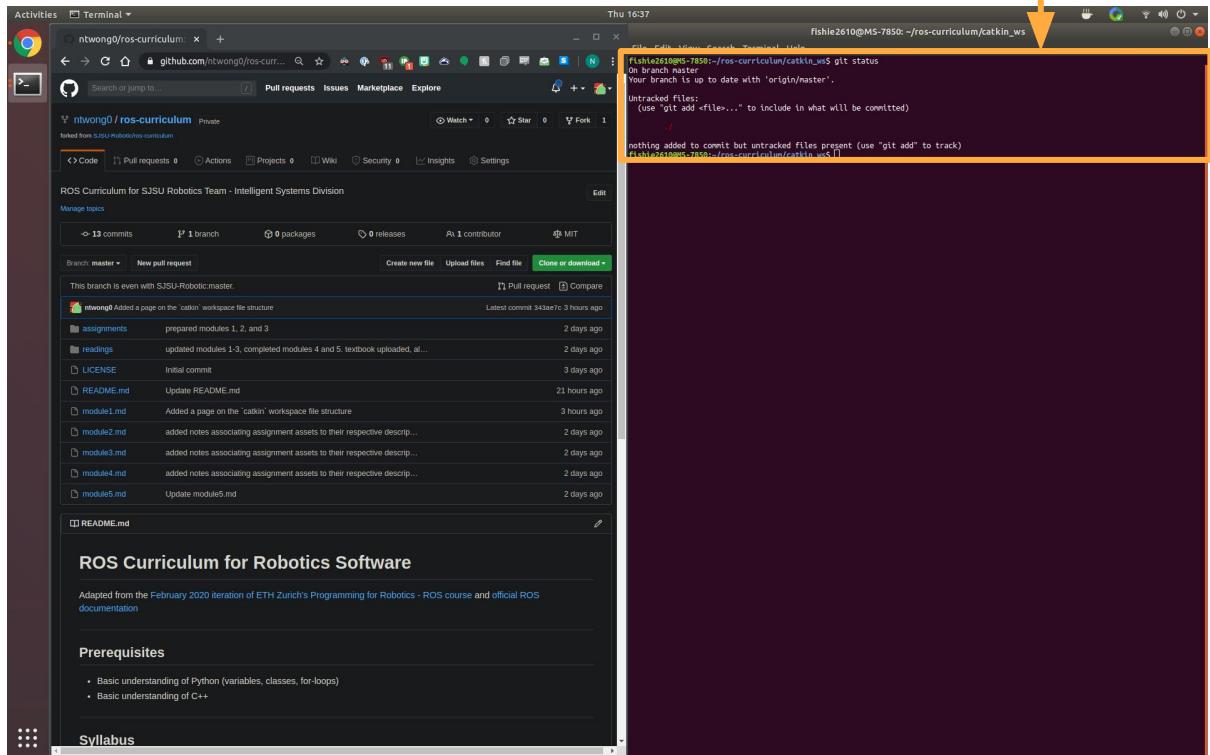
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ printenv | grep ROS
ROS_ETC_DIR=/opt/ros/melodic/etc/ros
ROS_ROOT=/opt/ros/melodic/share/ros
ROS_MASTER_URI=http://localhost:11311
ROS_VERSION=1
ROS_PYTHON_VERSION=2
ROS_DISTRO=melodic
ROS_WS_DIR=/home/fishie2610/ros-curriculum/catkin_ws
ROS_PACKAGE_DIRECTORIES=/home/fishie2610/ros-curriculum/catkin_ws/share
ROS_DISTRONAME=melodic
ROS_WS_NAME=catkin_ws
ROS_WS_PATH=/home/fishie2610/ros-curriculum/catkin_ws source devel/setup.bash
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo $ROS_PACKAGE_PATH
/opt/ros/melodic/share
Creating package 'beginner_tutorials' in '/home/fishie2610/ros-curriculum/catkin_ws/src'...
Created file 'beginner_tutorials/CMakeLists.txt'
Created folder 'beginner_tutorials/include/beginner_tutorials'
Created file 'beginner_tutorials/include/beginner_tutorials/CMakeLists.txt'
Successfully created package file in '/home/fishie2610/ros-curriculum/catkin_ws/src/beginner_tutorials'.
Profile: default
Extending: [env] /opt/ros/melodic;/home/fishie2610/ros-curriculum/catkin_ws/_devel
workspace: /home/fishie2610/ros-curriculum/catkin_ws
Build Space: [exists] /home/fishie2610/ros-curriculum/catkin_ws/build
Dev Space: [exists] /home/fishie2610/ros-curriculum/catkin_ws/_devel
Install Space: [exists] /home/fishie2610/ros-curriculum/catkin_ws/_install
Log Space: [exists] /home/fishie2610/ros-curriculum/catkin_ws/_log
Source Space: [exists] /home/fishie2610/ros-curriculum/catkin_ws/_src
DESTDIR: [unused] None
Devel Space Layout: linked
Install Space Layout: None
Additional CMake Args: None
Additional CXX Args: None
Additional Link Args: None
Internal Make Job Server: True
Cache Job Environments: False
Whitelisted Packages: None
Blacklisted Packages: None
Workspace configuration appears valid.

[build] Found 1 packages in 0.0 seconds.
[build] Updating package table.
Starting >>> beginner_tutorials
[build] [beginner_tutorials] [ 1.8 seconds ]
[build] Summary: All 1 packages succeeded!
[build] Ignored: None.
[build] Abandoned: None.
[build] Runtime: 1.9 seconds total.
[build] Note: Workspace packages have changed, please re-source setup files to use them.
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ source devel/setup.bash; echo $ROS_PACKAGE_PATH
/home/fishie2610/ros-curriculum/catkin_ws/share:/opt/ros/melodic/share
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ 5 reset;clear]
```

ros-curriculum

Since we created the workshop in the cloned repo, we can add the new files and folders we created.

First, let's check what files and folders we created in the repo with a **git status**. As we can see, the current working directory (**catkin_ws**, indicated with **./**) is untracked, which means it is new to the repo.



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "fishie2610@MS-7850: ~/ros-curriculum/catkin_ws". The terminal content displays the output of the command "git status". The output shows that the branch is up-to-date with 'origin/master' and lists several untracked files under "Untracked files". An orange arrow points from the top right towards the terminal window.

```
Fishie2610@MS-7850: ~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Untracked files:
  (use "git add -A" to include in what will be committed)
    ./
nothing added to commit but untracked files present (use "git add" to track)
```

ros-curriculum

Since we created the workshop in the cloned repo, we can add the new files and folders we created.

First, let's check what files and folders we created in the repo with a **git status**. As we can see, the current working directory (**catkin_ws**, indicated with **./**) is untracked, which means it is new to the repo.

We only need the contents of the **src/** folder with **git add src/***, and we can ignore the other files by appending them to the **.gitignore** file

The screenshot shows a Linux desktop environment with a terminal window and a web browser window. The terminal window is titled 'fishie2610@MS-7850: ~/ros-curriculum/catkin_ws' and displays the output of the 'git status' command. The GitHub browser window shows the 'ntwong0/ros-curriculum' repository, specifically the 'catkin_ws' directory. The terminal output includes:

```
Thu 16:41
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.

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

    ./
    ./src/beginner_tutorials/CMakeLists.txt
    ./src/beginner_tutorials/package.xml

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

    ./src/beginner_tutorials/CMakeLists.txt
    ./src/beginner_tutorials/package.xml

Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml

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

    .gitignore
    .gitlab-ci.yml
    .travis.yml
    ./devel/
    ./logs/
    ./tags/
```

The GitHub browser tab shows the 'catkin_ws' directory structure with several files and commits listed. The commits include:

- ntwong0 Added a page on the 'catkin' workspace file structure (3 days ago)
- Initial commit (2 days ago)
- Update README.md (21 hours ago)
- Added a page on the 'catkin' workspace file structure (3 hours ago)
- added notes associating assignment assets to their respective descrip... (2 days ago)
- added notes associating assignment assets to their respective descrip... (2 days ago)
- added notes associating assignment assets to their respective descrip... (2 days ago)
- added notes associating assignment assets to their respective descrip... (2 days ago)
- Update module5.md (2 days ago)

The terminal also shows the content of the 'README.md' file, which is titled 'ROS Curriculum for Robotics Software' and provides documentation for the ROS Curriculum.

ros-curriculum

Don't forget to **git add** the ignore file.

The screenshot shows a dual-monitor setup. The left monitor displays a GitHub browser window for the repository 'ntwong0/ros-curriculum'. The right monitor shows a terminal window with a Linux command-line interface. An orange arrow points from the GitHub window to the terminal window, specifically highlighting the command 'git add .gitignore'.

GitHub Repository (Left Monitor):

- Repository: ntwong0/ros-curriculum
- Branch: master
- Commits: 13 commits
- Pull Requests: 0
- Actions: 1
- Projects: 0
- Wiki: 0
- Security: 0
- Insights: 1
- Settings: 1

Terminal Window (Right Monitor):

```
Thu 16:43
file12610@MS-7850: ~/ros-curriculum/catkin_ws
File Edit View Search Terminal Help
git add .gitignore
git add src/beginner_tutorials/CMakeLists.txt
git add src/beginner_tutorials/package.xml
Untracked files:
(use "git add <file>..." to include in what will be committed)
    catkin_tools/
    build/
    devel/
    logs/
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo .catkin_tools >> .gitignore
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo build/ >> .gitignore
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo logs/ >> .gitignore
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Untracked files:
(use "git add <file>..." to include in what will be committed)
    catkin_tools/
    build/
    devel/
    logs/
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git add .gitignore
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git add CMakeLists.txt
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Untracked files:
(use "git add <file>..." to include in what will be committed)
    catkin_ws/.gitignore
    A catkin_ws/CMakeLists.txt
    A catkin_ws/src/beginner_tutorials/CMakeLists.txt
    A catkin_ws/src/beginner_tutorials/package.xml
Switched to a new branch 'workon-module-1'
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git commit -m 'git catkin_ws and beginner_tutorials'
3 files changed, 278 insertions(+)
create mode 100644 catkin_ws/.gitignore
create mode 100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt
create mode 100644 catkin_ws/src/beginner_tutorials/package.xml
Fishtie2610@MS-7850:~/ros-curriculum/catkin_ws$ git push origin workon-module-1
```

ros-curriculum

Don't forget to **git add** the ignore file.

Here, we will also switch to a different branch to contain our work related to module1. To switch over to the branch, which previously did not exist, we use

```
git checkout -b  
"workon-module-1"
```

The screenshot shows a Linux desktop environment with a terminal window and a browser window. The terminal window is running a shell session with the following commands and output:

```
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git add .catkin_tools/.gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    catkin_tools/
      build/
      devel/
      logs/
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo .catkin_tools >> .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo build/ >> .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo devel/ >> .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ echo logs/ >> .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git checkout -b "workon-module-1"
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml

fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git checkout -b "workon-module-1"
A  catkin_ws/.gitignore
A  catkin_ws/src/beginner_tutorials/CMakeLists.txt
A  catkin_ws/src/beginner_tutorials/package.xml
Switched to a new branch 'workon-module-1'
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml

[workon-module-1 fishie2610]$ catkin_ws and beginner_tutorials
3 files changed, 278 insertions(+)
create mode 100644 catkin_ws/.gitignore
create mode 100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt
create mode 100644 catkin_ws/src/beginner_tutorials/package.xml
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git push origin workon-module-1
```

The browser window shows the GitHub repository page for 'ntwong0/ros-curriculum'. The commit history lists several commits from 'ntwong0' adding pages to the 'catkin' workspace file structure. The current branch is 'master'.

ros-curriculum

Don't forget to **git add** the ignore file.

Here, we will also switch to a different branch to contain our work related to module1. To switch over to the branch, which previously did not exist, we use

```
git checkout -b  
"workon-module-1"
```

We then **git commit** our changes, and we use the **-m** flag to append a message describing this commit.

The screenshot shows a Linux desktop environment with a terminal window and a GitHub browser tab. The terminal window is running on a terminal emulator like xterm or rxvt. It displays a series of git commands and their outputs. An orange arrow points from the bottom right towards the terminal window, highlighting the command history at the bottom.

```
git add .gitignore
git add src/beginner_tutorials/CMakeLists.txt
git add src/beginner_tutorials/package.xml
git commit -m "catkin_ws and beginner_tutorials"
[1 file changed, 270 insertions(+)]
create mode 100644 catkin_ws/.gitignore
create mode 100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt
create mode 100644 catkin_ws/src/beginner_tutorials/package.xml
```

The GitHub browser tab shows the repository `ntwong0/ros-curriculum`. The terminal window shows the user's session on a machine named `file12610@MS-7850` running ROS. The terminal output includes:

- Setting up a new branch named `workon-module-1`.
- Adding files to the staging area: `.gitignore`, `src/beginner_tutorials/CMakeLists.txt`, and `src/beginner_tutorials/package.xml`.
- Committing the changes with the message: "catkin_ws and beginner_tutorials".
- Outputting the commit hash: `100644 catkin_ws/.gitignore`, `100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt`, and `100644 catkin_ws/src/beginner_tutorials/package.xml`.

ros-curriculum

Don't forget to **git add** the ignore file.

Here, we will also switch to a different branch to contain our work related to module1. To switch over to the branch, which previously did not exist, we use

```
git checkout -b  
"workon-module-1"
```

We then **git commit** our changes, and we use the **-m** flag to append a message describing this commit.

Finally, we **git push** onto the **origin** repo (the repo on our GitHub account) our committed changes from the **workon-module-1** branch

```
Thu 16:43
file:///home/ntwong0/ROS_Curriculum/catkin_ws
File Edit View Search Terminal Help
gitignore added to track but untracked files present (use "git add" to track)
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git add src/*
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstaged)
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .catkin_tools/
    build/
    devel/
    logs/
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ echo .catkin_tools >> .gitignore
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ echo build/ >> .gitignore
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ echo devel/ >> .gitignore
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ echo logs/ >> .gitignore
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Untracked files:
  (use "git add <file>..." to include in what will be committed)
    .gitignore
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git add .gitignore
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git checkout -b "workon-module-1"
A catkin_ws/.gitignore
A catkin_ws/src/beginner_tutorials/CMakeLists.txt
A catkin_ws/src/beginner_tutorials/package.xml
Switched to a new branch 'workon-module-1'
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git commit -m "got catkin_ws and beginner_tutorials"
3 files changed, 270 insertions(+)
create mode 100644 catkin_ws/.gitignore
create mode 100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt
create mode 100644 catkin_ws/src/beginner_tutorials/package.xml
flsht2e610@MS-7850:~/ros-curriculum/catkin_ws$ git push origin workon-module-1
```

ros-curriculum

Once the commit is pushed, we can see the result GitHub. Selecting **workon-module-1** will display the freshly uploaded branch.

The screenshot shows a Linux desktop environment with a terminal window and a GitHub browser tab. The terminal window is titled 'fishie2610@MS-7850: ~/ros-curriculum/catkin_ws' and displays a series of git commands for committing changes and pushing them to the 'workon-module-1' branch. The GitHub browser tab shows the 'ntwong0/ros-curriculum' repository, specifically the 'workon-module-1' branch, which has been updated with the new commit. An arrow points from the terminal window down to the GitHub commit message.

```
git add .catkin_tools/ >> .gitignore
git add .catkin_ws/echo build/ >> .gitignore
git add .catkin_ws/echo devel/ >> .gitignore
git add .catkin_ws/echo install/ >> .gitignore
git add .catkin_ws/echo status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file! src/beginner_tutorials/CMakeLists.txt
    new file! src/beginner_tutorials/package.xml
Untracked files:
  (use "git add <file>" to include in what will be committed)
    .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git add .gitignore
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file! .gitignore
    new file! src/beginner_tutorials/CMakeLists.txt
    new file! src/beginner_tutorials/package.xml
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git checkout -b workon-module-1
A catkin_ws/.gitignore
A catkin_ws/src/beginner_tutorials/CMakeLists.txt
A catkin_ws/src/beginner_tutorials/package.xml
Switched to a new branch 'workon-module-1'
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Changes to be committed:
  (use "git reset HEAD <file>" to unstage)
    new file! .gitignore
    new file! src/beginner_tutorials/CMakeLists.txt
    new file! src/beginner_tutorials/package.xml
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git commit -m "got catkin_ws and beginner_tutorials"
[master 180644] got catkin_ws and beginner_tutorials
 3 files changed, 278 insertions(+)
create mode 100644 catkin_ws/.gitignore
create mode 100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt
create mode 100644 catkin_ws/src/beginner_tutorials/package.xml
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$ git push origin workon-module-1
Counting objects: 8, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (8/8), 2.67 KB / 1.22 MB/s, done.
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: Create a pull request for 'workon-module-1' on GitHub by visiting:
remote:   https://github.com/ntwong0/ros-curriculum/pull/new/workon-module-1
remote:
To https://github.com/ntwong0/ros-curriculum.git
 * [new branch]      workon-module-1 -> workon-module-1
fishie2610@MS-7850:~/ros-curriculum/catkin_ws$
```

GitHub Repository: ntwong0/ros-curriculum

Branch: workon-module-1 (less than a minute ago)

Changes:

- prepared modules 1, 2, and 3
- readings updated modules 1-3, completed modules 4 and 5, textbook uploaded, al...
- LICENSE Initial commit
- README.md Update README.md
- module1.md Added a page on the catkin workspace file structure
- module2.md added notes associating assignment assets to their respective descrip...
- module3.md added notes associating assignment assets to their respective descrip...
- module4.md added notes associating assignment assets to their respective descrip...
- module5.md Update module5.md

README.md

ROS Curriculum for Robotics Software

Adapted from the February 2020 iteration of ETH Zurich's Programming for Robotics - ROS course and official ROS documentation

Prerequisites

- Basic understanding of Python (variables, classes, for-loops)
- Basic understanding of C++

ros-curriculum

Once the commit is pushed, we can see the result GitHub. Selecting **workon-module-1** will display the freshly uploaded branch.

As we can see in the **workon-module-1** branch, the **catkin_ws** directory now appears

The screenshot shows a terminal window with a GitHub commit history and a file browser. The terminal output at the bottom right shows the command `git push origin workon-module-1` being run, with progress and status messages. The GitHub commit history shows a commit from "ntwong0" titled "got catkin_ws and beginner_tutorials". The commit message includes a link to the ROS Curriculum for Robotics Software. The file browser shows the "workon-module-1" branch, which contains a "catkin_ws" directory. Two orange arrows point to the "catkin_ws" directory in the file browser and the "catkin_ws" entry in the commit history.

```
fish[2]@fish2610:~/ros-curriculum$ git push origin workon-module-1
Counting objects: 8, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (8/8), 2.67 KB / 1.22 MB, done.
remote: Total 8 (delta 7), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: Create a pull request for 'workon-module-1' on GitHub by visiting:
remote:   https://github.com/ntwong0/ros-curriculum/pull/new/workon-module-1
remote:
To https://github.com/ntwong0/ros-curriculum.git
 * [new branch]  workon-module-1 -> workon-module-1
fish[2]@fish2610:~/ros-curriculum/catkin_ws$
```

Thu 16:43

File Edit View Search Terminal Help

Untracked files:

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

```
  catkin_ws/
  build/
  devel/
  logs/
```

```
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ echo .catkin_tools >> .gitignore
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ echo build/ >> .gitignore
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ echo devel/ >> .gitignore
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ echo logs/ >> .gitignore
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file: src/beginner_tutorials/CMakeLists.txt
    new file: src/beginner_tutorials/package.xml
```

Untracked files:

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

```
  .gitignore
```

```
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ git add .gitignore
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file: .gitignore
    new file: src/beginner_tutorials/CMakeLists.txt
    new file: src/beginner_tutorials/package.xml
```

```
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ git checkout -b "workon-module-1"
A  catkin_ws/.gitignore
A  catkin_ws/src/beginner_tutorials/CMakeLists.txt
A  catkin_ws/src/beginner_tutorials/package.xml
Switched to a new branch 'workon-module-1'
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file: .gitignore
    new file: src/beginner_tutorials/CMakeLists.txt
    new file: src/beginner_tutorials/package.xml
```

```
fish[2]@fish2610:~/ros-curriculum/catkin_ws$ git commit -m "got catkin_ws and beginner_tutorials"
[workon-module-1 000444 catkin_ws/.gitignore 0]
[workon-module-1 000444 catkin_ws/src/beginner_tutorials/CMakeLists.txt 0]
[workon-module-1 000444 catkin_ws/src/beginner_tutorials/package.xml 0]
Counting objects: 8, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (8/8), 2.67 KB / 1.22 MB, done.
remote: Total 8 (delta 7), reused 0 (delta 0)
remote: Resolving deltas: 100% (1/1), completed with 1 local object.
remote:
remote: Create a pull request for 'workon-module-1' on GitHub by visiting:
remote:   https://github.com/ntwong0/ros-curriculum/pull/new/workon-module-1
remote:
To https://github.com/ntwong0/ros-curriculum.git
 * [new branch]  workon-module-1 -> workon-module-1
fish[2]@fish2610:~/ros-curriculum/catkin_ws$
```

Activities Google Chrome

ntwong0/ros-curriculum

Pull requests Issues Marketplace Explore

ROS Curriculum for SJTU Robotics Team - Intelligent Systems Division

Manage topics

14 commits 2 branches 0 packages 0 releases A 1 contributor MIT

Your recently pushed branches:

Branch: **workon-module-1** (less than a minute ago)

New pull request Create new file Upload files Find file Clone or download

This branch is 1 commit ahead of SJTU-Robotics:master.

Branch: **workon-module-1** - New pull request

Latest commit fd7fbf 1 minute ago

ntwong0 got catkin_ws and beginner_tutorials

Prepared modules 1, 2, and 3

assignments prepared modules 1, 2, and 3

catkin_ws got catkin_ws and beginner_tutorials

readings updated modules 1-3, completed modules 4 and 5, textbook uploaded, al...

LICENSE Initial commit

README.ind Update README.md

module1.ind Added a page on the 'catkin' workspace file structure

module2.ind added notes associating assignment assets to their respective descrip...

module3.ind added notes associating assignment assets to their respective descrip...

module4.ind added notes associating assignment assets to their respective descrip...

module5.ind Update module5.md

README.md

ROS Curriculum for Robotics Software

Adapted from the February 2020 iteration of ETH Zurich's Programming for Robotics - ROS course and official ROS documentation

Prerequisites

Basic understanding of Python (variables, loops, functions)

ros-curriculum

Once the commit is pushed, we can see the result GitHub. Selecting **workon-module-1** will display the freshly uploaded branch.

As we can see in the **workon-module-1** branch, the **catkin_ws** directory now appears

The screenshot shows a terminal window with a GitHub commit history and a file browser. The commit history lists several commits from the 'workon-module-1' branch, including one from 'ntwong0' that added a 'catkin_ws' directory. The file browser shows the contents of the 'catkin_ws' directory, which includes 'assessments', 'readings', and 'LICENSE'. The terminal window also displays the command used to push the changes to GitHub.

```
Thu 16:43
File Edit View Search Terminal Help
Untracked files:
(use "git add <file>..." to include in what will be committed)
    catkin_ws/
        build/
        devel/
        logs/
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ echo .catkin_tools >> .gitignore
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ echo build/ >> .gitignore
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ echo devel/ >> .gitignore
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ echo logs/ >> .gitignore
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Untracked files:
(use "git add <file>..." to include in what will be committed)
    .gitignore
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git add .gitignore
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git checkout -b "workon-module-1"
A      catkin_ws/.gitignore
A      catkin_ws/src/beginner_tutorials/CMakeLists.txt
A      catkin_ws/src/beginner_tutorials/package.xml
Switched to a new branch 'workon-module-1'
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git status
On branch workon-module-1
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
    new file:   .gitignore
    new file:   src/beginner_tutorials/CMakeLists.txt
    new file:   src/beginner_tutorials/package.xml
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git commit -m "got catkin_ws and beginner_tutorials"
[workon-module-1 100% (2/2), 278 bytes]
create mode 100644 catkin_ws/.gitignore
create mode 100644 catkin_ws/src/beginner_tutorials/CMakeLists.txt
create mode 100644 catkin_ws/src/beginner_tutorials/package.xml
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$ git push origin workon-module-1
Counting objects: 8, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (8/8), 2.67 KB | 1.22 MB/s, done.
remote: Resolving deltas: 100% (4/4), completed with 1 local object.
remote:
remote: Create a pull request for 'workon-module-1' on GitHub by visiting:
remote:   https://github.com/ntwong0/ros-curriculum/pull/new/workon-module-1
remote:
To github.com:ntwong0/ros-curriculum.git
 * [new branch]  workon-module-1 -> workon-module-1
Fishe2e210@MS-7850:~/ros-curriculum/catkin_ws$
```

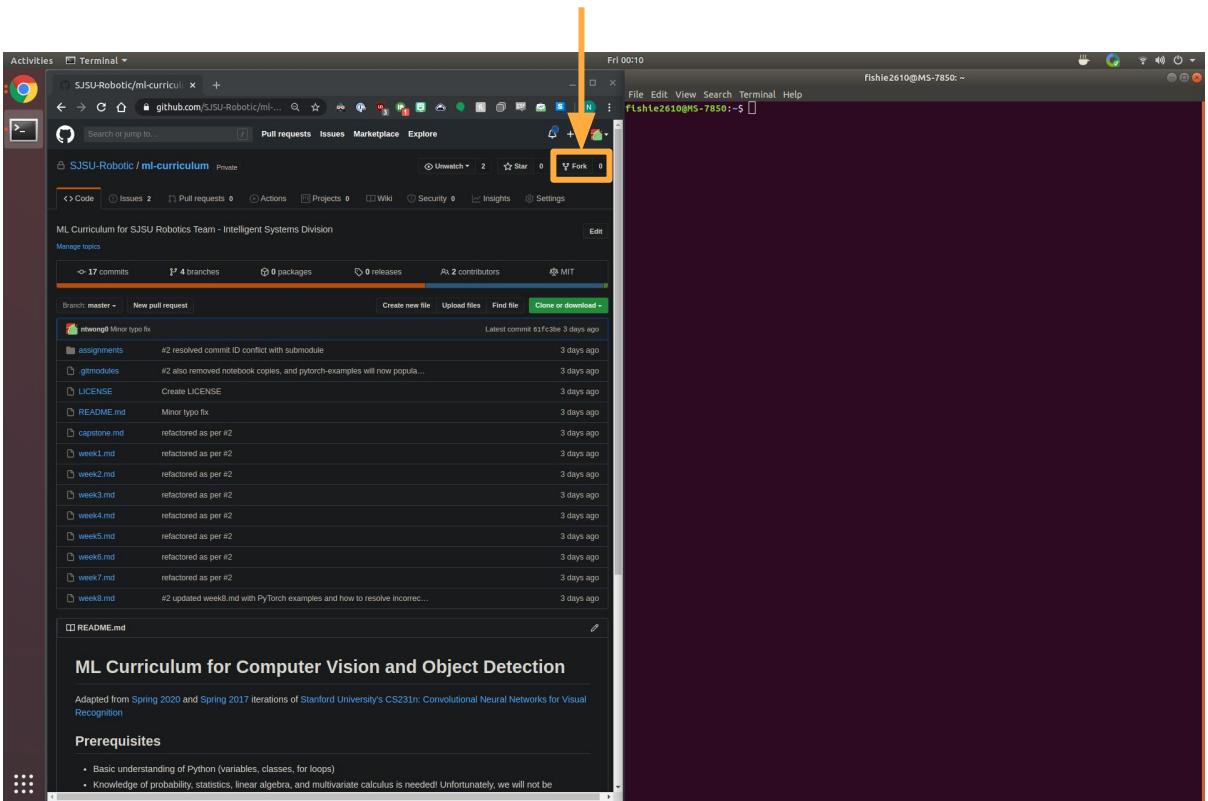
ml-curriculum

ml-curriculum

You can use the course repo as a container for your ROS workspace.

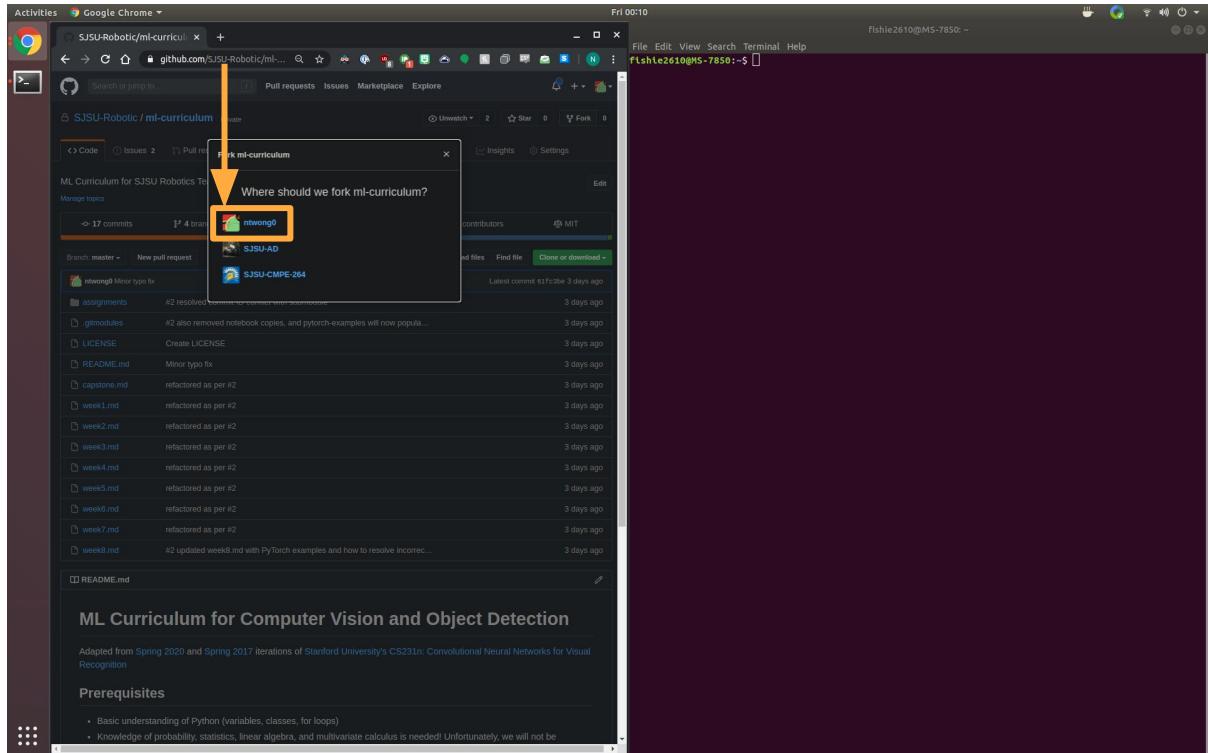
First, we start with the repo page on the left, and a terminal window on the right.

[Create a fork of the repo](#) to your GitHub account by selecting the [Fork] button.



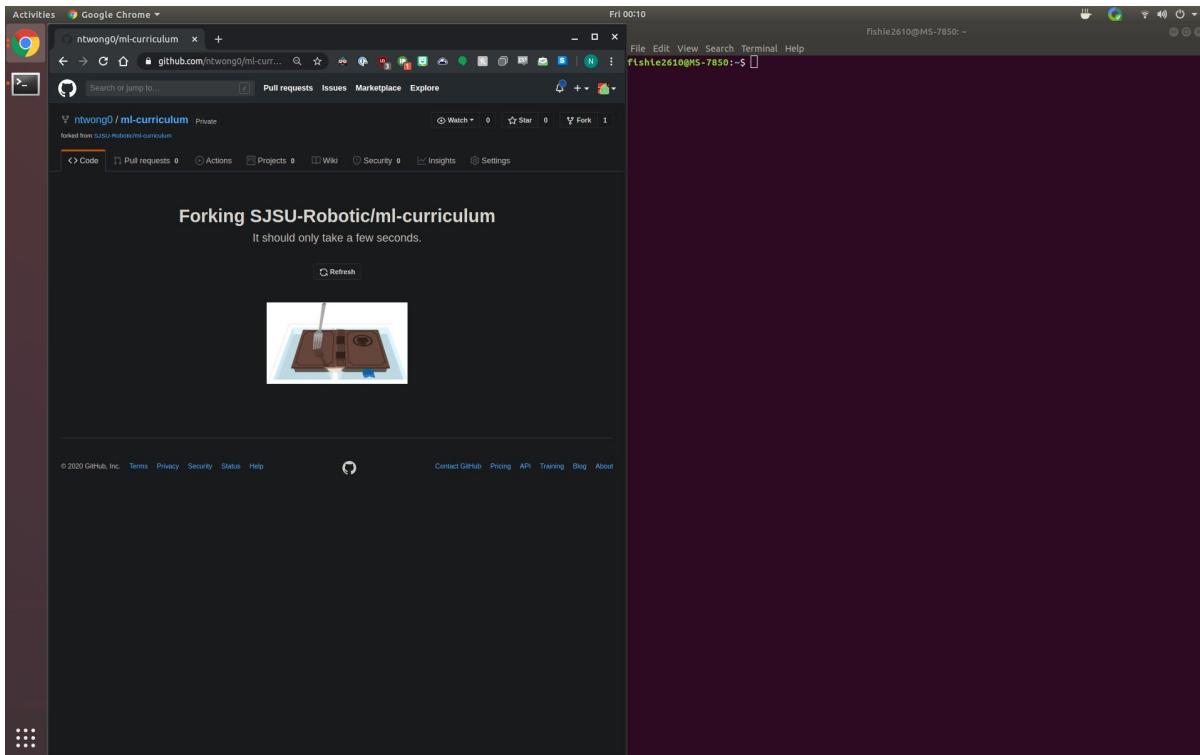
ml-curriculum

Select your account as the fork destination



ml-curriculum

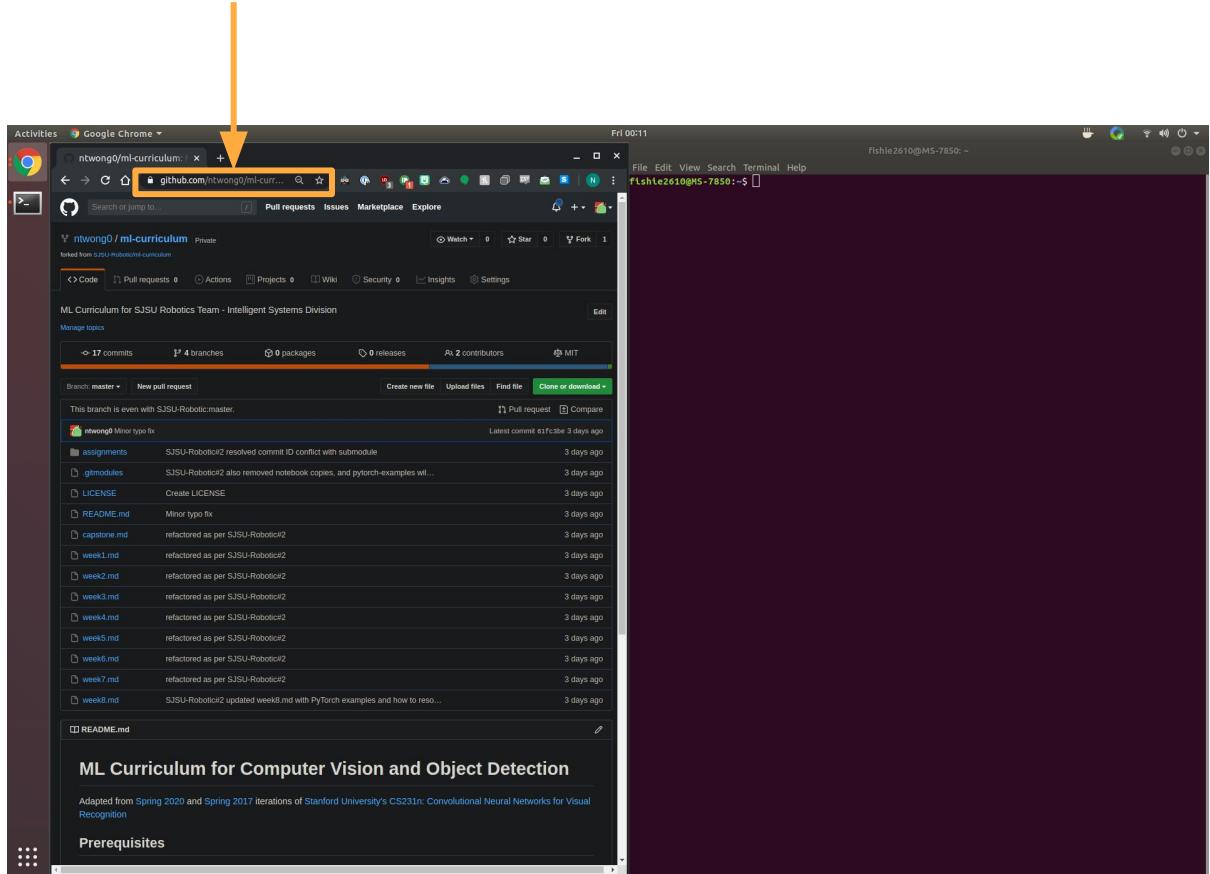
Forking will take a few seconds.



ml-curriculum

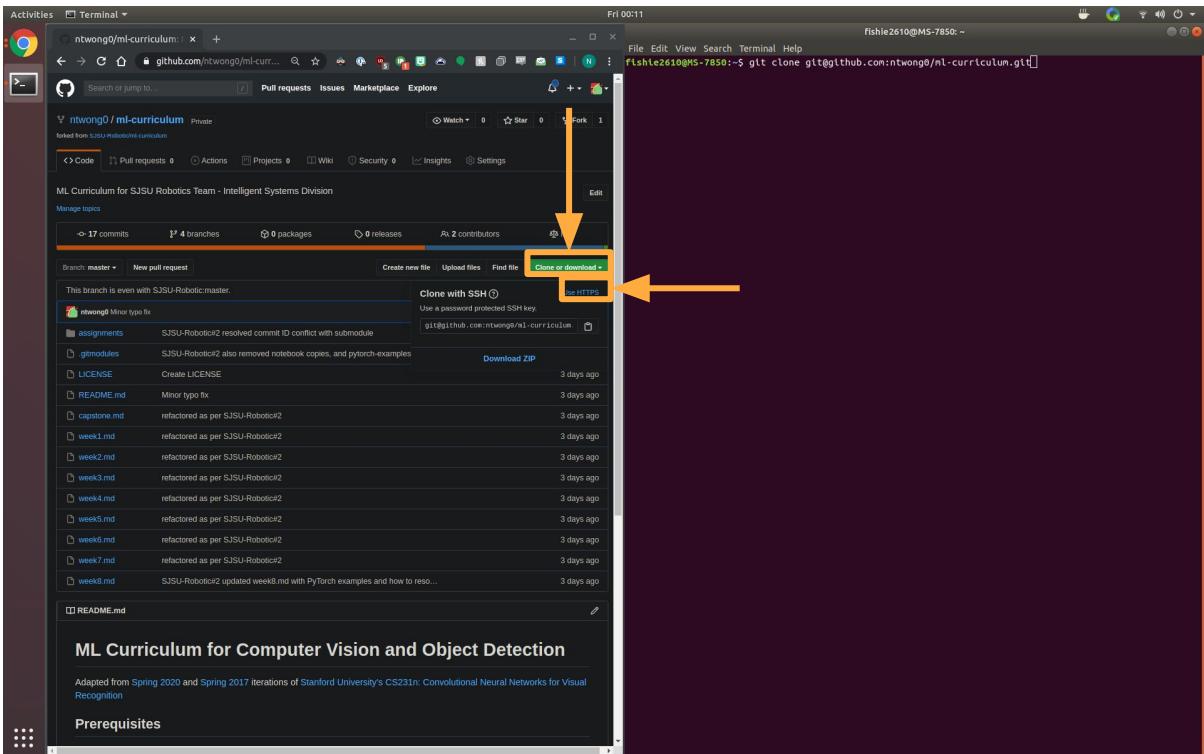
The fork is now complete, and it is now accessible at

github.com/<yourAcct>/ml-curriculum



ml-curriculum

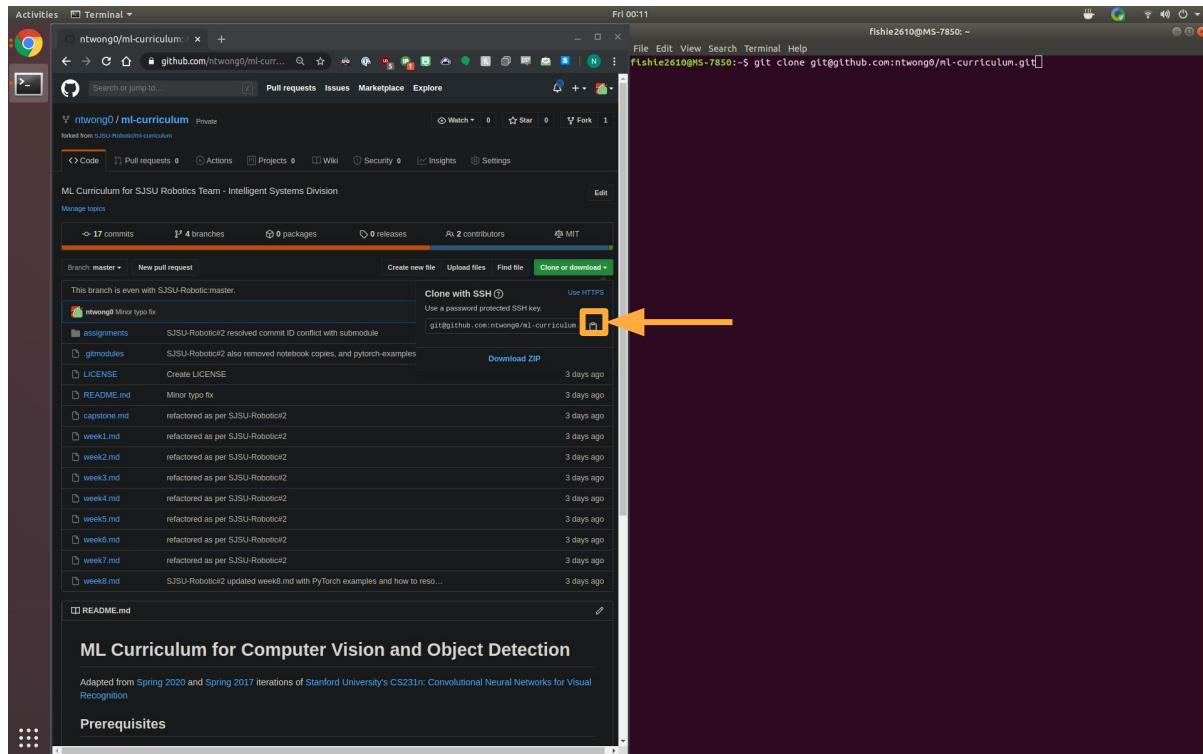
Select [Clone or download], then select [Use SSH] to reveal the URL.



ml-curriculum

Select [Clone or download], then select [Use SSH] to reveal the URL.

Copy the URL to your clipboard.



ml-curriculum

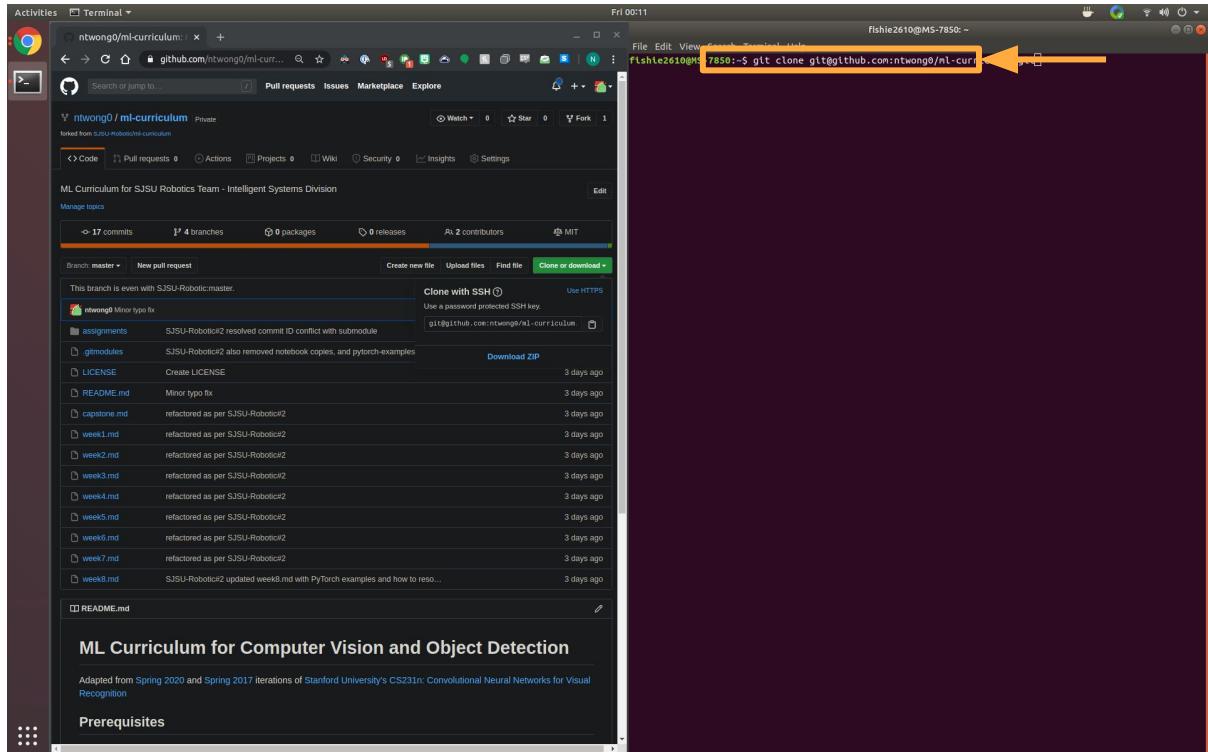
Select [Clone or download], then select [Use SSH] to reveal the URL.

Copy the URL to your clipboard.

In the terminal window, type

```
git clone
```

then paste the URL, and hit enter.



ml-curriculum

The repo is cloned into a folder at the current working directory. If you use the `ls` command to list the working directory's contents, the `ros-curriculum` folder is listed

A screenshot of a Linux desktop environment showing a terminal window and a file browser.

The terminal window (fishie2610@MS-7850: ~) shows the command `git clone git@github.com:ntwong0/ml-curriculum.git` being run, followed by the output of the cloning process:

```
Cloning into 'ml-curriculum'...
remote: Enumerating objects: 340, done.
remote: Counting objects: 100% (340/340), done.
remote: Compressing objects: 100% (144/144), done.
remote: Total 340 (delta 118), reused 139 (delta 118), pack-reused 0
Receiving objects: 100% (340/340), 4.47 MB | 8.94 MB/s, done.
Resolving deltas: 100% (144/144), done.
fishie2610@MS-7850: ~$ ls
```

The file browser (Activities Terminal) shows the contents of the `ml-curriculum` directory, which includes files like `LICENSE`, `README.md`, and several `weekX.md` files.

ml-curriculum

The repo is cloned into a folder at the current working directory. If you use the `ls` command to list the working directory's contents, the `ros-curriculum` folder is listed

A screenshot of a Linux desktop environment showing a terminal window and a file browser.

The terminal window (fishie2610@MS-7850: ~) shows the command `git clone git@github.com:ntwong0/ml-curriculum.git` being run, followed by the output of the cloning process:

```
Cloning into 'ml-curriculum'...
remote: Enumerating objects: 340, done.
remote: Counting objects: 100% (340/340), done.
remote: Compressing objects: 100% (207/207), done.
remote: Total 340 (delta 144), reused 149 (delta 118), pack-reused 0
Receiving objects: 100% (340/340), 4.47 MB | 8.94 MB/s, done.
Resolving deltas: 100% (144/144), done.
fishie2610@MS-7850: ~$ ls
```

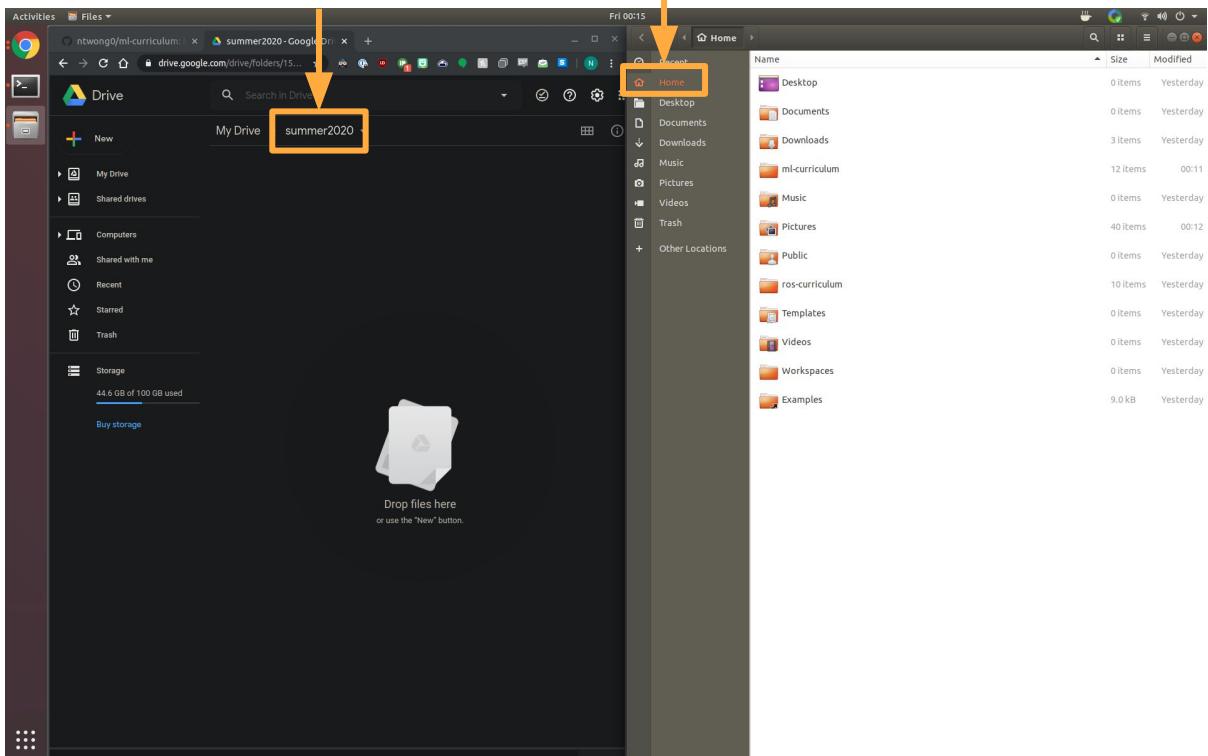
The file browser (Activities Terminal) shows the contents of the `ml-curriculum` directory, which includes files like `LICENSE`, `README.md`, and several `weekX.md` files.

ml-curriculum

Now that we have cloned the folder, let's upload the assignment files to Google Drive.

In our browser, open Google Drive, and create a folder called **summer2020**

Let's also open a file explorer window (you can use the **Ctrl + N** hotkey), and select the Home directory



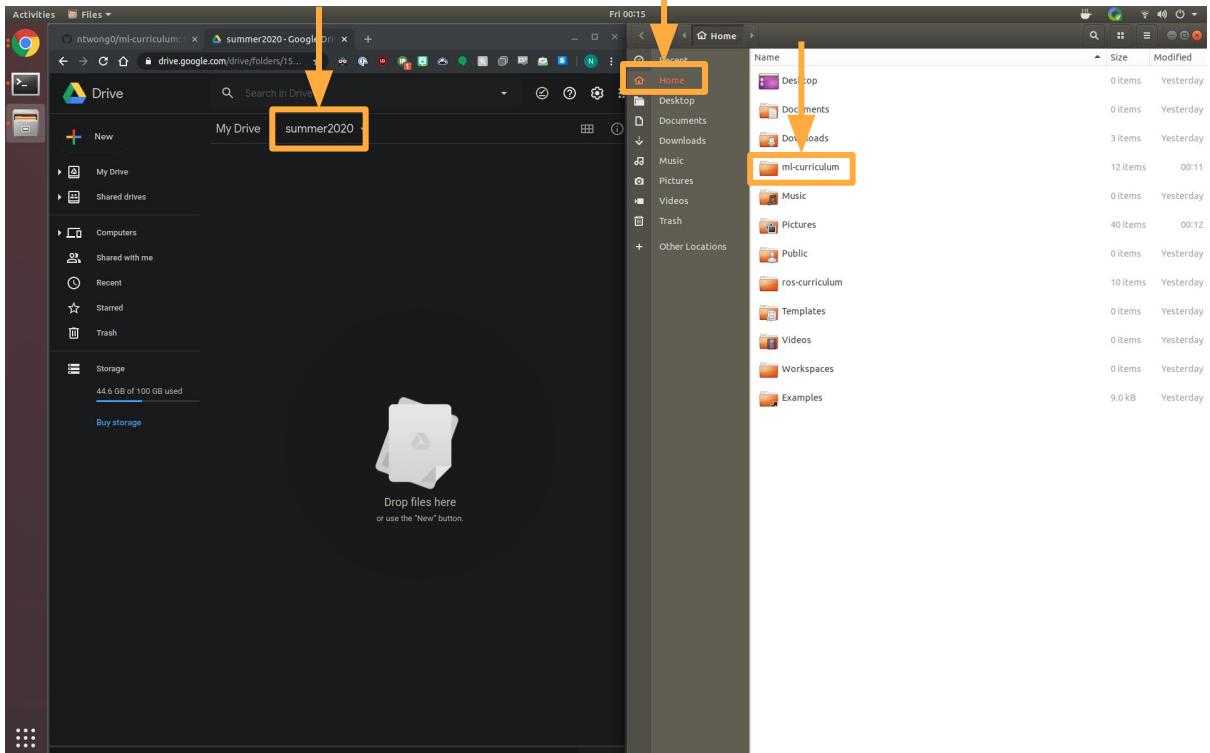
ml-curriculum

Now that we have cloned the folder, let's upload the assignment files to Google Drive.

In our browser, open Google Drive, and create a folder called **summer2020**

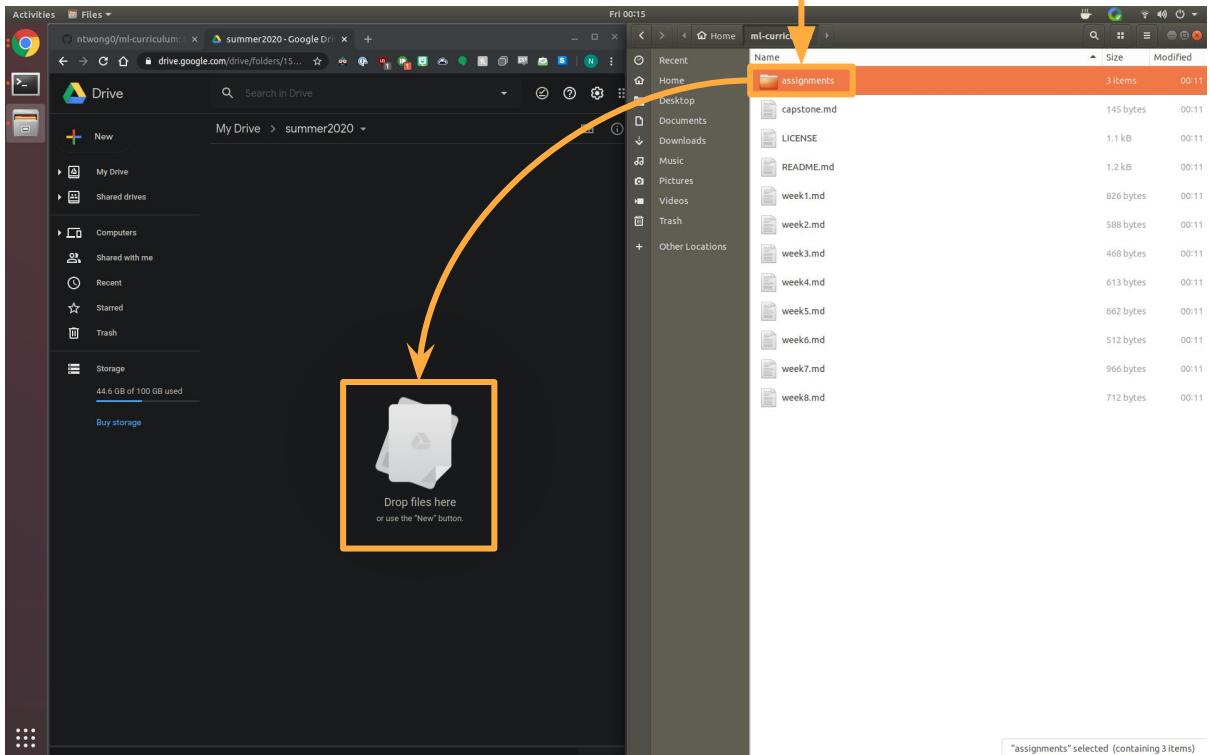
Let's also open a file explorer window (you can use the **Ctrl + N** hotkey), and select the Home directory.

Then, double-click to open the **ml-curriculum** directory



ml-curriculum

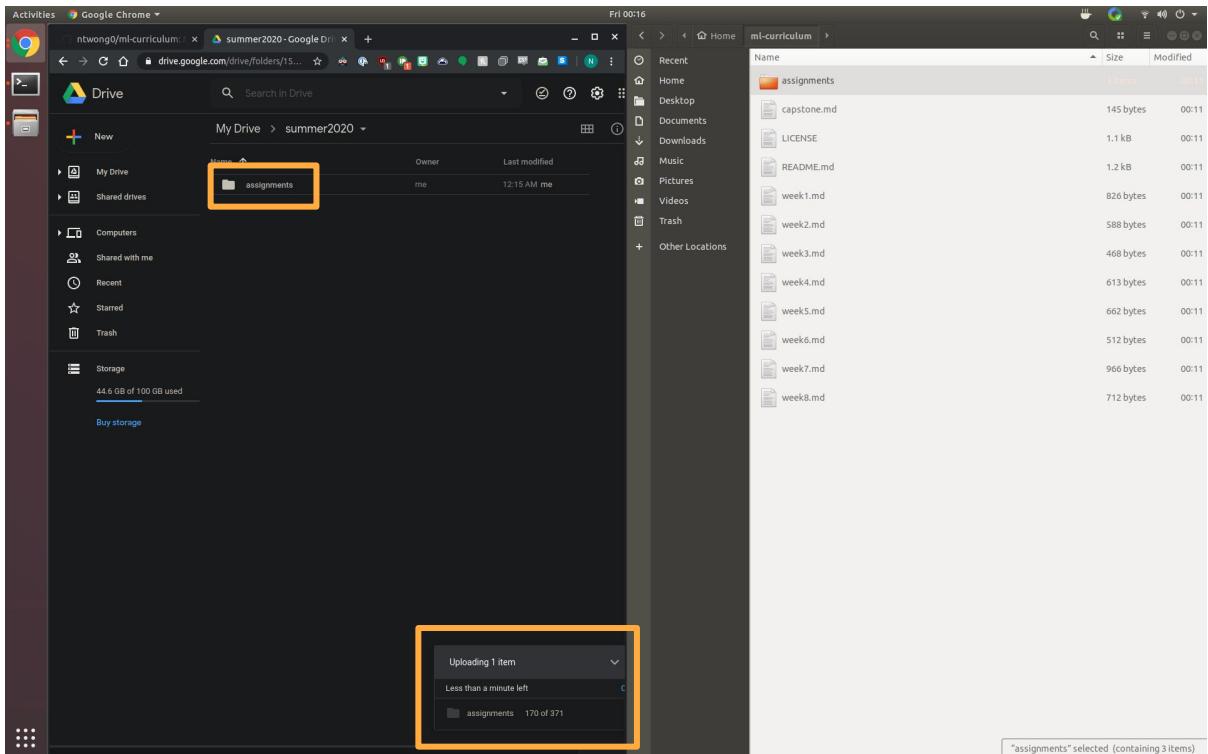
Then, select the **assignments** directory, and drag-and-drop the assignments directory into **summer2020**...



ml-curriculum

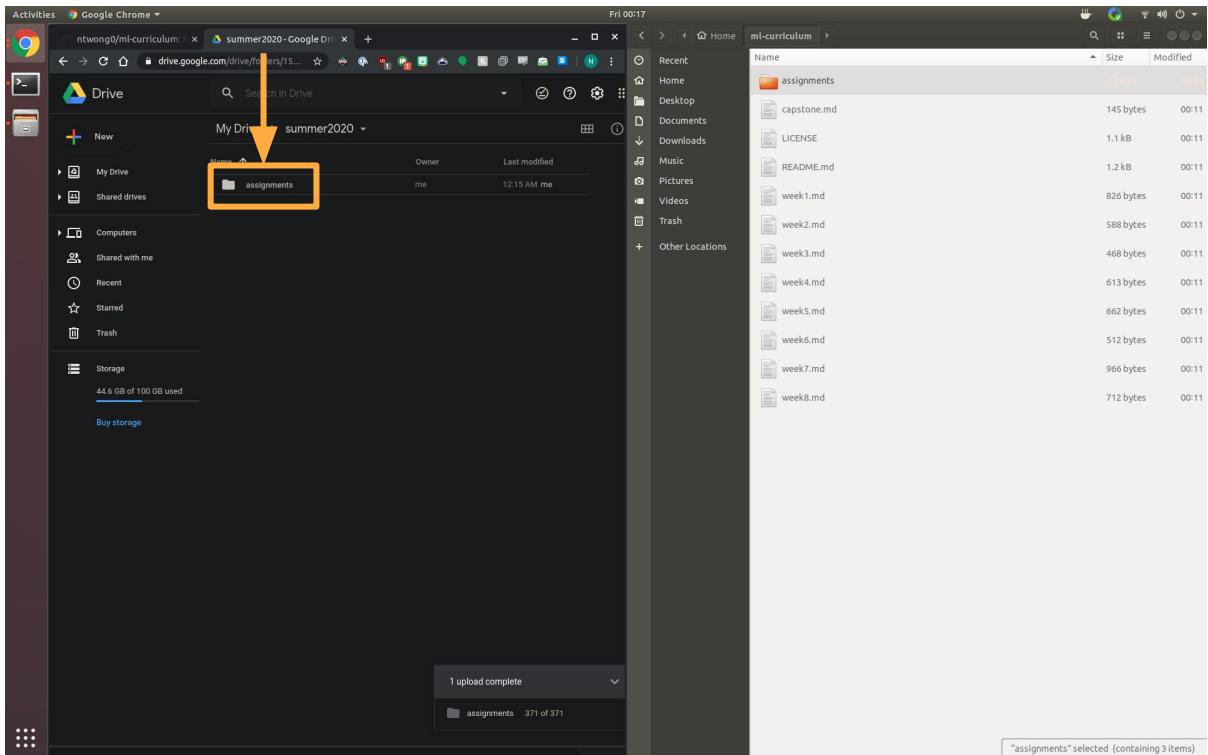
Then, select the **assignments** directory, and drag-and-drop the assignments directory into **summer2020**...

...and the directory will begin to upload to your Google Drive.



ml-curriculum

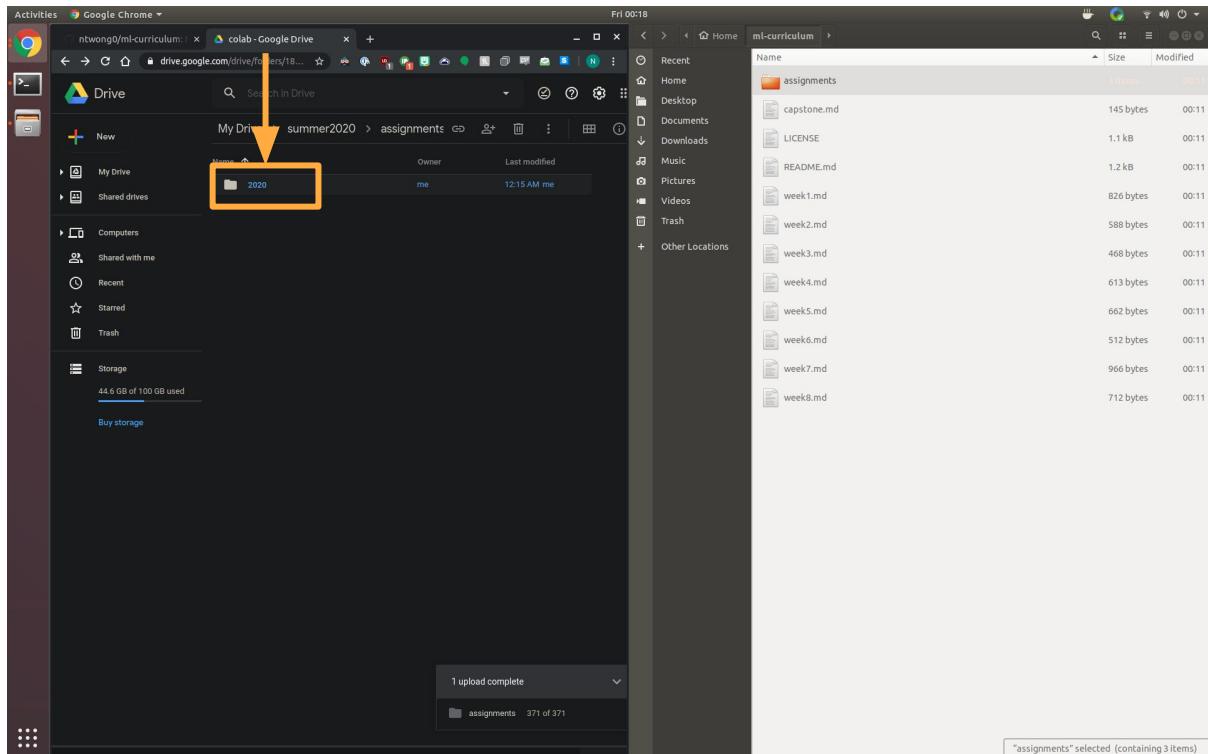
Once the upload is complete,
double-click to open the **assignments**
folder...



ml-curriculum

Once the upload is complete,
double-click to open the **assignments**
folder...

...then double-click to open the **2020**
folder...



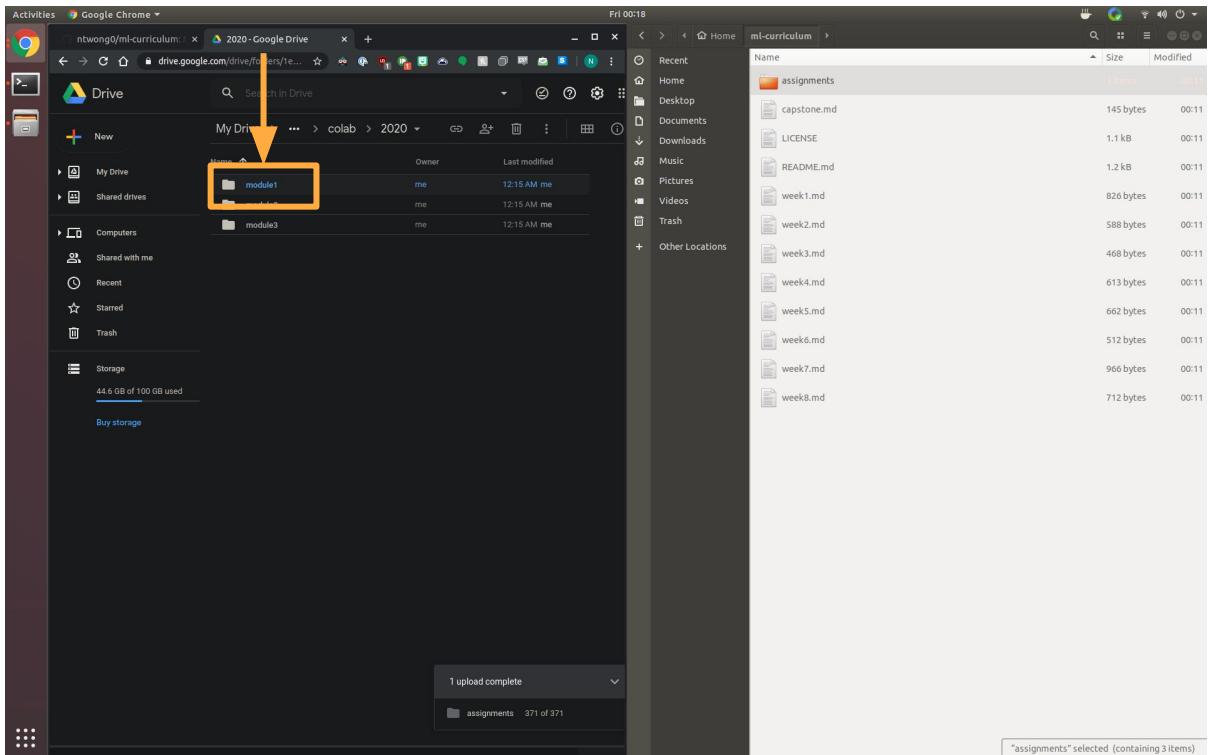
ml-curriculum

Once the upload is complete,
double-click to open the **assignments**
folder...

...then double-click to open the **2020**
folder...

...and then double-click again to open
the **module1** folder.

You are now able to access the
assignment files.

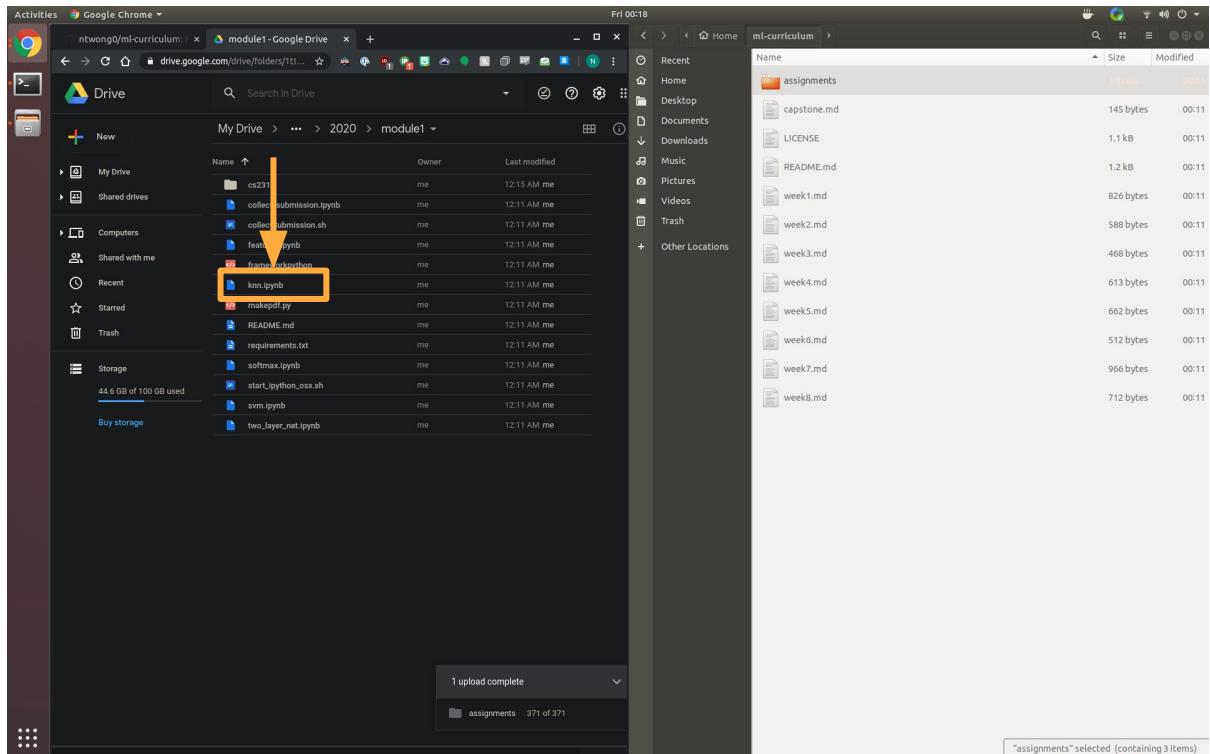


ml-curriculum

For each assignment, you'll need to modify both the `.ipynb` notebook file and the underlying `.py` implementation files.

First, we'll discuss the notebook file.

Right-click the `knn.ipynb` file...



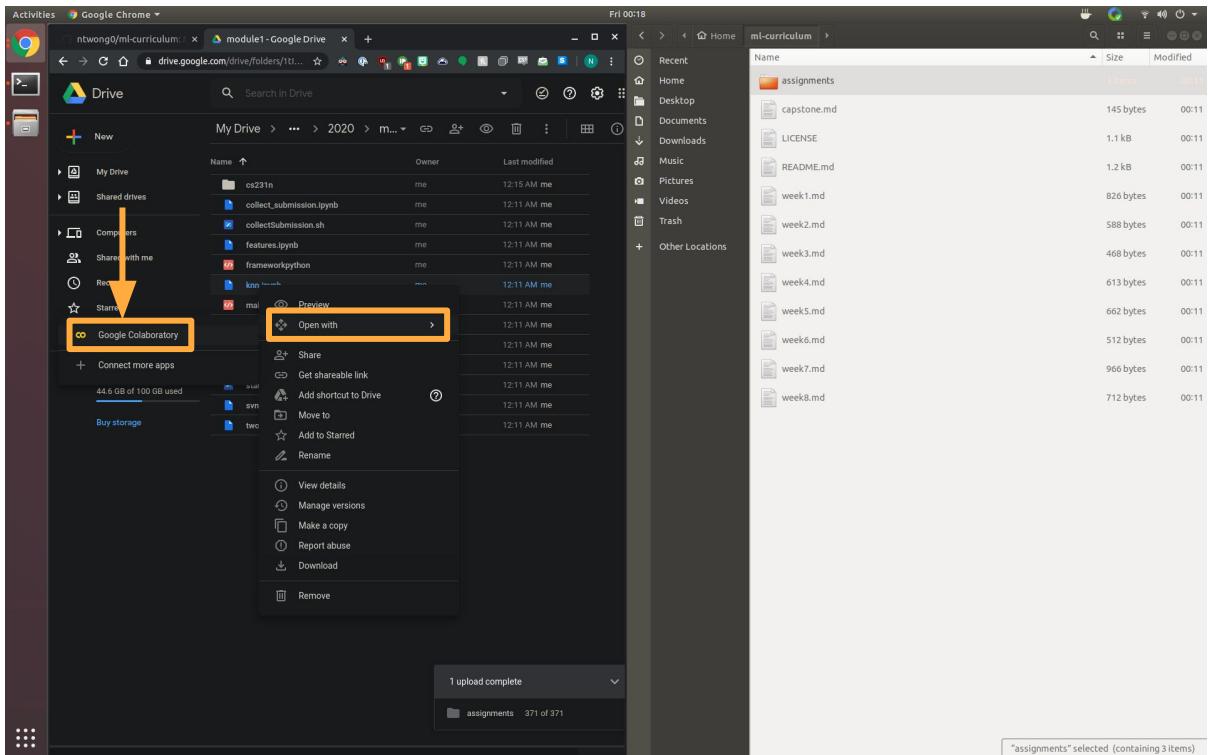
ml-curriculum

For each assignment, you'll need to modify both the `.ipynb` notebook file and the underlying `.py` implementation files.

First, we'll discuss the notebook file.

Right-click the `knn.ipynb` file...

...then hover over “Open with”, and select “Google Colaboratory”.



ml-curriculum

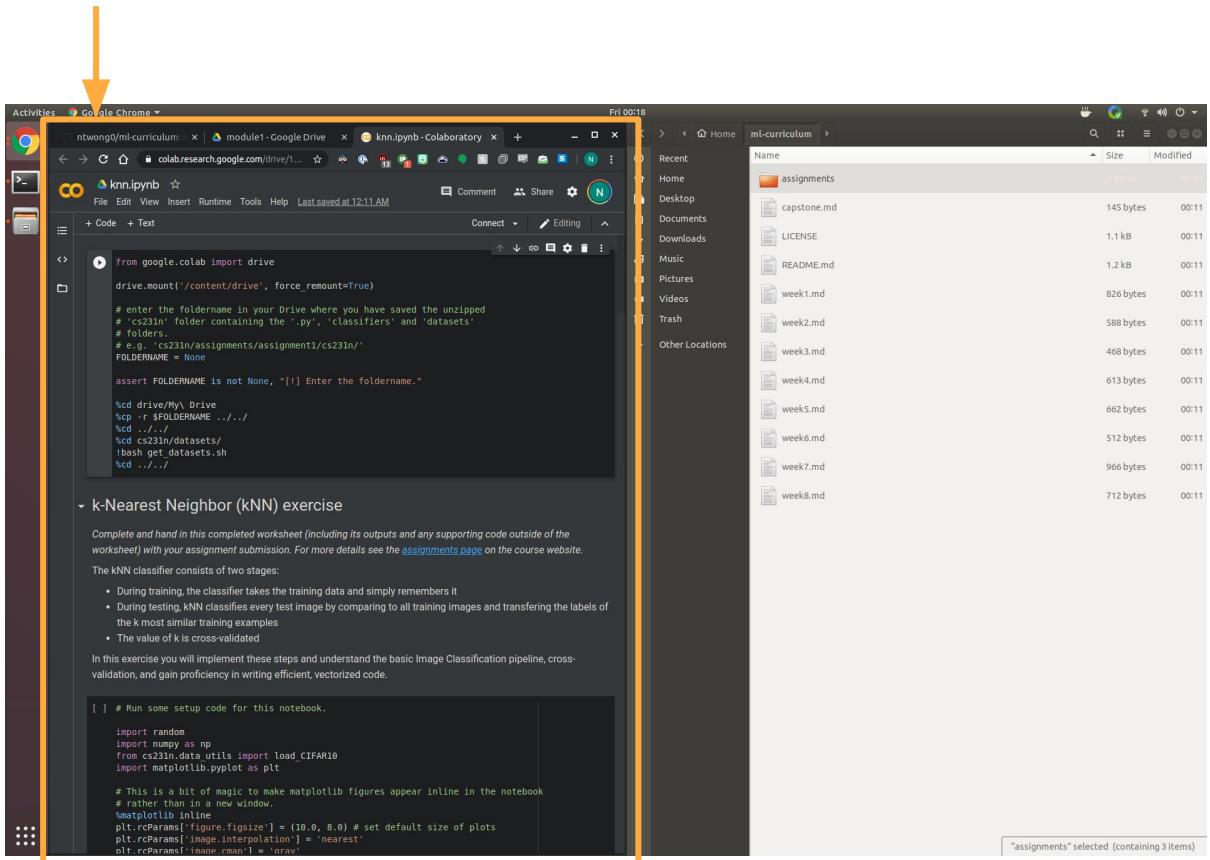
For each assignment, you'll need to modify both the **.ipynb** notebook file and the underlying **.py** implementation files.

First, we'll discuss the notebook file.

Right-click the **knn.ipynb** file...

...then hover over “Open with”, and select “Google Colaboratory”.

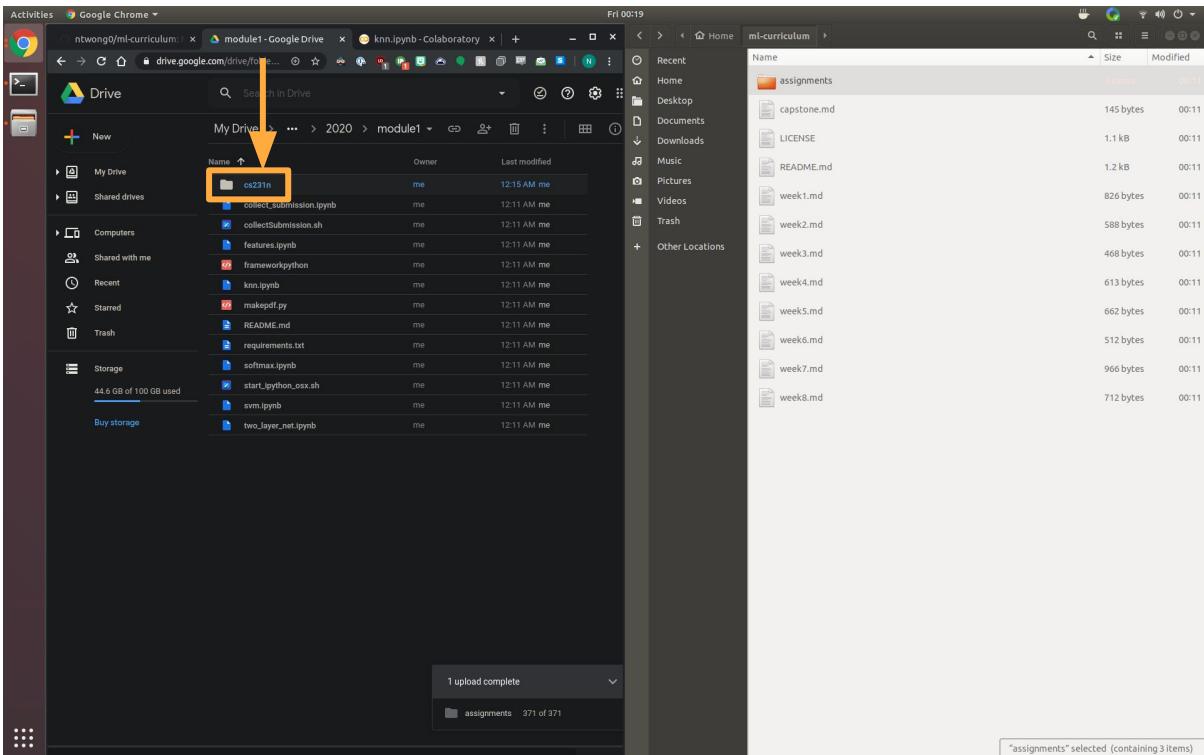
The notebook is now open via Google Colaboratory (colab), and you can proceed with the assignment here.



ml-curriculum

Next, we'll discuss the Python implementation file.

Back in the **module1** Google Drive folder, double-click to open **cs231n...**

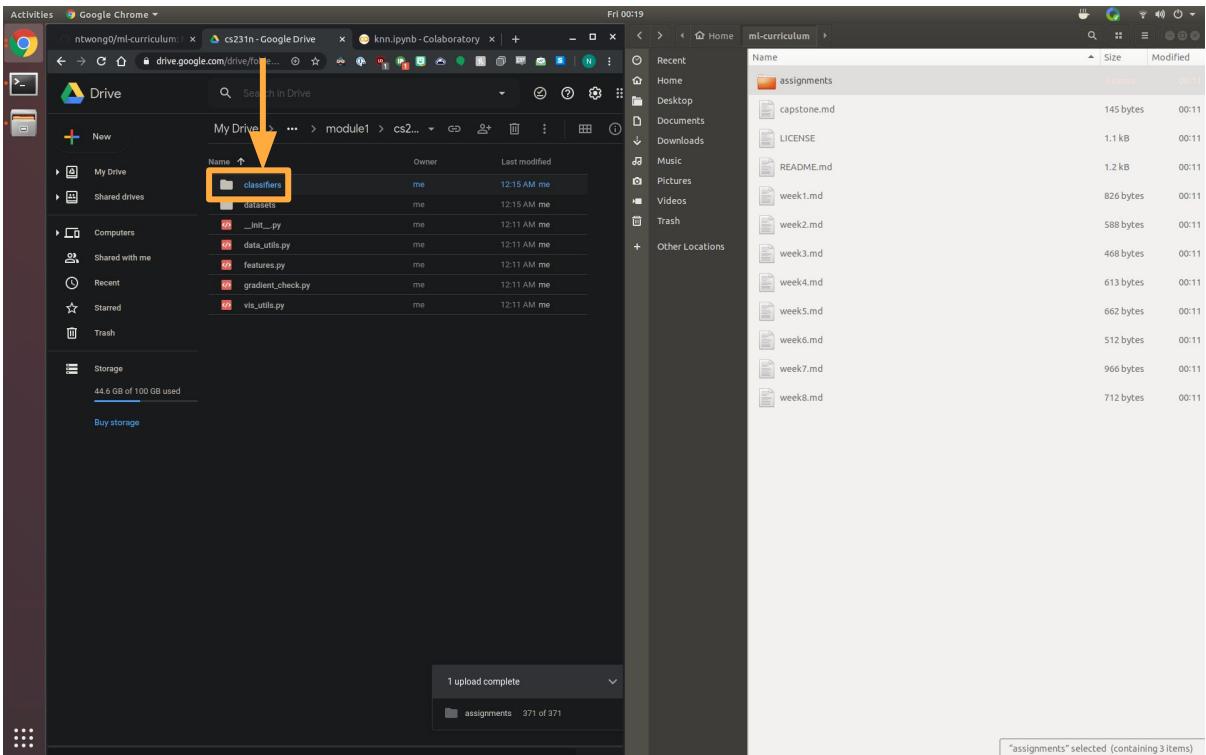


ml-curriculum

Next, we'll discuss the Python implementation file.

Back in the **module1** Google Drive folder, double-click to open **cs231n...**

...and double-click to open
classifiers...



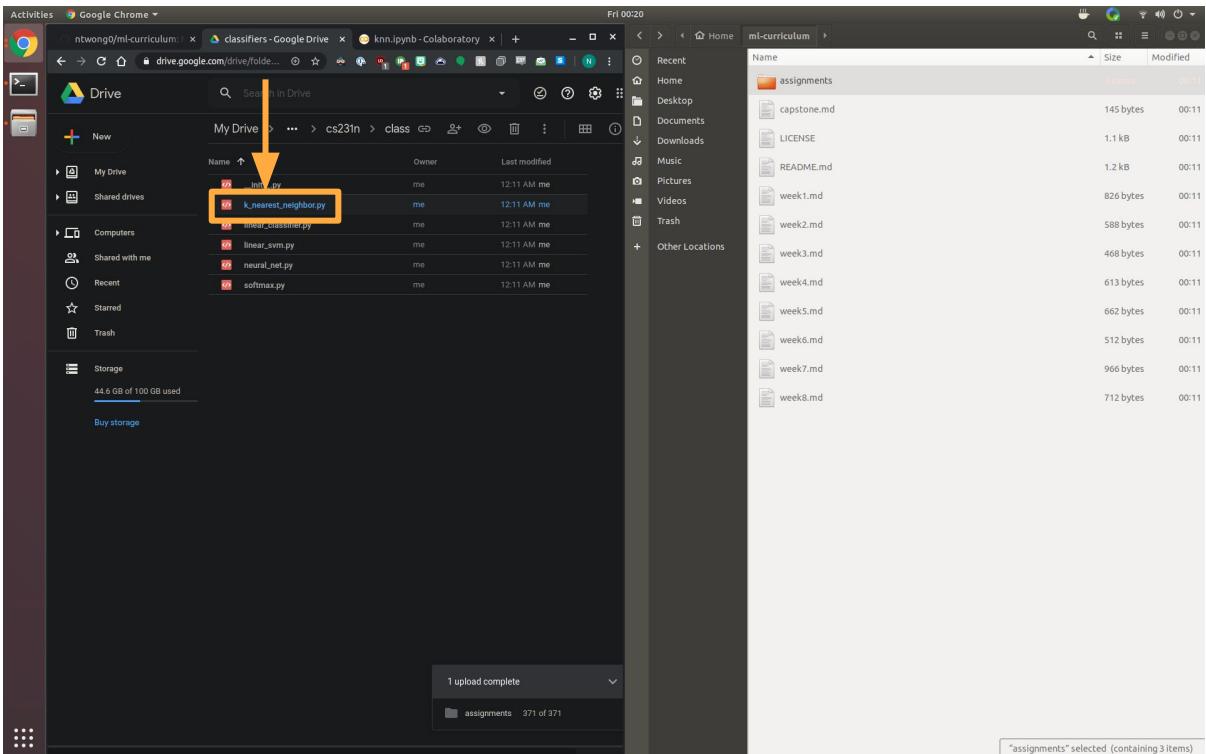
ml-curriculum

Next, we'll discuss the Python implementation file.

Back in the **module1** Google Drive folder, double-click to open **cs231n...**

...and double-click to open **classifiers...**

...and right-click on the implementation file of interest. Here, we have **k_nearest_neighbor.py**.



ml-curriculum

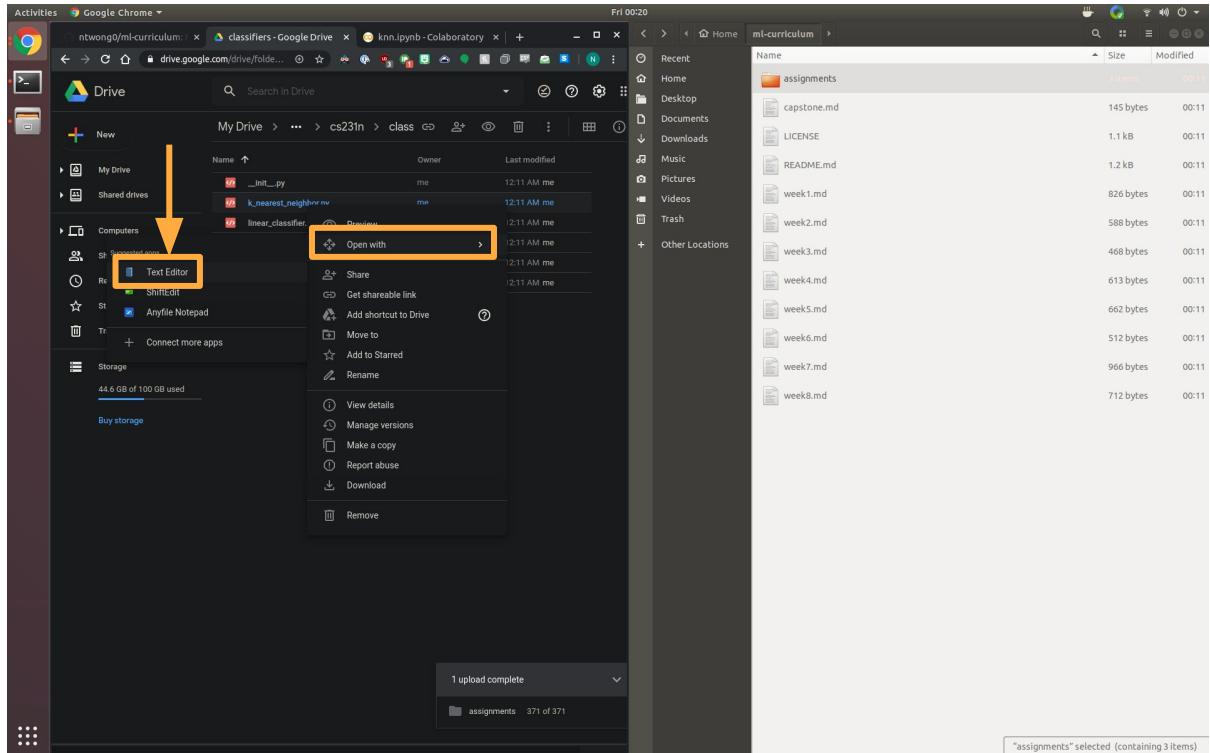
Next, we'll discuss the Python implementation file.

Back in the **module1** Google Drive folder, double-click to open **cs231n...**

...and double-click to open **classifiers...**

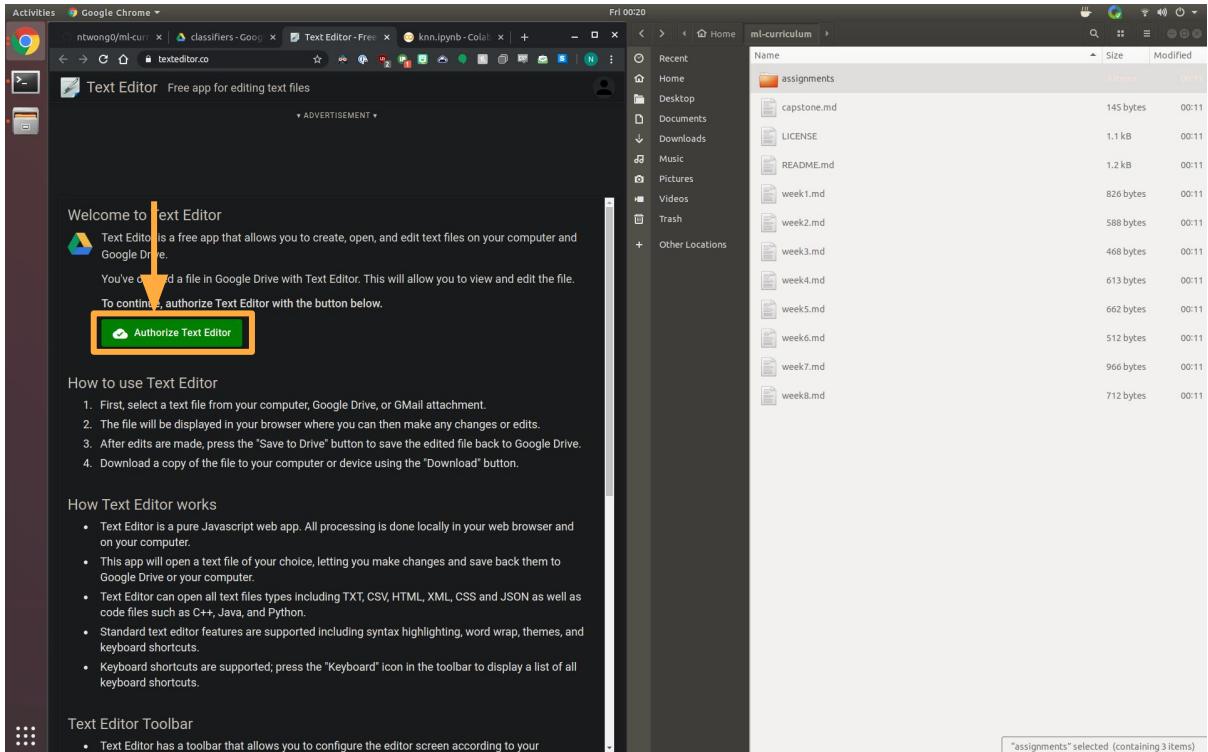
...and right-click on the implementation file of interest. Here, we have **k_nearest_neighbor.py**.

Hover over “Open with”, and select “Text Editor”.



ml-curriculum

You'll need to authorize Text Editor to proceed. Select "Authorize Text Editor"

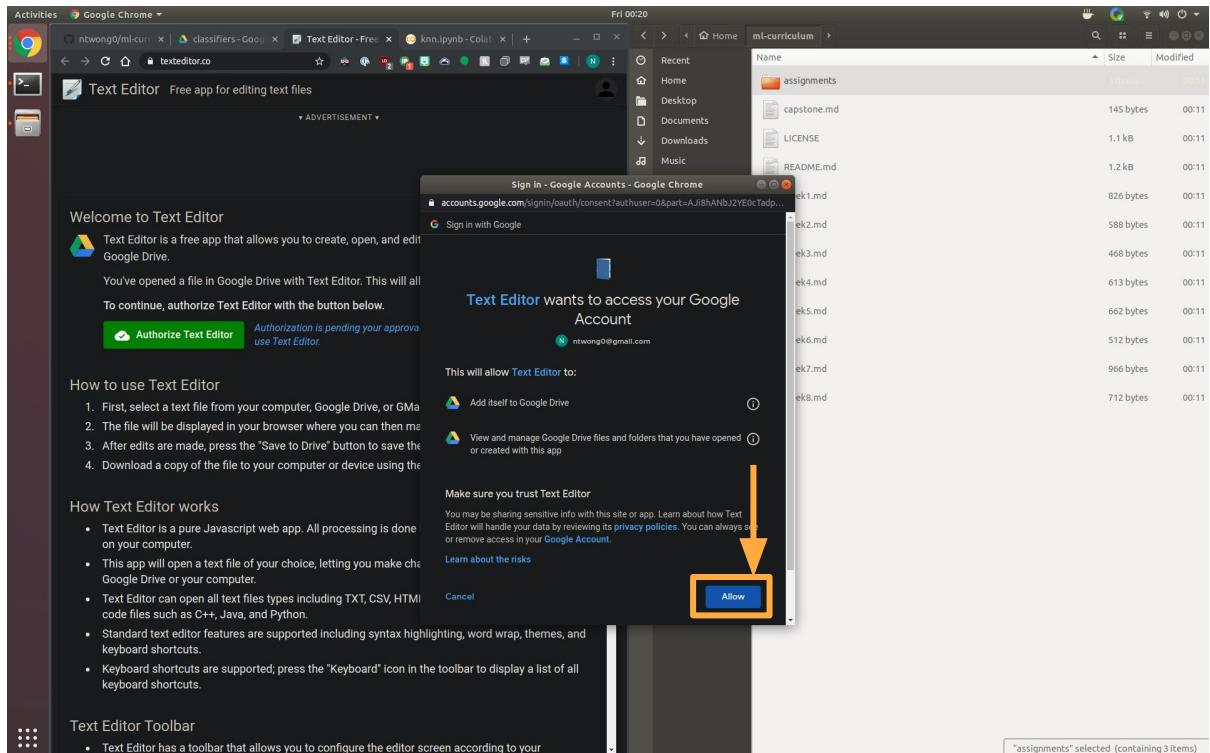


ml-curriculum

You'll need to authorize Text Editor to proceed. Select "Authorize Text Editor"

Then, select your account.

Then, select "Allow".



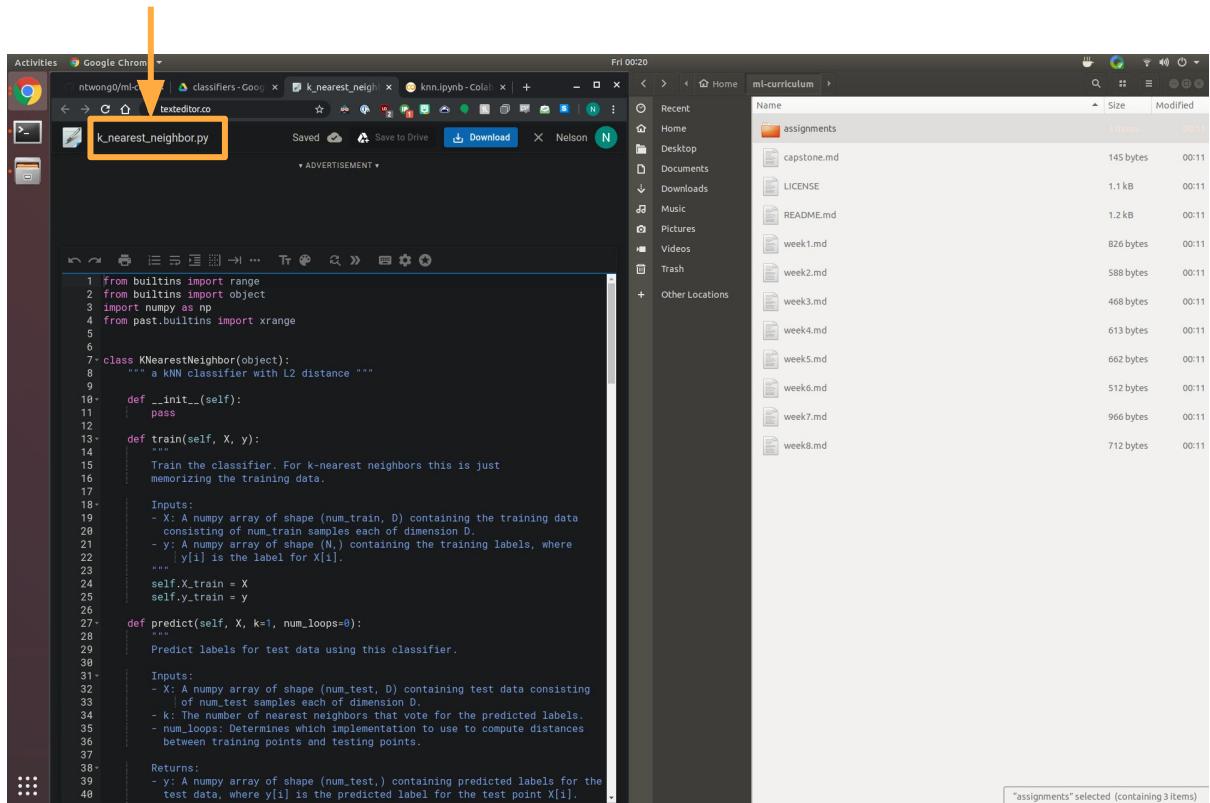
ml-curriculum

You'll need to authorize Text Editor to proceed. Select "Authorize Text Editor"

Then, select your account.

Then, select "Allow".

You are now able to edit
k_nearest_neighbor.py.



The screenshot shows a desktop environment with several windows open. On the left, a terminal window displays the command 'ntwong0/ml-curriculum\$' followed by a long list of files from 'LICENSE' to 'week8.md'. In the center, a text editor window titled 'k_nearest_neighbor.py' is open, showing Python code for a KNearestNeighbor classifier. An orange arrow points to the title bar of this text editor window. To the right, a file manager window titled 'ml-curriculum' shows a directory structure with files like 'assignments', 'capstone.md', 'LICENSE', 'README.md', etc. A tooltip at the bottom right of the file manager window says "'assignments' selected (containing 3 items)'.

```
1  from builtins import range
2  from builtins import object
3  import numpy as np
4  from past.builtins import xrange
5
6
7  class KNearestNeighbor(object):
8      """ a KNN classifier with L2 distance """
9
10     def __init__(self):
11         pass
12
13     def train(self, X, y):
14         """
15             Train the classifier. For k-nearest neighbors this is just
16             memorizing the training data.
17
18         Inputs:
19         - X: A numpy array of shape (num_train, D) containing the training data
20             consisting of num_train samples each of dimension D.
21         - y: A numpy array of shape (N,) containing the training labels, where
22             ...[y[i]] is the label for X[i].
23
24         self.X_train = X
25         self.y_train = y
26
27     def predict(self, X, k=1, num_loops=0):
28         """
29             Predict labels for test data using this classifier.
30
31         Inputs:
32         - X: A numpy array of shape (num_test, D) containing test data consisting
33             ...of num_test samples each of dimension D.
34         - k: The number of nearest neighbors that vote for the predicted labels.
35         - num_loops: Determines which implementation to use to compute distances
36             between training points and testing points.
37
38         Returns:
39         - y: A numpy array of shape (num_test,) containing predicted labels for the
40             test data, where y[i] is the predicted label for the test point X[i].
```

ml-curriculum

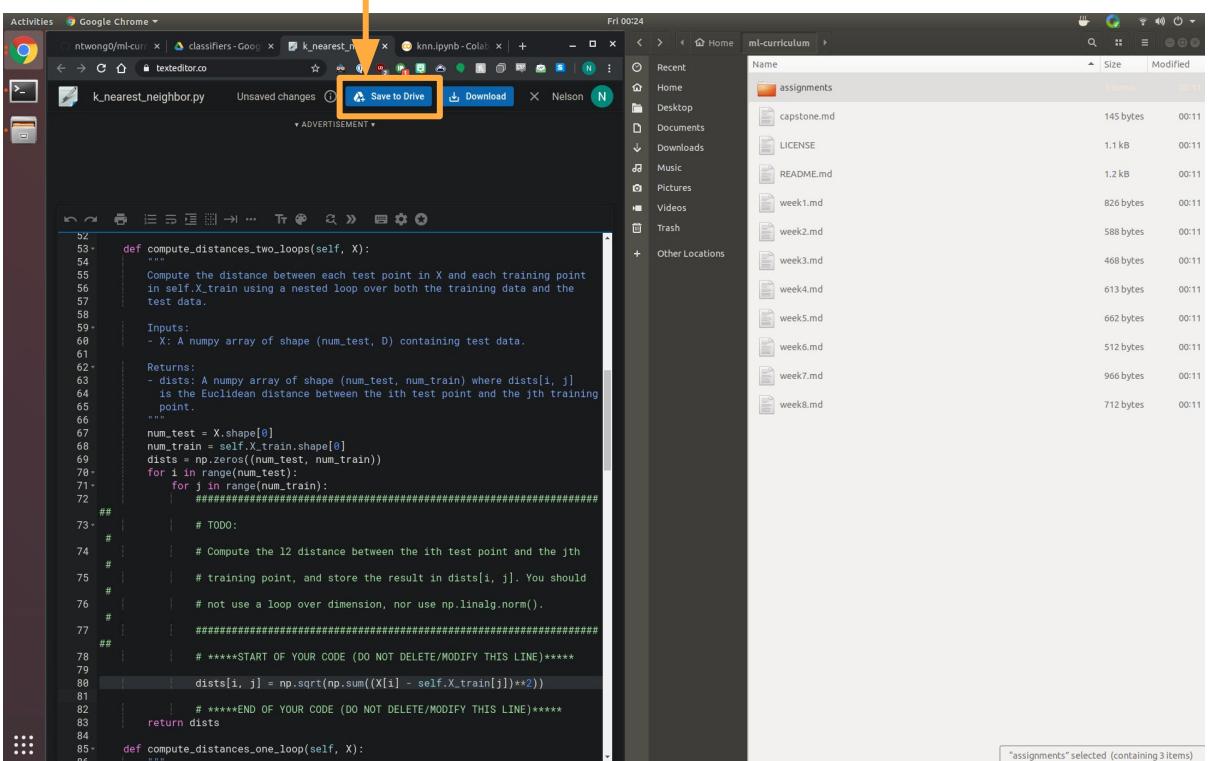
You'll need to authorize Text Editor to proceed. Select "Authorize Text Editor"

Then, select your account.

Then, select "Allow".

You are now able to edit
k_nearest_neighbor.py.

Remember to save your edits to Drive!



The screenshot shows a Mac desktop environment. On the left, there's a dock with icons for Finder, Mail, Safari, and others. In the center, a Text Editor window is open, showing Python code for a k-nearest neighbor algorithm. The code includes comments explaining nested loops for distance calculations. At the top of the Text Editor window, there are tabs for 'k_nearest_neighbor.py' (with 'Unsaved changes'), 'texteditor.co', and 'knn.ipynb'. To the right of the tabs are buttons for 'Save to Drive' (highlighted with an orange arrow), 'Download', and 'Nelson'. Below the editor is a preview pane showing the code's output. On the right side of the screen is a file browser window titled 'ml-curriculum'. It shows a list of files in a folder named 'assignments'. The files listed are: assignments, capstone.md, LICENSE, README.md, week1.md, week2.md, week3.md, week4.md, week5.md, week6.md, week7.md, and week8.md. Each file has its size and last modified date next to it. A tooltip at the bottom right of the file browser says "'assignments' selected (containing 3 items)'".

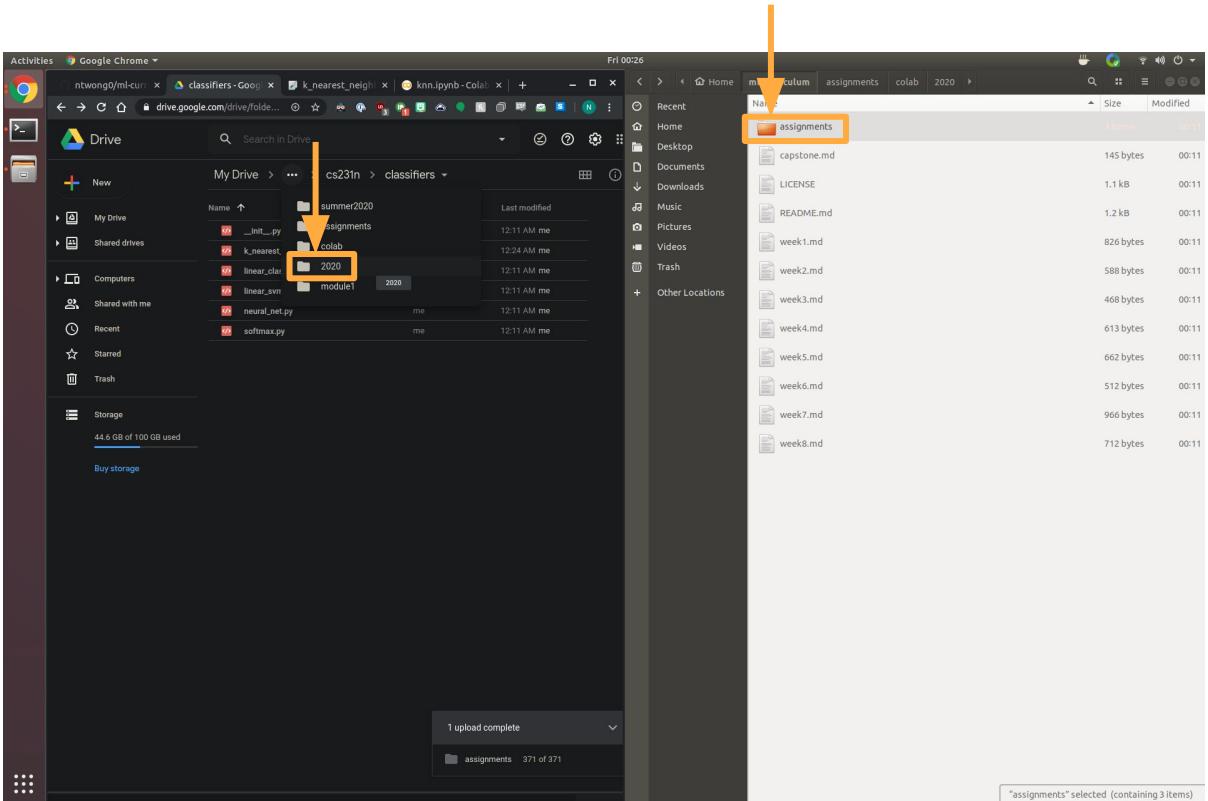
```
52
53+     def compute_distances_two_loops(self, X):
54+         """
55+             Compute the distance between each test point in X and each training point
56+             in self.X_train using a nested loop over both the training data and the
57+             test data.
58+
59+         Inputs:
60+             - X: A numpy array of shape (num_test, D) containing test data.
61+
62+         Returns:
63+             - dists: A numpy array of shape (num_test, num_train) where dists[i, j]
64+               is the Euclidean distance between the ith test point and the jth training
65+               point.
66+
67+             num_test = X.shape[0]
68+             num_train = self.X_train.shape[0]
69+             dists = np.zeros((num_test, num_train))
70+             for i in range(num_test):
71+                 for j in range(num_train):
72+                     #####
73+                     # TODO:
74+                     # Compute the L2 distance between the ith test point and the jth
75+                     # training point, and store the result in dists[i, j]. You should
76+                     # not use a loop over dimension, nor use np.linalg.norm().
77+                     #####
78+                     # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
79+                     dists[i, j] = np.sqrt(np.sum((X[i] - self.X_train[j])**2))
80+                     # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
81+
82+             return dists
83+
84+
85+     def compute_distances_one_loop(self, X):
```

ml-curriculum

Once you're done editing the assignment, you'll wish to publish your work.

First, navigate back to the **2020** folder on Google Drive.

At the same time, double-click to open the **assignments** directory.

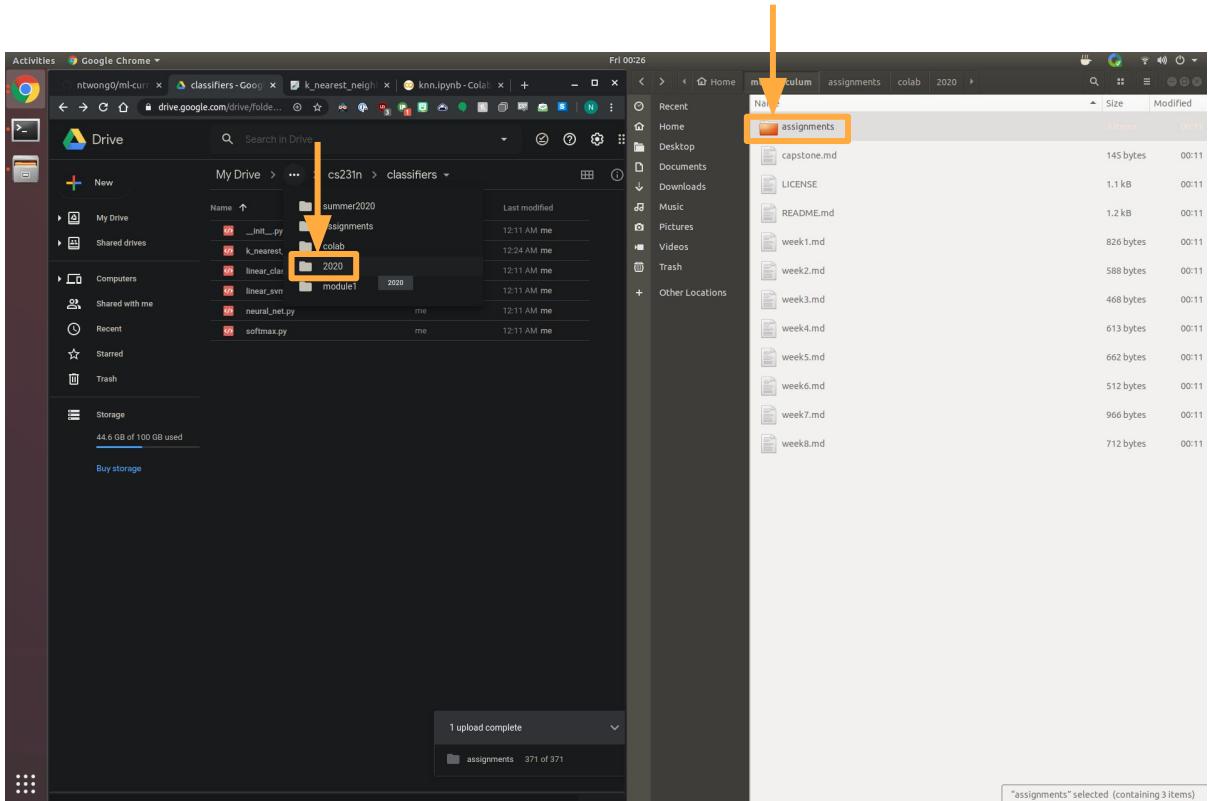


ml-curriculum

Once you're done editing the assignment, you'll wish to publish your work.

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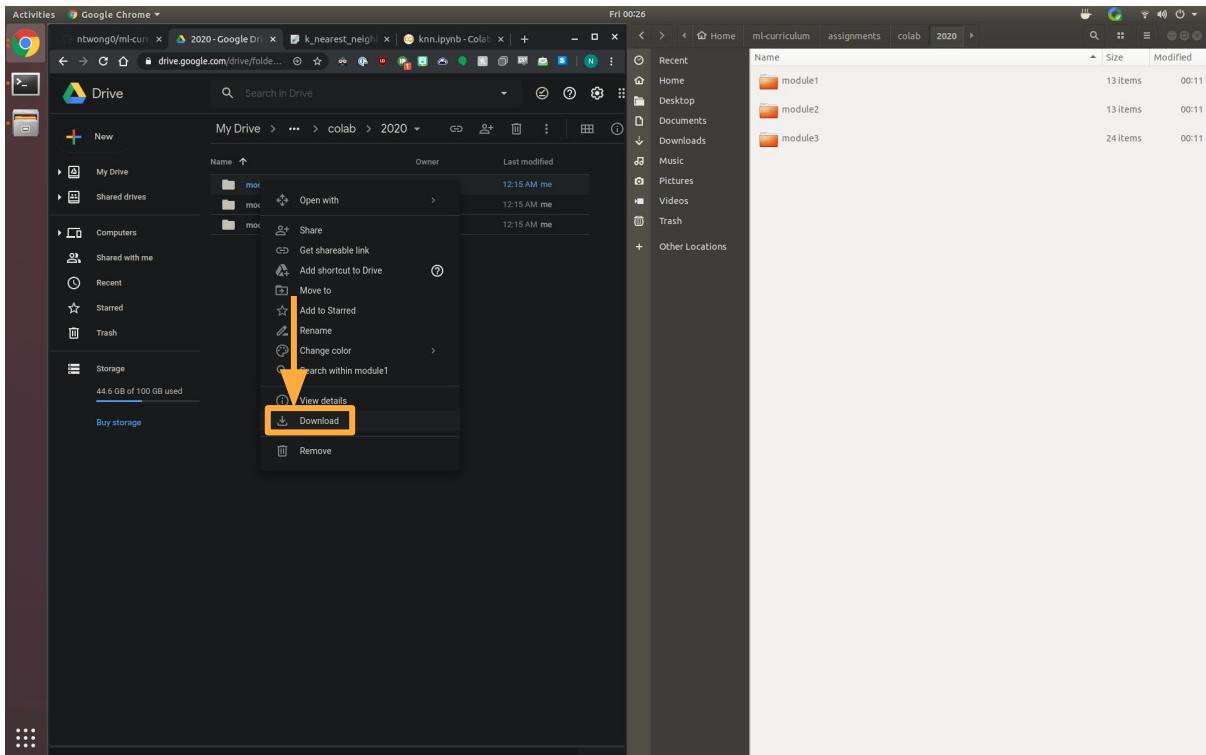
ml-curriculum

Once you're done editing the assignment, you'll wish to publish your work.

First, navigate back to the **2020** folder on Google Drive.

At the same time, double-click to open the **assignments** directory.

Right-click on the module1 folder, and select "Download".



ml-curriculum

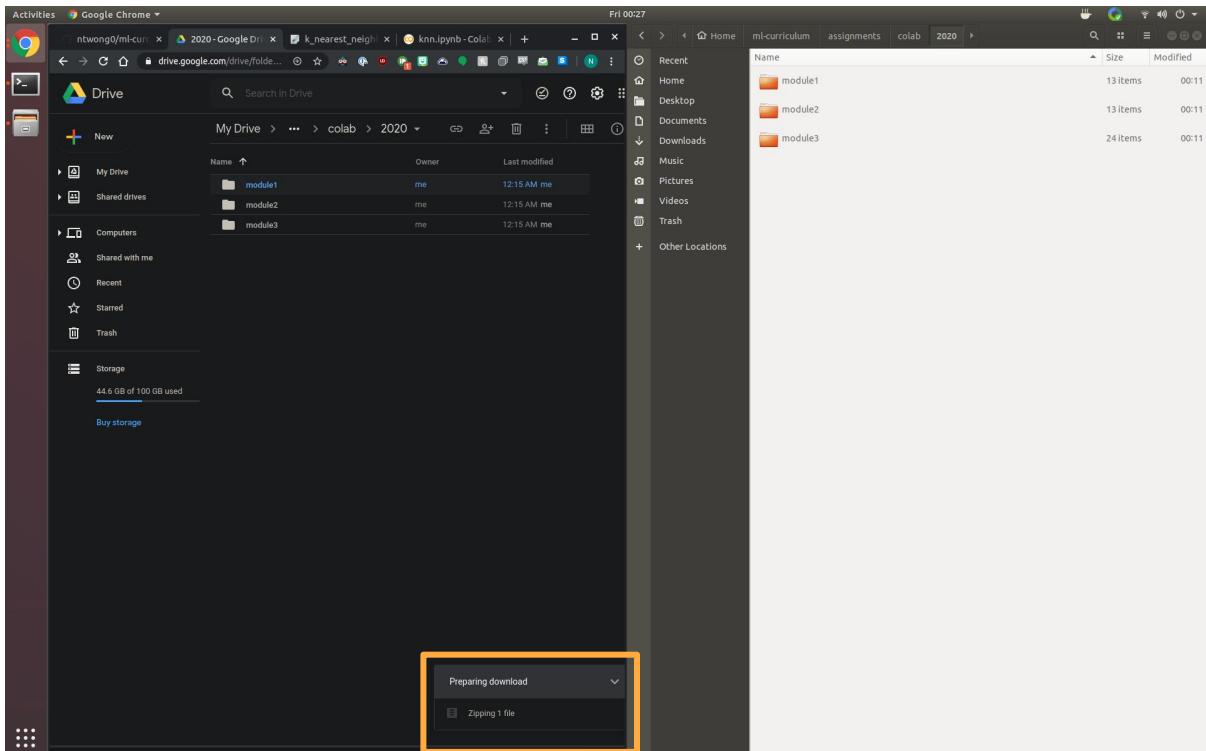
Once you're done editing the assignment, you'll wish to publish your work.

First, navigate back to the **2020** folder on Google Drive.

At the same time, double-click to open the **assignments** directory.

Right-click on the module1 folder, and select “Download”.

Wait for the zip file to generate...



ml-curriculum

Once you're done editing the assignment, you'll wish to publish your work.

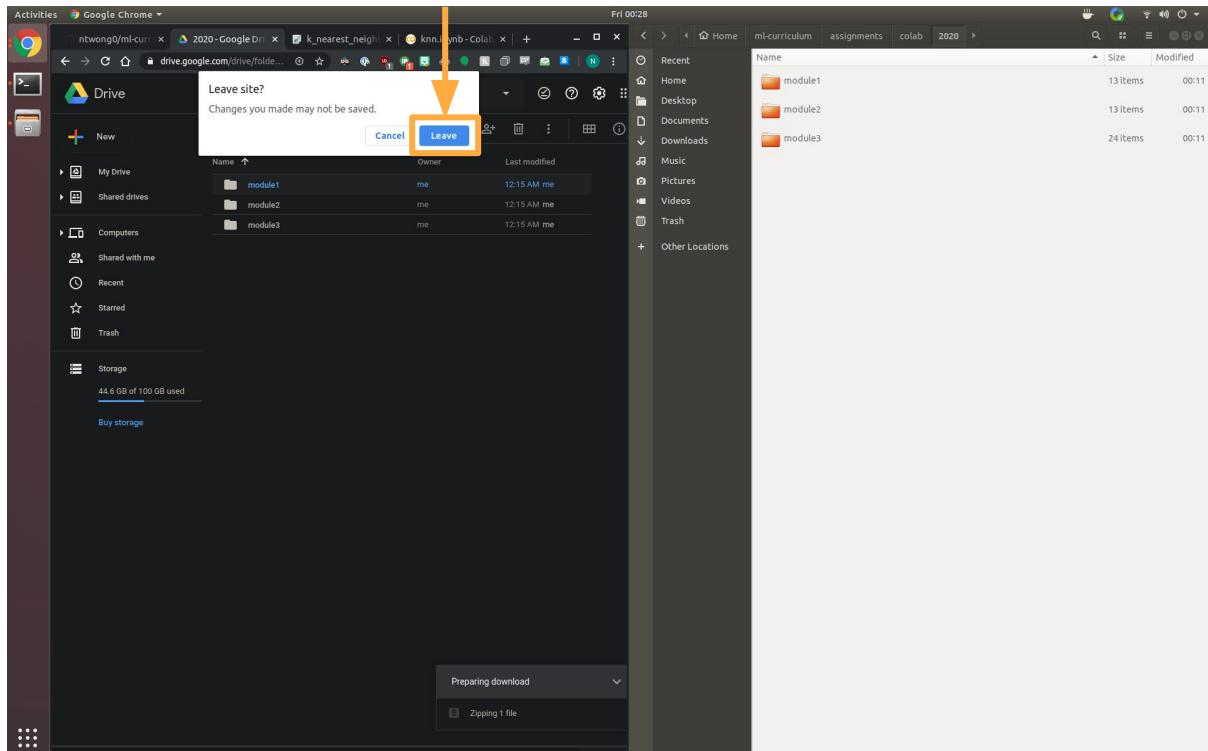
First, navigate back to the **2020** folder on Google Drive.

At the same time, double-click to open the **assignments** directory.

Right-click on the module1 folder, and select "Download".

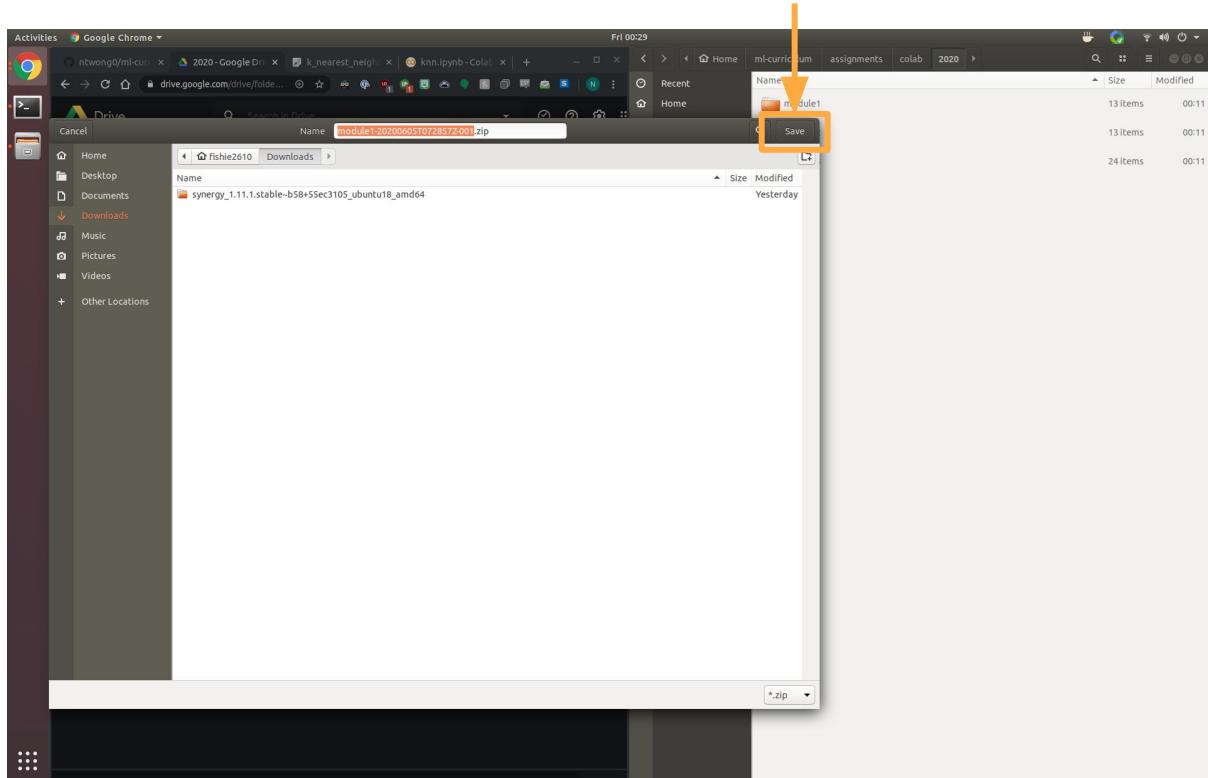
Wait for the zip file to generate...

...then select "Leave" to open the file download dialog.



ml-curriculum

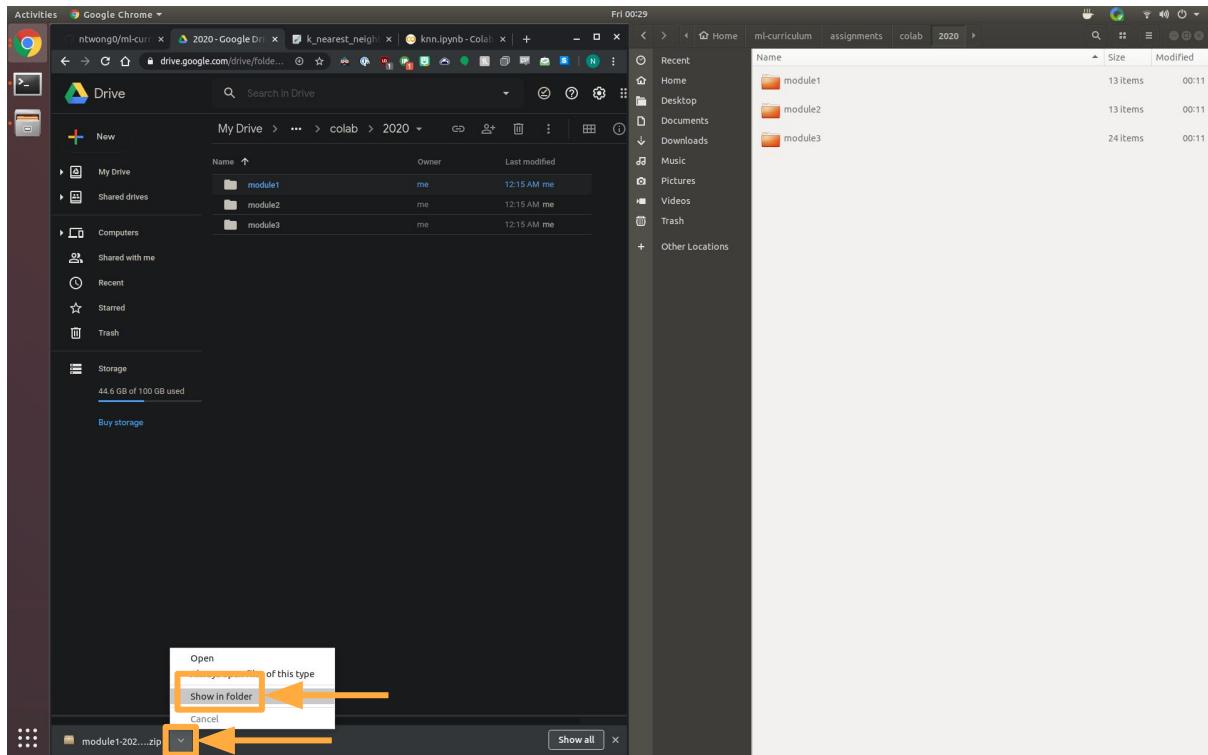
In the following save file dialog box,
select the “Save” button.



ml-curriculum

In the following save file dialog box,
select the “Save” button.

After the file finishes downloading,
select the down-arrow next to the zip
file, and select “Show in Folder”

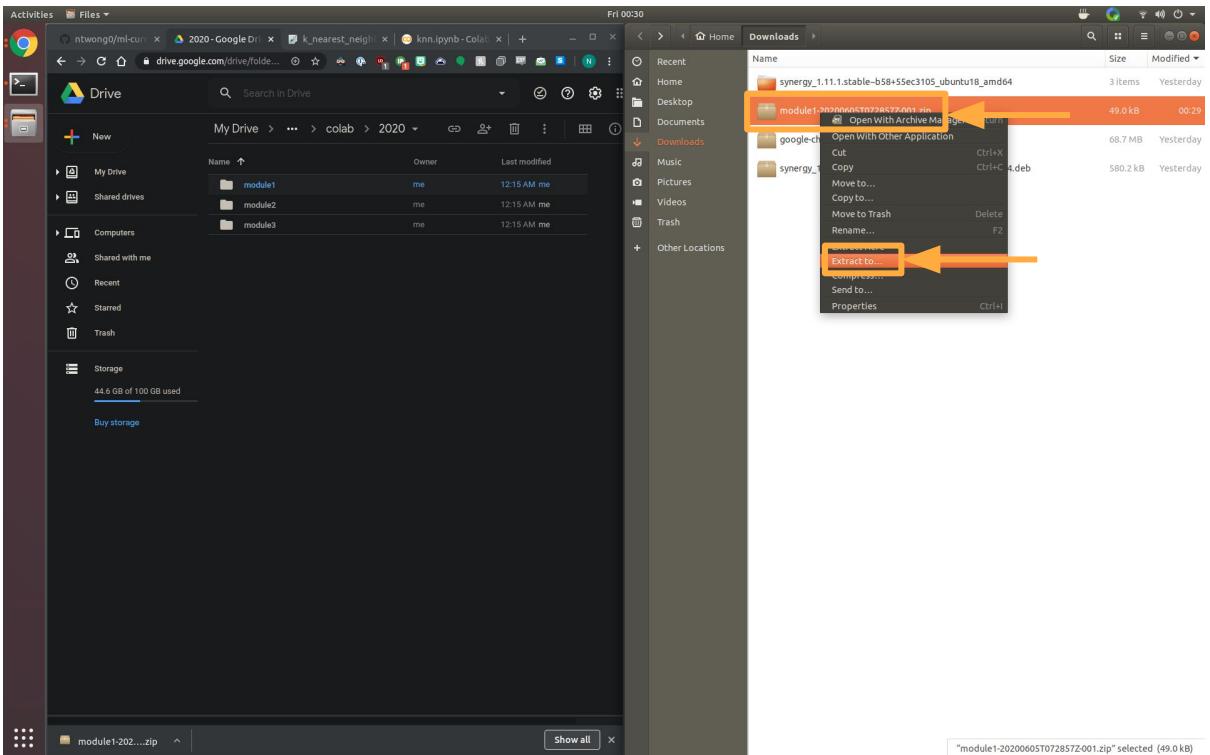


ml-curriculum

In the following save file dialog box,
select the “Save” button.

After the file finishes downloading,
select the down-arrow next to the zip
file, and select “Show in Folder”

This opens up a new File Explorer
window. Right-click the
module1....zip file, and select
“Extract to...”



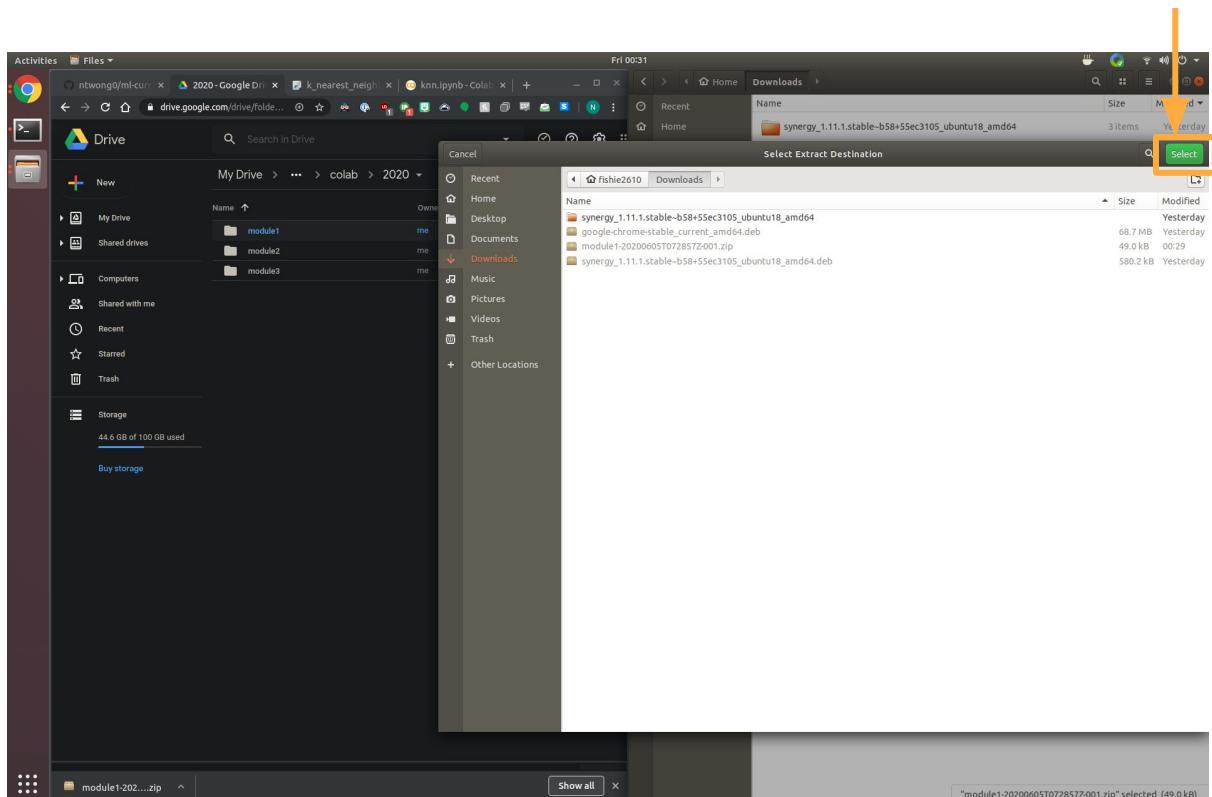
ml-curriculum

In the following save file dialog box, select the “Save” button.

After the file finishes downloading, select the down-arrow next to the zip file, and select “Show in Folder”

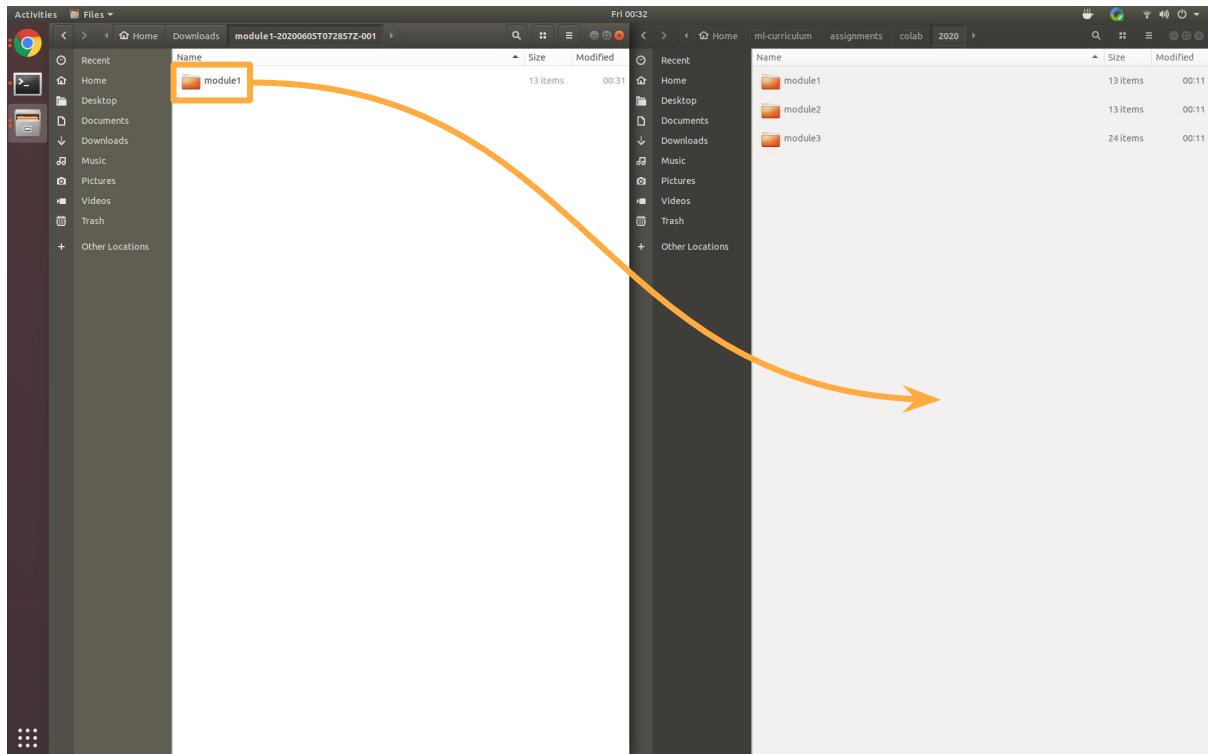
This opens up a new File Explorer window. Right-click the **module1....zip** file, and select “Extract to...”

Extract to the Downloads folder by clicking “Select”



ml-curriculum

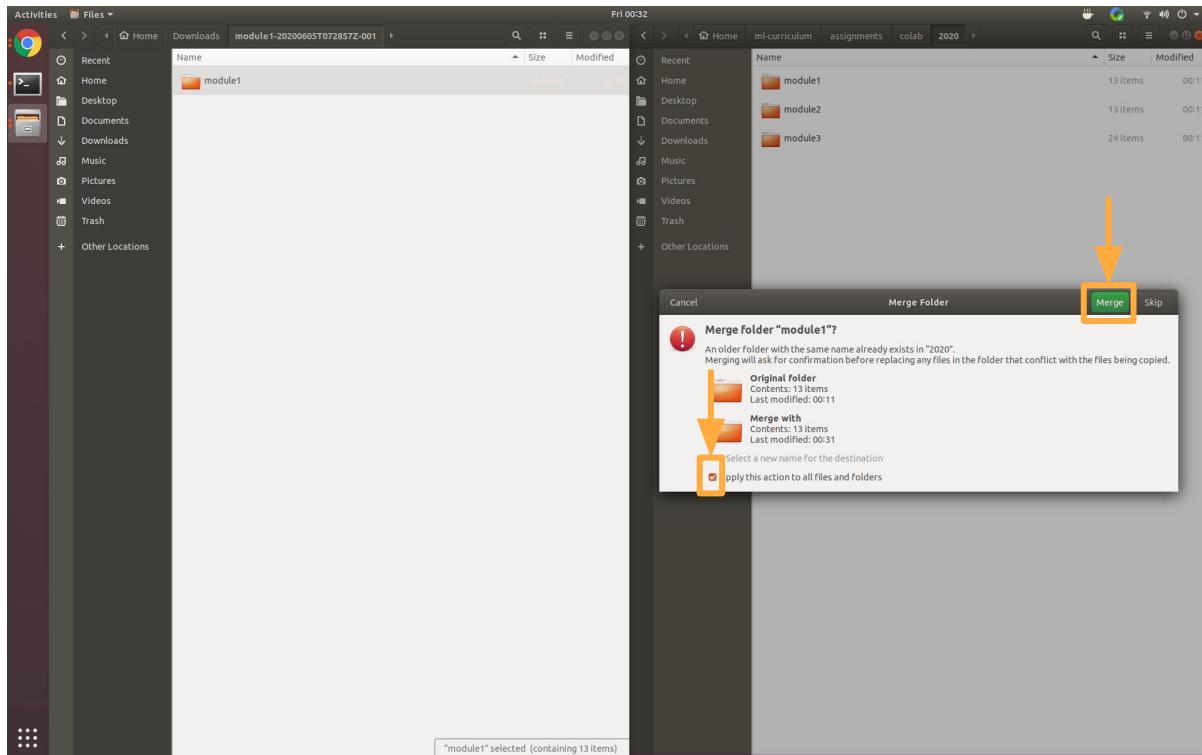
The extracted directory should now be revealed. Show the window side-by-side with our previous **2020** directory. Then, drag-and-drop the extracted module1 directory into the **2020** directory.



ml-curriculum

The extracted directory should now be revealed. Show the window side-by-side with our previous **2020** directory. Then, drag-and-drop the extracted module1 directory into the **2020** directory.

When presented with the Merge Folder prompt, check the box “Apply this action to all files and folders”, then select “Merge”

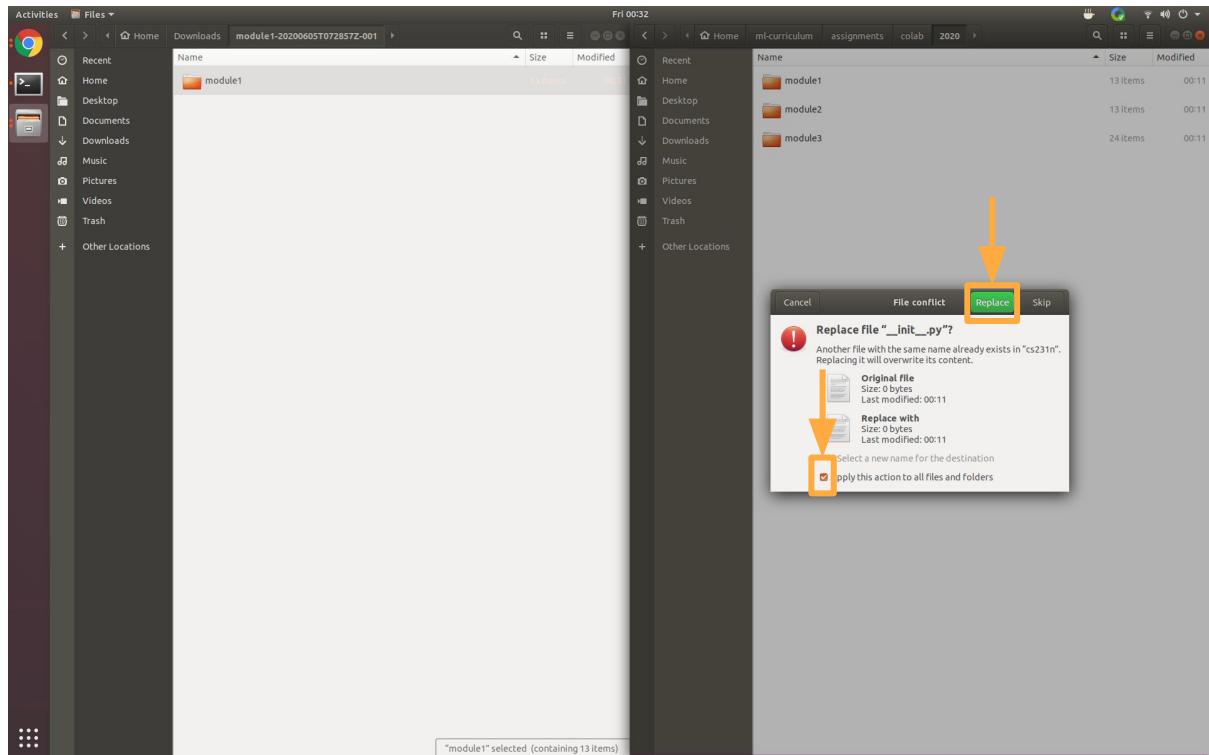


ml-curriculum

The extracted directory should now be revealed. Show the window side-by-side with our previous **2020** directory. Then, drag-and-drop the extracted module1 directory into the **2020** directory.

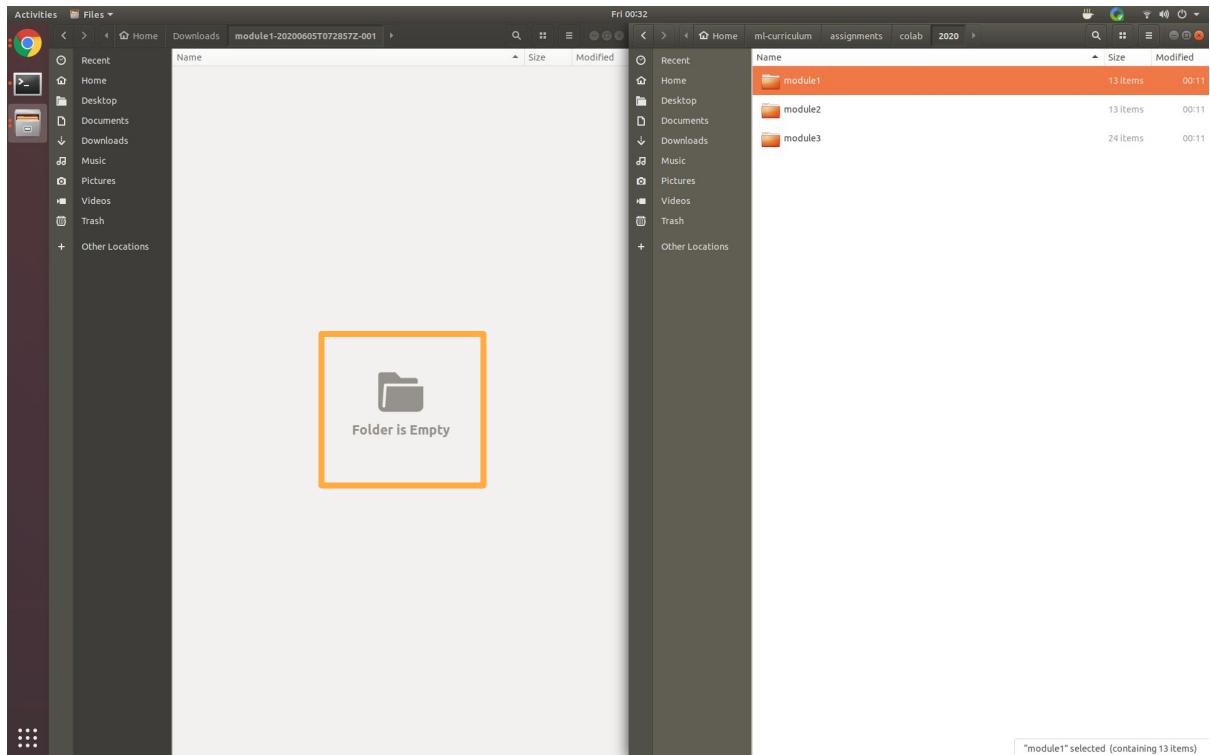
When presented with the Merge Folder prompt, check the box “Apply this action to all files and folders”, then select “Merge”

When presented with the File Conflict prompt, check the box “Apply this action to all files and folders”, then select “Replace”



ml-curriculum

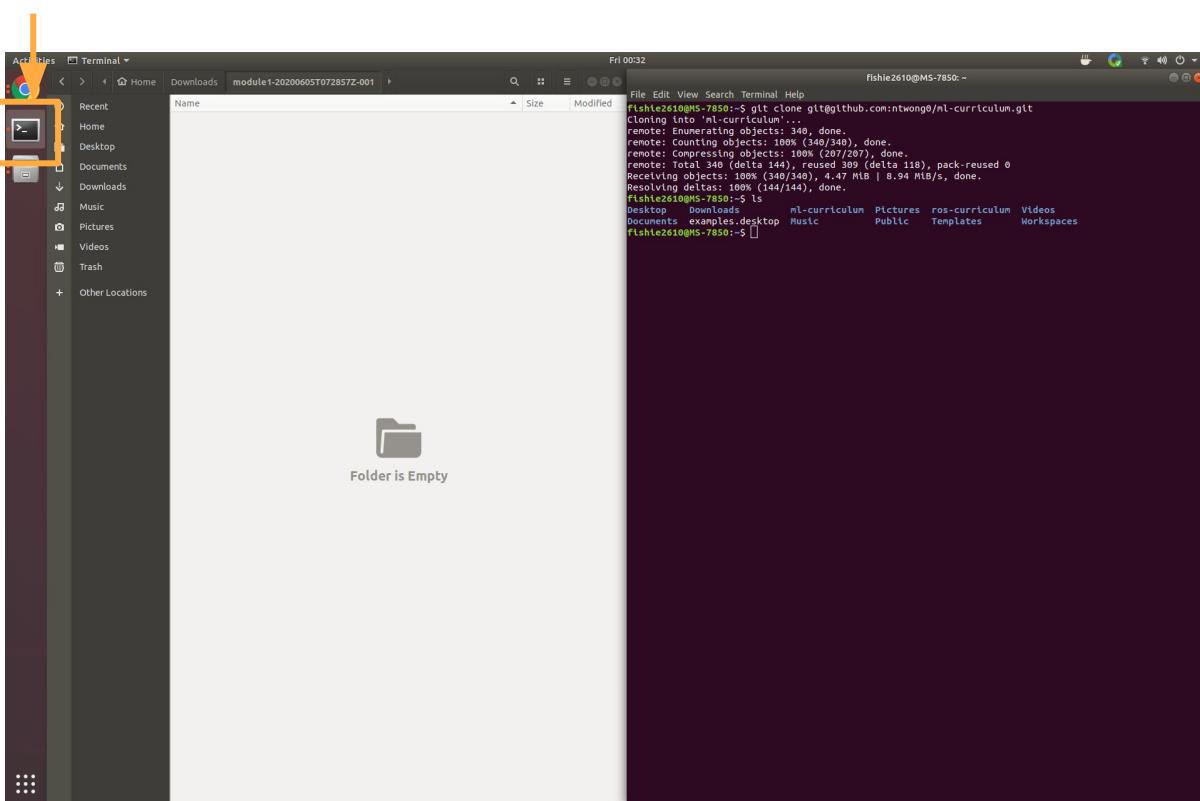
When the drag-and-drop operation is complete, the extracted directory will show as empty.



ml-curriculum

Let's begin the process of uploading our files to Github.

Select the terminal window from before. If you closed it, open a new terminal window.

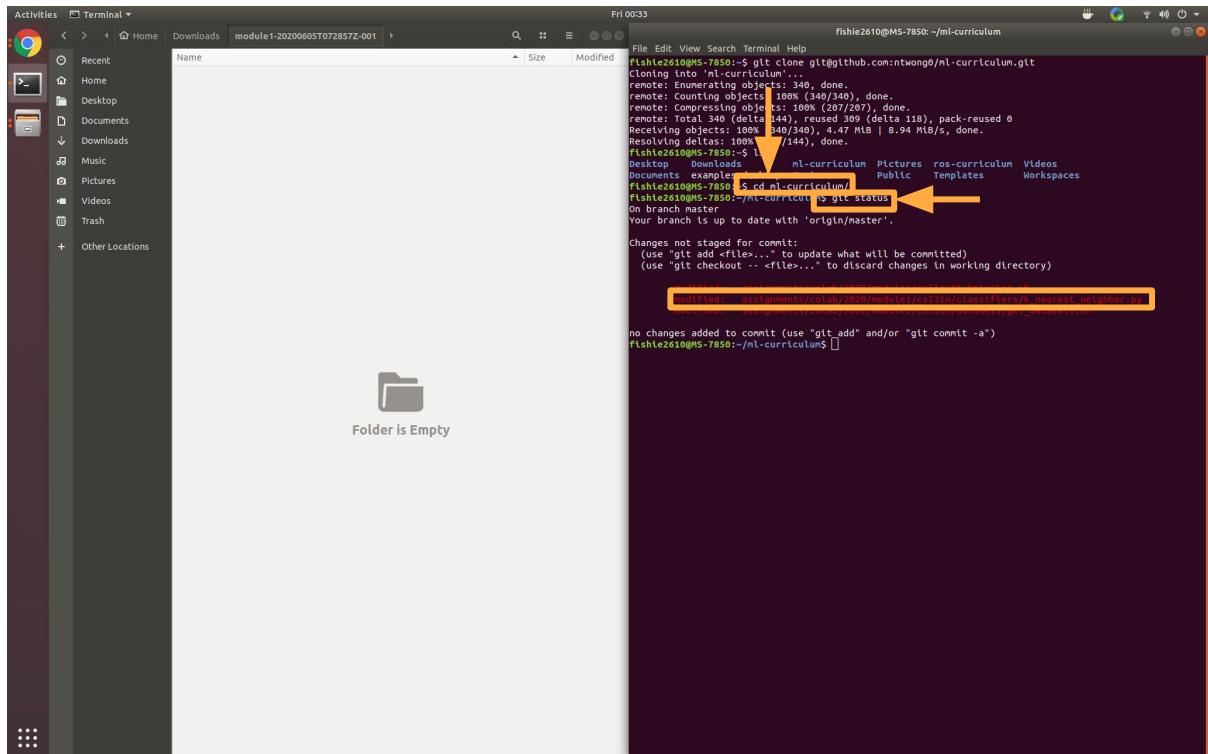


ml-curriculum

Let's begin the process of uploading our files to Github.

Select the terminal window from before. If you closed it, open a new terminal window.

Change into the **ml-curriculum** directory with **cd ml-curriculum**, then use **git status** to reveal our edits. In this case, we see that our **k_nearest_neighbor.py** has changed.



The screenshot shows a Linux desktop environment with a dark theme. On the left, a file manager window is open, showing a sidebar with 'Recent', 'Home', 'Desktop', 'Documents', 'Downloads', 'Music', 'Pictures', 'Videos', and 'Trash'. The main pane is titled 'module1-20200605T072857Z-001' and displays a list of files. In the center, there is a small icon of a folder labeled 'Folder is Empty'. On the right, a terminal window is open with the following text:

```
Fri 00:33
File Edit View Search Terminal Help
Cloning into 'ml-curriculum'...
remote: Enumerating objects: 340, done.
remote: Counting objects: 100% (340/340), done.
remote: Compressing objects: 100% (207/207), done.
remote: Total 340 (delta 144), reused 139 (delta 118), pack-reused 0
Receiving objects: 100% (340/340), 4.47 MB | 8.94 MB/s, done.
Resolving deltas: 100% (144/144), done.
fishie2610@MS-7850:~/ml-curriculum$ l
Desktop Downloads ml-curriculum Pictures ros-curriculum Videos
Documents Public Templates Workspaces
fishie2610@MS-7850:~/ml-curriculum$ cd ml-curriculum/
fishie2610@MS-7850:~/ml-curriculum$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
    (use "git checkout -- <file>..." to discard changes in working directory)

no changes added to commit (use "git add" and/or "git commit -a")
fishie2610@MS-7850:~/ml-curriculum$
```

A yellow arrow points to the command `git status` in the terminal. A red box highlights the output of the command, showing that no changes have been staged for commit.

ml-curriculum

If we use `git add`, we can stage our edit to `k_nearest_neighbor.py`

We can also use `git diff` to see our changes. In the case of the two `.sh` files, only the file attributes were changed, and we can reject those changes with `git checkout` to recall a previous version of those files.

The screenshot shows a Linux desktop environment with a terminal window and a file browser. The terminal window is titled 'Terminal' and shows a session of a user named 'fishie2610MS-7850'. The user has cloned a GitHub repository named 'ml-curriculum' and checked its status. They then staged changes to 'k_nearest_neighbor.py' using 'git add'. After committing the changes, they used 'git diff' to view the changes and 'git checkout' to revert to a previous version of 'assignments.sh'. Finally, they committed the changes to 'collectSubmission.sh'. The file browser shows a folder named 'ml-curriculum' which is currently empty.

```
Fri 00:34
File Edit View Search Terminal Help
fishie2610MS-7850:~$ git clone git@github.com:ntwong0/ml-curriculum.git
Cloning into 'ml-curriculum'...
remote: Enumerating objects: 340, done.
remote: Counting objects: 100% (340/340), done.
remote: Compressing objects: 100% (144/144), done.
remote: Total 340 (delta 118), reused 0 (delta 0), pack-reused 0
Receiving objects: 100% (340/340), 4.47 MB | 8.94 MB/s, done.
Resolving deltas: 100% (144/144), done.
fishie2610MS-7850:~$ ls
Desktop Downloads ml-curriculum Pictures ros-curriculum Videos
Documents Downloads desktop public Public Templates Workspaces
fishie2610MS-7850:~$ cd ml-curriculum/
fishie2610MS-7850:~/ml-curriculum$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

        modified:   assignments/colab/2020/module1/cs231n/classifiers/k_nearest_neighbor.py
        modified:   assignments/colab/2020/module1/cs231n/datasets/get_datasets.sh

no changes added to commit (use "git add" and/or "git commit -m")
```

Folder is Empty

```
fishie2610MS-7850:~/ml-curriculum$ git add assignments/colab/2020/module1/cs231n/classifiers/k_nearest_neighbor.py
fishie2610MS-7850:~/ml-curriculum$ git diff assignments/colab/2020/module1/cs231n/datasets/get_datasets.sh
diff --git a/assignments/colab/2020/module1/cs231n/datasets/get_datasets.sh b/assignments/colab/2020/module1/cs231n/datasets/get_datasets.sh
old mode 100755
new mode 100644
```

```
fishie2610MS-7850:~/ml-curriculum$ git checkout assignments/colab/2020/module1/cs231n/datasets/get_datasets.sh
fishie2610MS-7850:~/ml-curriculum$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

        modified:   assignments/colab/2020/module1/cs231n/classifiers/k_nearest_neighbor.py

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

        modified:   assignments/colab/2020/module1/cs231n/datasets/get_datasets.sh
```

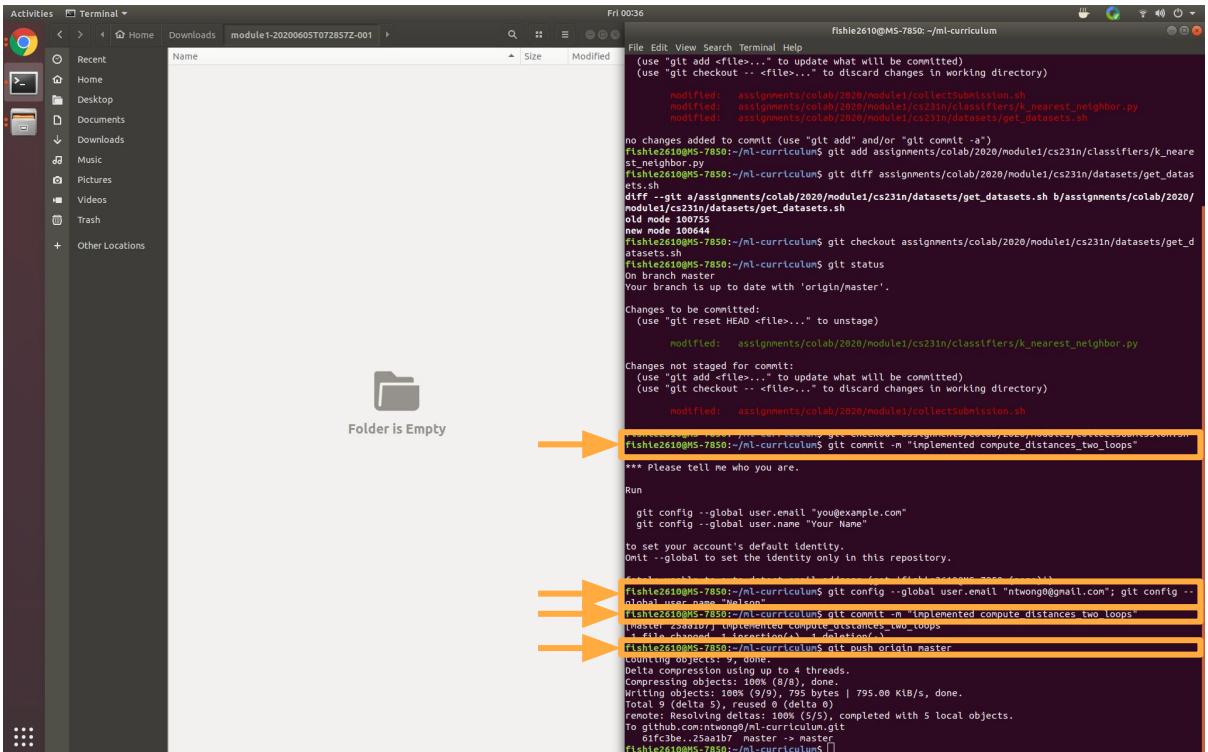
```
fishie2610MS-7850:~/ml-curriculum$ git add collectSubmission.sh
fishie2610MS-7850:~/ml-curriculum$ git commit -m "Add collectSubmission.sh"
[master 1e0f3d1] Add collectSubmission.sh
 1 file changed, 1 insertion(+)
```

ml-curriculum

With all the changes staged, we are able to commit the changes using **git commit**.

If this is the first time you are committing a change, you'll need to identify your email and name with **git config**.

After you git commit, upload the commit to Github using **git push**



The screenshot shows a desktop environment with a file browser on the left and a terminal window on the right.

File Browser: Shows a sidebar with 'Recent' and links to 'Home', 'Desktop', 'Documents', 'Downloads', 'Music', 'Pictures', 'Videos', and 'Trash'. The main area displays a folder icon with the message 'Folder is Empty'.

Terminal Window: The title bar says 'Fri 00:36' and 'fishie2610@MS-7850: ~/ml-curriculum'. The terminal content is as follows:

```
File Edit View Search Terminal Help
(use "git add <file>..." to update what will be committed)
(use "git checkout -- <file>..." to discard changes in working directory)

 modified: assignments/colab/2020/module1/collectSubmission.sh
 modified: assignments/colab/2020/module1/cs23in/classifiers/k_nearest_neighbor.py
 modified: assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh

no changes added to commit (use "git add" and/or "git commit -a")
fishie2610@MS-7850:~/ml-curriculum$ git add assignments/colab/2020/module1/cs23in/classifiers/k_nearest_neighbor.py
fishie2610@MS-7850:~/ml-curriculum$ git diff assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh
diff --git a/assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh b/assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh
old mode 100755
new mode 100644
fishie2610@MS-7850:~/ml-curriculum$ git checkout assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh
fishie2610@MS-7850:~/ml-curriculum$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    modified: assignments/colab/2020/module1/cs23in/classifiers/k_nearest_neighbor.py

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

    modified: assignments/colab/2020/module1/collectSubmission.sh

fishie2610@MS-7850:~/ml-curriculum$ git commit -m "implemented compute_distances_two_loops"
*** Please tell me who you are.

Run
git config --global user.email "you@example.com"
git config --global user.name "Your Name"

to set your account's default identity.
Omit --global to set the identity only in this repository.

fishie2610@MS-7850:~/ml-curriculum$ git config --global user.email "ntwong@gmail.com"; git config --global user.name "Malcan"
fishie2610@MS-7850:~/ml-curriculum$ git commit -m "implemented compute_distances_two_loops"
[master 23aa1b7] implemented compute_distances_two_loops
 1 file changed, 1 insertion(+), 1 deletion(-)
fishie2610@MS-7850:~/ml-curriculum$ git push origin master
Counting objects: 3, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (9/9), 795 bytes | 795.00 KB/s, done.
Total 9 (delta 5), reused 0 (delta 0)
remote: Resolving deltas: 100% (5/5) completed with 5 local objects.
To https://github.com/fishie2610/ml-curriculum.git
 ! [new branch] master -> master
 61fc3be..25aa1b7 master -> master
fishie2610@MS-7850:~/ml-curriculum$
```

Three orange arrows point from the text 'After you git commit, upload the commit to Github using **git push**' to the 'git push' command in the terminal output.

ml-curriculum

If you navigate back to your fork of the ml-curriculum repo, you will find your pushed commit on Github.

The screenshot shows a Linux desktop environment with a terminal window and a browser window. The terminal window is titled 'fishie2610@MS-7850: ~/ml-curriculum' and displays a series of git commands and their output. The browser window is titled 'ntwong0 / ml-curriculum' and shows the GitHub repository page for the 'ntwong0 / ml-curriculum' fork. Two orange arrows point to specific elements: one arrow points to the terminal window, and another arrow points to the GitHub commit history on the right side of the browser window.

```
File Edit View Search Terminal Help
(use "git add <file>..." to update what will be committed)
(use "git checkout -- <file>..." to discard changes in working directory)
modified: assignments/colab/2020/module1/collectSubmission.sh
modified: assignments/colab/2020/module1/cs23in/classifiers/k_nearest_neighbor.py
modified: assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh

no changes added to commit (use "git add" and/or "git commit -a")
fishie2610@MS-7850:~/ml-curriculum$ git diff assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh
diff --git a/assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh b/assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh
mode 100755
mode 100644
fishie2610@MS-7850:~/ml-curriculum$ git checkout assignments/colab/2020/module1/cs23in/datasets/get_datasets.sh
Branch master
Your branch is up to date with 'origin/master'.
Changes to be committed:
(use "git reset HEAD <file>..." to unstage)

modified: assignments/colab/2020/module1/cs23in/classifiers/k_nearest_neighbor.py

Changes not staged for commit:
(use "git add <file>..." to update what will be committed)
(use "git checkout -- <file>..." to discard changes in working directory)
modified: assignments/colab/2020/module1/collectSubmission.sh

fishie2610@MS-7850:~/ml-curriculum$ git commit -m "implemented compute_distances_two_loops"
*** Please tell me who you are.

Run
git config --global user.email "you@example.com"
git config --global user.name "Your Name"
to set your account's default identity.
Omit --global to set the identity only in this repository.

fatal: unable to auto-detect email address (got 'fishie2610@MS-7850.(none)')
fishie2610@MS-7850:~/ml-curriculum$ git config --global user.email "ntwong@gmail.com"; git config --global user.name "Nelson"
fishie2610@MS-7850:~/ml-curriculum$ git commit -m "implemented compute_distances_two_loops"
[master 25aa1b7] implemented compute_distances_two_loops
 1 file changed, 1 insertion(+), 1 deletion(-)
fishie2610@MS-7850:~/ml-curriculum$ git push origin master
Counting objects: 9, done.
Delta compression using up to 4 threads.
Compressing objects: 100% (8/8), done.
Writing objects: 100% (9/9), 795 bytes | 795.00 KB/s, done.
Total 9 (delta 5), reused 0 (delta 0)
remote: Resolving deltas: 100% (5/5) completed with 5 local objects.
To https://github.com/ntwong/ml-curriculum.git
 ! [new branch] master -> master
 61fc3be...25aa1b7 master -> master
fishie2610@MS-7850:~/ml-curriculum$
```

ML Curriculum for Computer Vision and Object Detection
Adapted from Spring 2020 and Spring 2017 iterations of Stanford University's CS231n: Convolutional Neural Networks for Visual Recognition

Activities Google Chrome ntwong0/ml-curriculum 2020 - Google Drive k_nearest_neighbor.ipynb - Colab knn.ipynb - Colab Search or jump to... Pull requests Issues Marketplace Explore Watch 0 Star 0 Fork 1 ML Curriculum for SJSU Robotics Team - Intelligent Systems Division Manage topics 18 commits 4 branches 0 packages 0 releases As 2 contributors MIT Branch: master New pull request Create new file Upload files Find file Clone or download This branch is 1 commit ahead of SJSU-Robotics:master. Pull request Compare ntwong0 implemented compute_distances_two_loops Latest commit 25aa1b7 1 minute ago assignments implemented compute_distances_two_loops 1 minute ago .gitmodules SJSU-Robotics2 also removed notebook copies, and pytorch-examples will... 3 days ago LICENSE Create LICENSE 3 days ago README.md Minor typo fix 3 days ago capstone.md refactored as per SJSU-Robotics2 3 days ago week1.md refactored as per SJSU-Robotics2 3 days ago week2.md refactored as per SJSU-Robotics2 3 days ago week3.md refactored as per SJSU-Robotics2 3 days ago week4.md refactored as per SJSU-Robotics2 3 days ago week5.md refactored as per SJSU-Robotics2 3 days ago week6.md refactored as per SJSU-Robotics2 3 days ago week7.md refactored as per SJSU-Robotics2 3 days ago week8.md SJSU-Robotics2 updated week8.md with Pytorch examples and how to reso... 3 days ago README.md

module1-2020.zip Show all