

How to import and use HydroAI library with Google Colab

02. 28, 2024

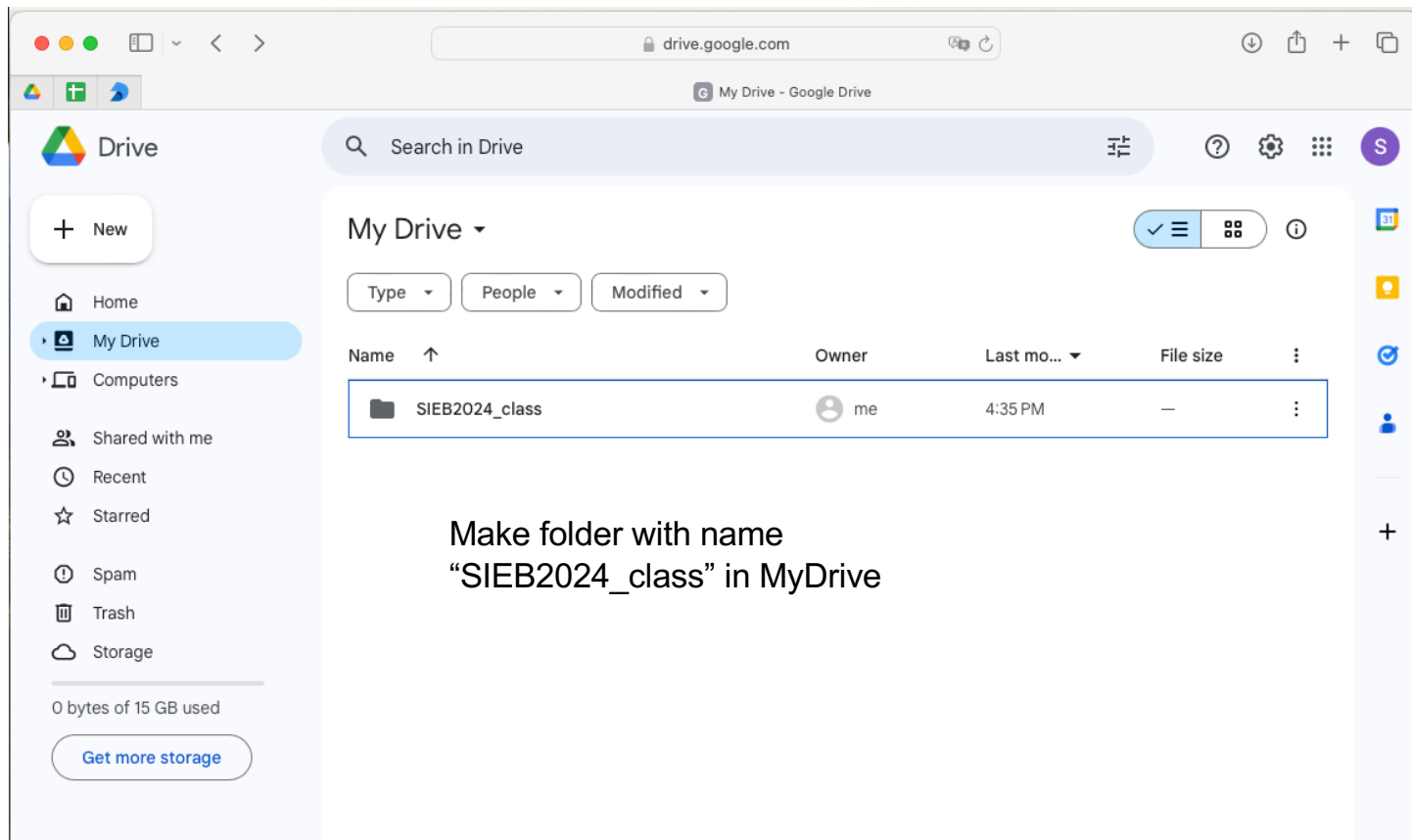
Statistical Inference and Environmental Big Data Analysis class
(EN5423-01)

TA: Subin Kim



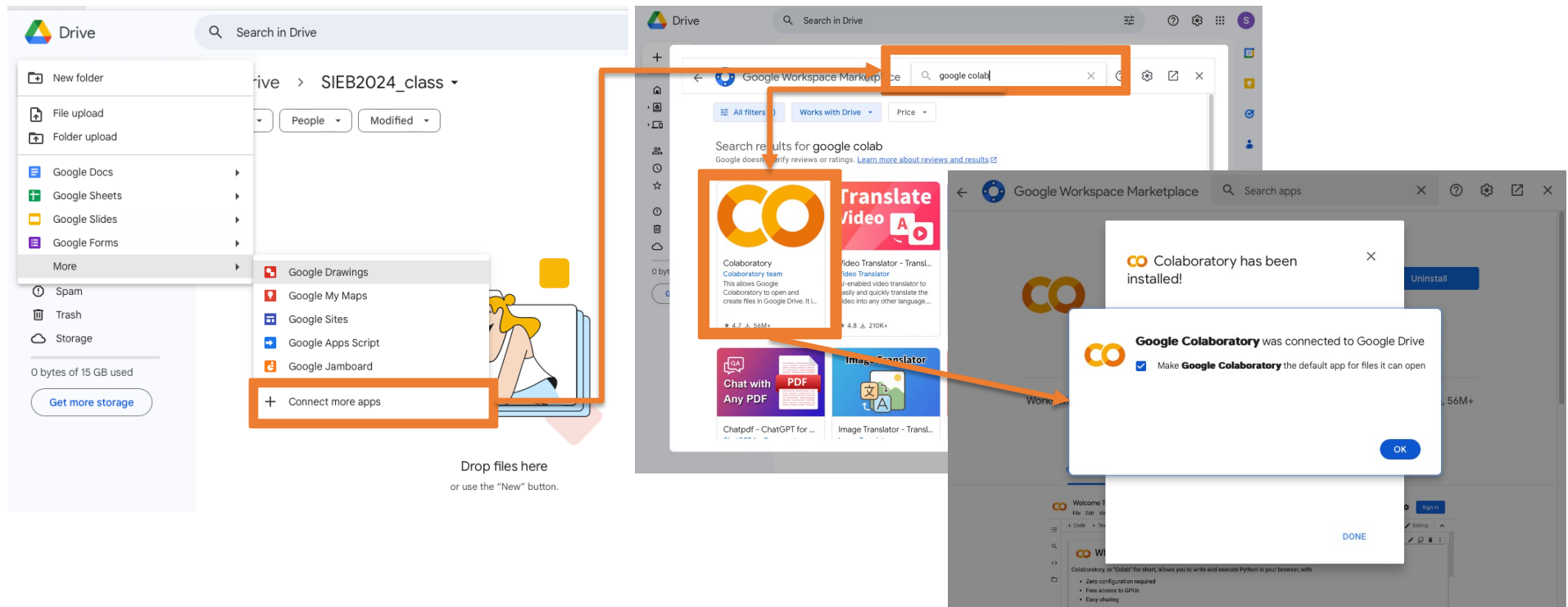
- 0. Prerequisites**
 - 1. Mount Google drive**
 - 2. Change your path and check**
 - 3. Import HydroAI library and check**
 - 4. Import all HydroAI packages**

0-1. Prepare Google account to use google drive

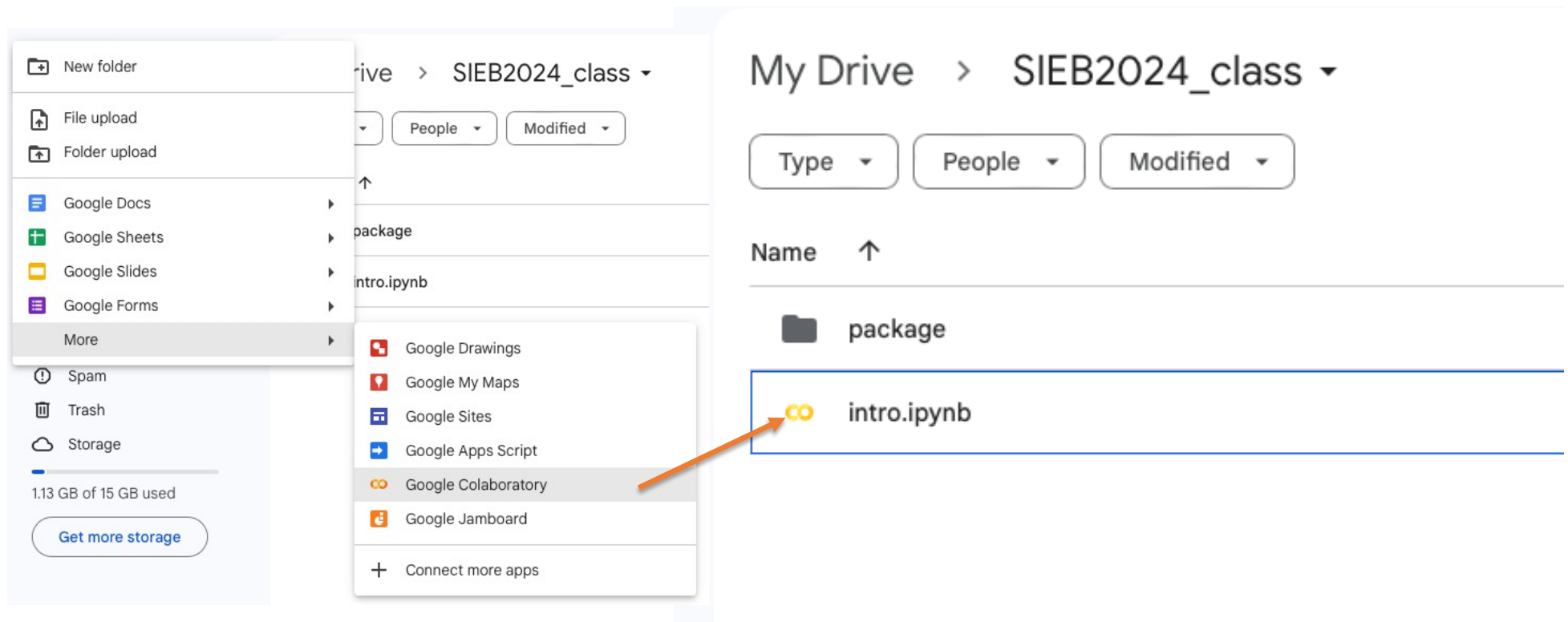


0-2. Add Google Colab app

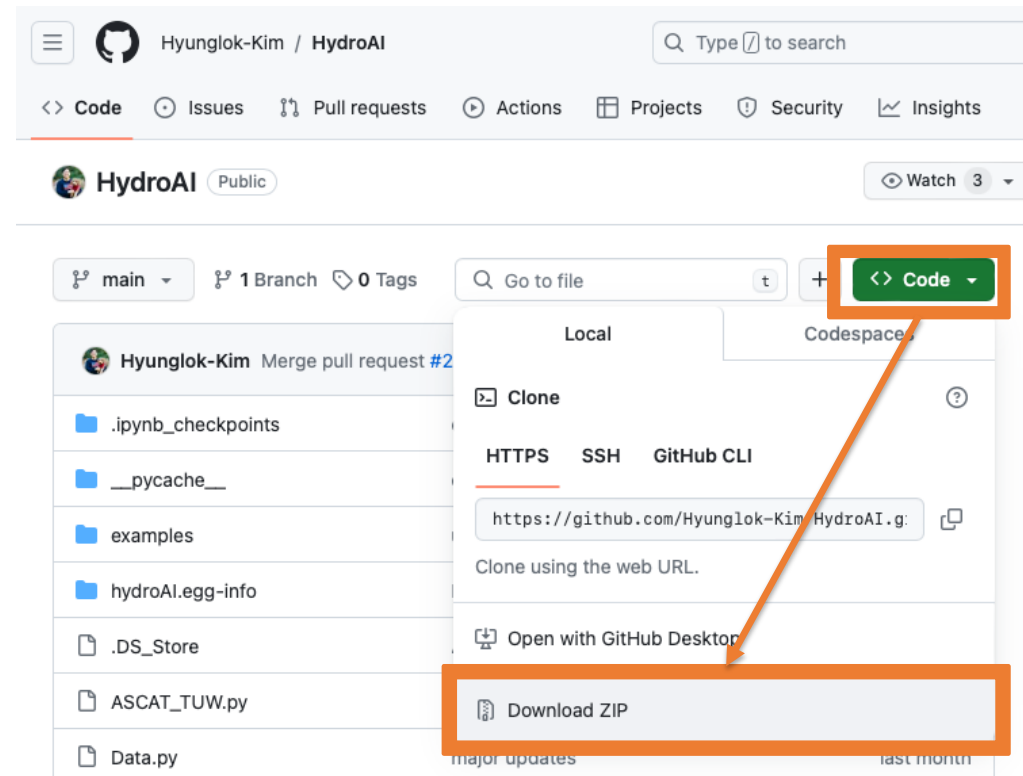
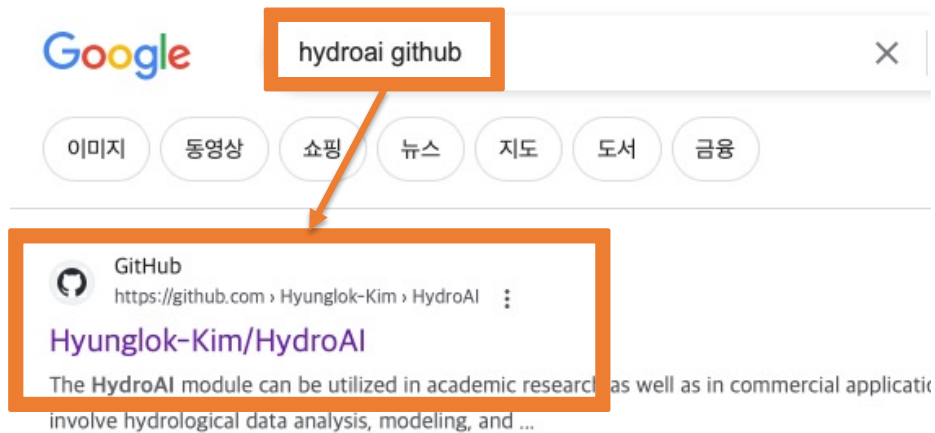
Search “google colab”



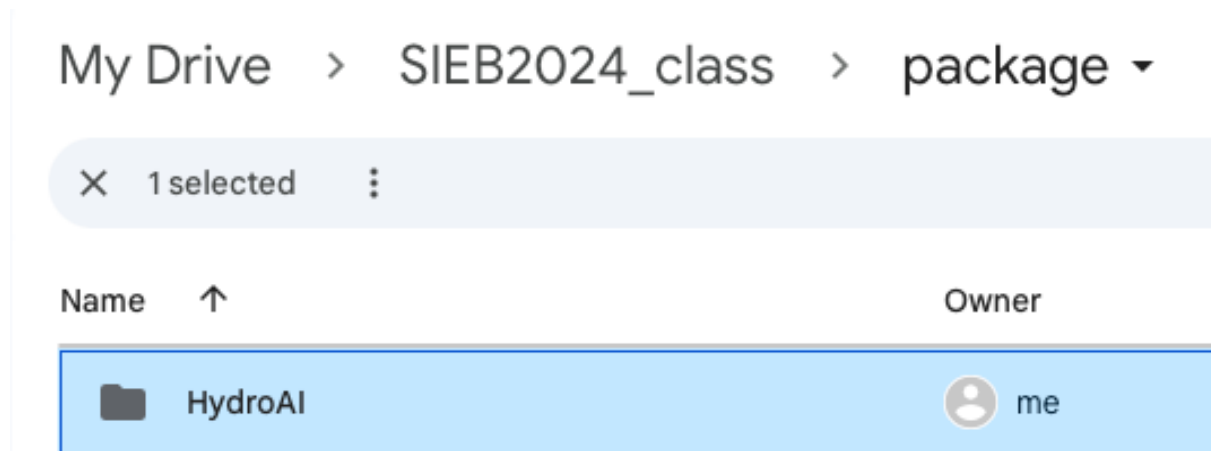
0-3. Make Colab file & package folder in SIEB2024_class



0-4. Download HydroAI library in Github “Hyunglok-Kim/HydroAI”



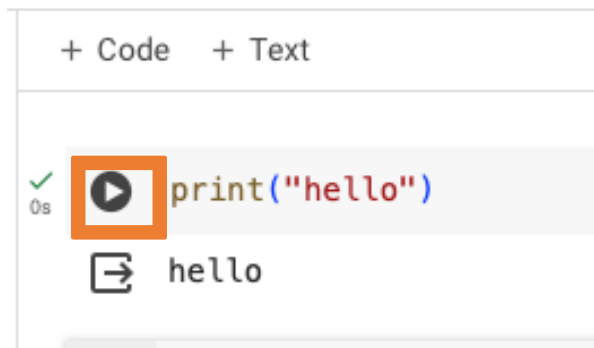
0-5. Add HydroAI library in your package folder



Set folder name "HydroAI"

0-6. Run test code with two methods

1. Click play button



2. [Shift] + [Enter]



Done symbol with number of running this code

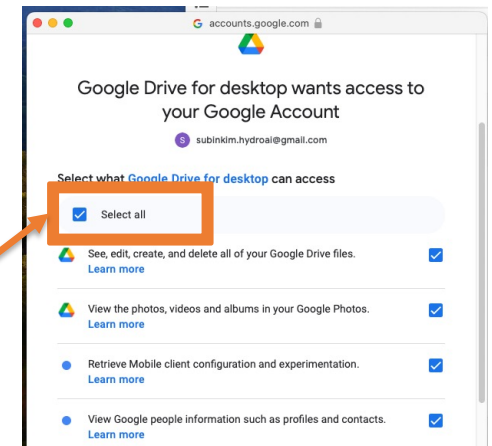
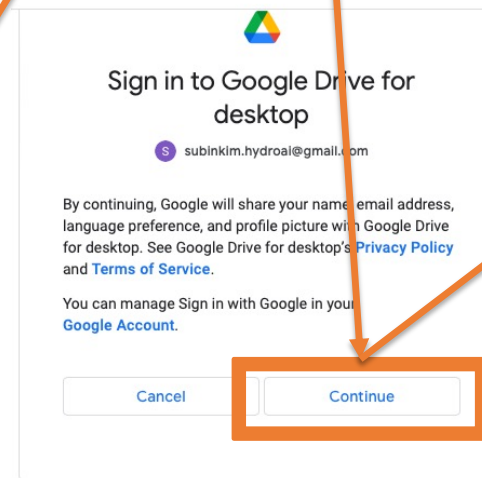
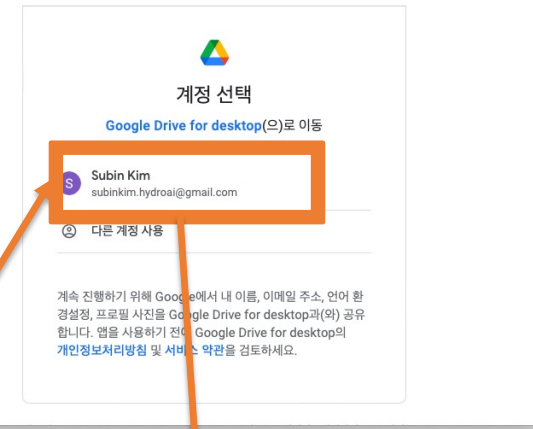
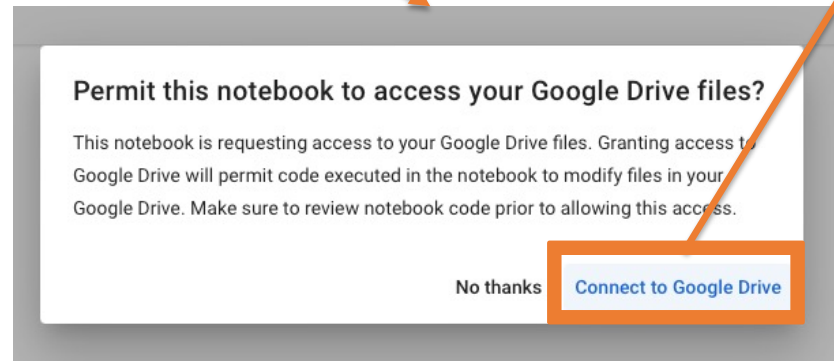
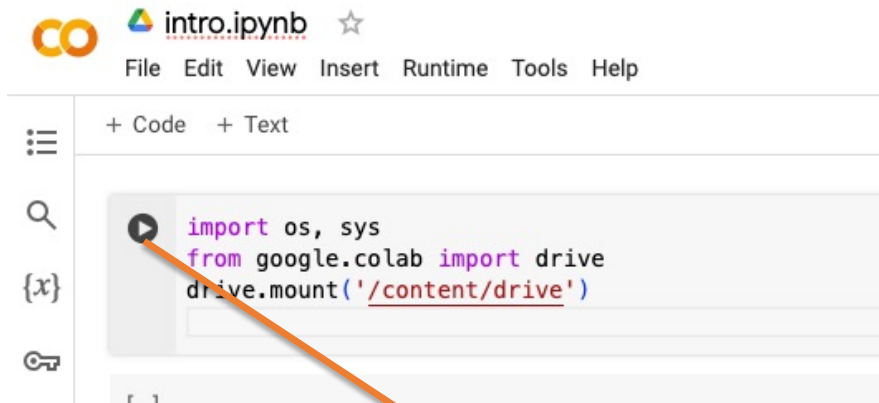


+@)

1. Add code, text
2. Move and delete code cell, etc...

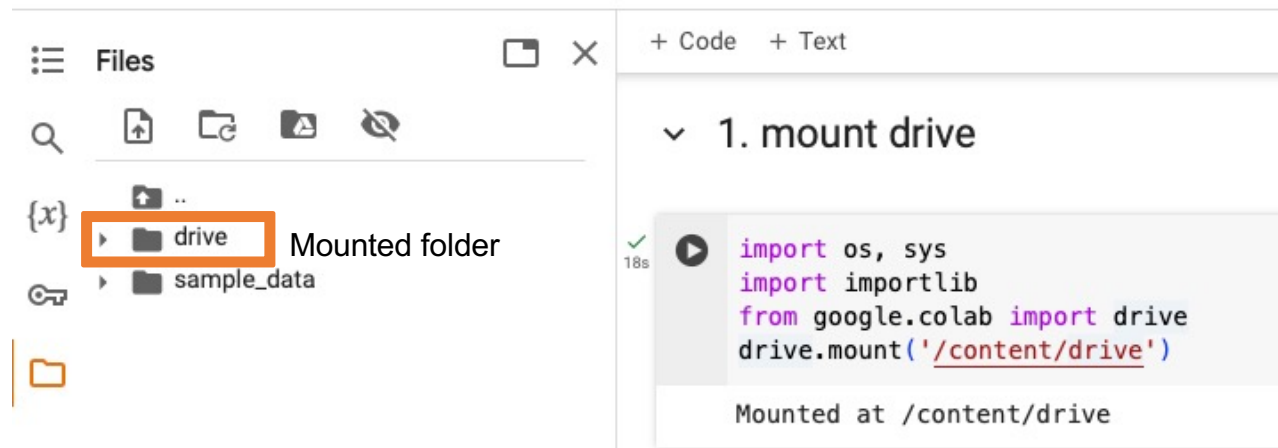
1. Mount Google drive

1-1. Mount drive

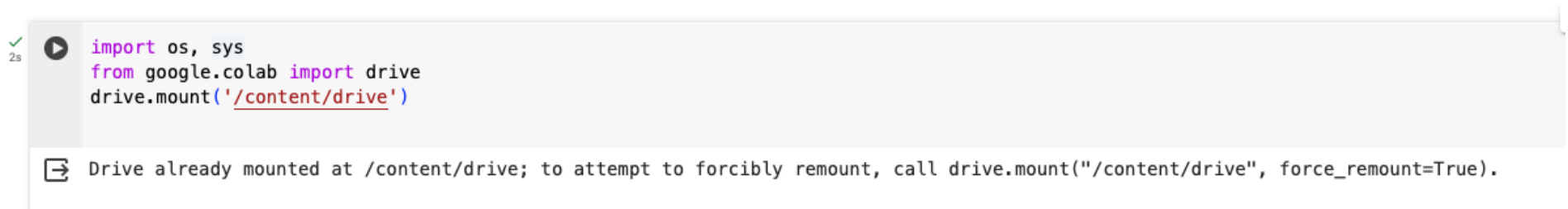


Keep clicking continue button

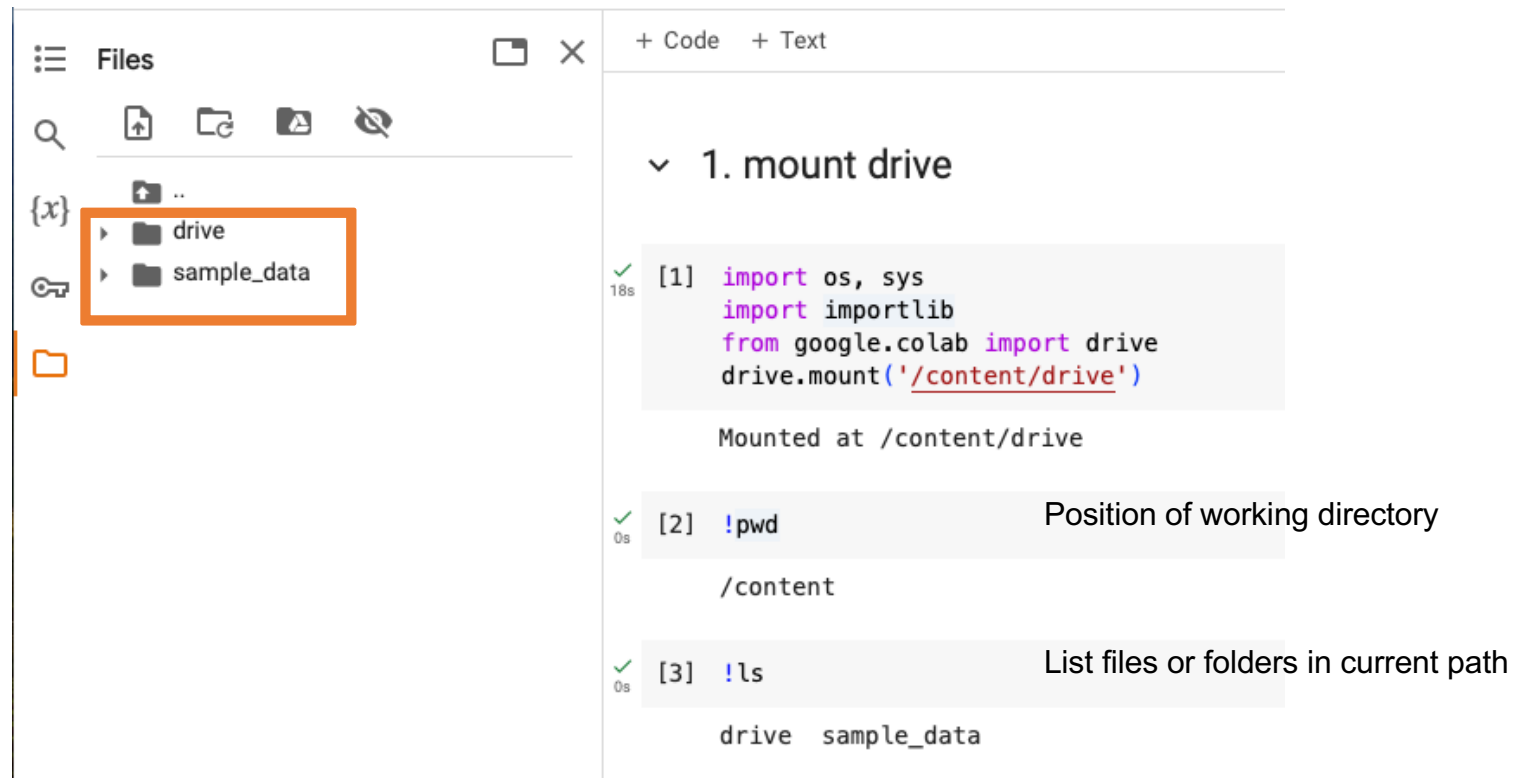
1-2. Check result your mounted drive folder



+@) When you run one more time



1-3. Check your current directory & folder lists



The screenshot displays a Jupyter Notebook interface. On the left, a file explorer sidebar titled 'Files' shows a directory structure with folders 'drive' and 'sample_data' highlighted by an orange box. The main area of the notebook contains three code cells, each with a green checkmark indicating successful execution. The first cell, labeled '[1]', imports the necessary modules and mounts the Google Drive at '/content/drive'. The second cell, labeled '[2]', uses '!pwd' to show the current working directory as '/content'. The third cell, labeled '[3]', uses '!ls' to list the contents of the current directory, showing 'drive' and 'sample_data'.

```
+ Code + Text
```

1. mount drive

```
[1] import os, sys
import importlib
from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

```
[2] !pwd
```

Position of working directory

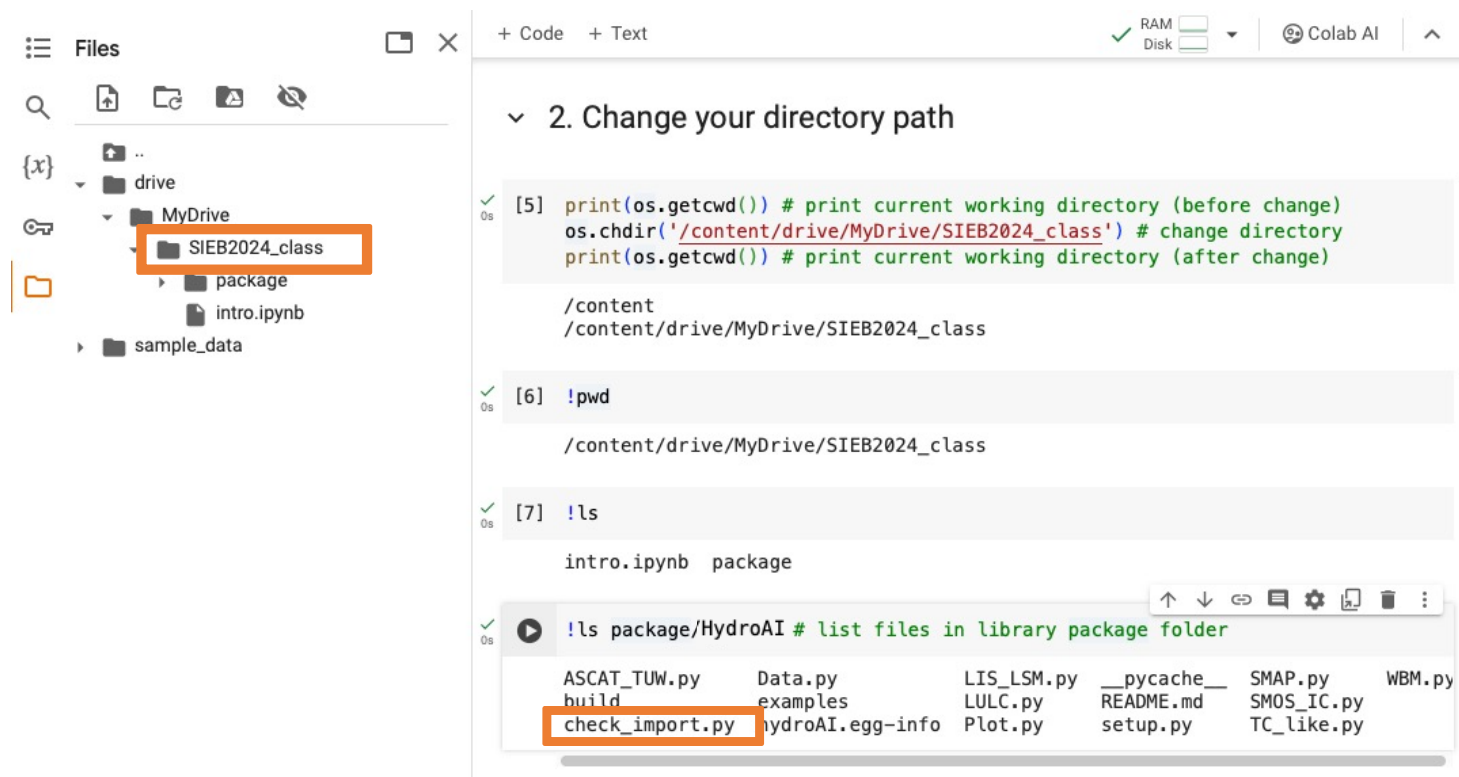
/content

```
[3] !ls
```

List files or folders in current path

drive sample_data

2. Change your directory path and check your HydroAI files



The screenshot displays the Google Colab environment. On the left, the 'Files' sidebar shows a directory structure: 'drive' > 'MyDrive' > 'SIEB2024_class' (highlighted with an orange box) > 'package' > 'intro.ipynb'. Below this is a 'sample_data' folder. The main code area on the right is titled '2. Change your directory path' and contains three code blocks:

```
[5] print(os.getcwd()) # print current working directory (before change)
os.chdir('/content/drive/MyDrive/SIEB2024_class') # change directory
print(os.getcwd()) # print current working directory (after change)

/content
/content/drive/MyDrive/SIEB2024_class

[6] !pwd

/content/drive/MyDrive/SIEB2024_class

[7] !ls

intro.ipynb package
```

Below the code blocks, a terminal window shows the command `!ls package/HydroAI # list files in library package folder` and its output:

ASCAT_TUW.py	Data.py	LIS_LSM.py	__pycache__	SMAP.py	WBM.py
build	examples	LULC.py	README.md	SMOS_IC.py	
check_import.py	hydroAI.egg-info	Plot.py	setup.py	TC_like.py	

The file `check_import.py` is highlighted with an orange box in the terminal output.

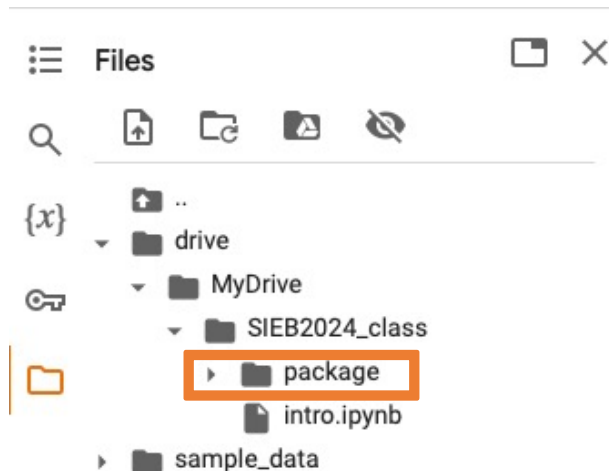
3. Import HydroAI library and check

3. Import HydroAI's check_import library

In `check_import.py` file

```
!ls package/HydroAI # list files
ASCAT_TUW.py  Data.py
build         examples
check_import.py  hydroAI.egg-info
```

```
1 print("HydroAI libraries are import successfully!")
2 print("You can import other python package files (*.py) in hydroAI folder.")
3
4 def message():
5     print("This is < message > function in check_import.py file")
6
7
8
```



+ Code + Text

RAM ☐ Disk ☐ Colab AI

3. Import hydroAI library

```
[10] import package.hydroAI.check_import as check_import
importlib.reload(check_import)

print("\n")
check_import.message()
```

HydroAI libraries are import successfully!
You can import other python package files (*.py) in hydroAI folder.

This is < message > function in check_import.py file

4-1. How to account <ModuleNotFoundError>

```
[11] from package.HydroAI import ASCAT_TUW # you will get < ModuleNotFoundError >
```

```
-----  
ModuleNotFoundError                                Traceback (most recent call last)  
<ipython-input-11-a63ced46e781> in <cell line: 1>()  
----> 1 from package.hydroAI import ASCAT_TUW # you will get <  
ModuleNotFoundError >  
  
/content/drive/MyDrive/SIEB2024_class/package/hydroAI/ASCAT_TUW.py in  
<module>  
      2 import os  
      3 import h5py  
----> 4 import netCDF4  
      5  
      6 def load_mat_file(mat_file, path):  
ModuleNotFoundError: No module named 'netCDF4'
```

NOTE: If your import is failing due to a missing package, you can manually install dependencies using either !pip or !apt.

To view examples of installing some common dependencies, click the "Open Examples" button below.

[OPEN EXAMPLES](#)

You need to install required other modules.

4-2. Install modules in package path

```
[16] pkg_path = '/content/drive/MyDrive/SIEB2024_class/package'  
!pip install --target=$pkg_path netCDF4  
!pip install --target=$pkg_path multiprocessing  
!pip install --target=$pkg_path cartopy  
!pip install --target=$pkg_path rasterio  
!pip install --target=$pkg_path rioxarray
```

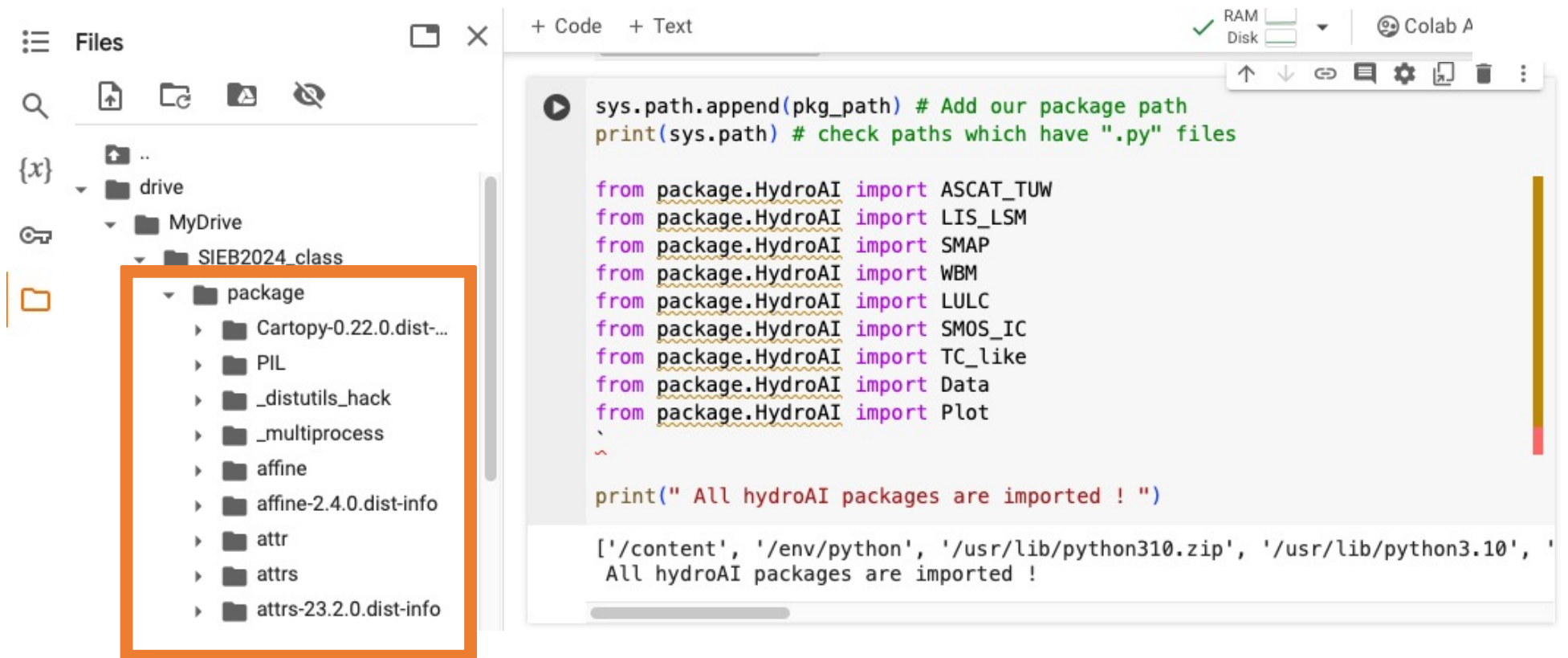
Package path

Install all prerequisite modules with pip
+@) pip: Package Installer of Python

```
Collecting netCDF4  
  Using cached netCDF4-1.6.5-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_  
Collecting cftime (from netCDF4)  
  Using cached cftime-1.6.3-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_  
Collecting certifi (from netCDF4)  
  Using cached certifi-2024.2.2-py3-none-any.whl (163 kB)  
Collecting numpy (from netCDF4)  
  Using cached numpy-1.26.4-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_  
Installing collected packages: numpy, certifi, cftime, netCDF4  
Successfully installed certifi-2024.2.2 cftime-1.6.3 netCDF4-1.6.5 numpy-1.26
```


4-3. All HydroAI packages are imported

You need to install packages



The screenshot displays a Google Colab interface. On the left, the 'Files' pane shows a directory structure: 'drive' > 'MyDrive' > 'SIEB2024_class' > 'package'. The 'package' folder is highlighted with an orange box and contains subfolders: 'Cartopy-0.22.0.dist-...', 'PIL', '_distutils_hack', '_multiprocess', 'affine', 'affine-2.4.0.dist-info', 'attr', 'attrs', and 'attrs-23.2.0.dist-info'. The main code editor on the right contains the following Python code:

```
sys.path.append(pkg_path) # Add our package path
print(sys.path) # check paths which have ".py" files

from package.HydroAI import ASCAT_TUW
from package.HydroAI import LIS_LSM
from package.HydroAI import SMAP
from package.HydroAI import WBM
from package.HydroAI import LULC
from package.HydroAI import SMOS_IC
from package.HydroAI import TC_like
from package.HydroAI import Data
from package.HydroAI import Plot

print(" All hydroAI packages are imported ! ")
```

Below the code, the output shows the system path and a confirmation message:

```
['/content', '/env/python', '/usr/lib/python310.zip', '/usr/lib/python3.10', 'All hydroAI packages are imported !']
```

With many packages

4-4. When you disconnect & restart your code

The screenshot shows a Google Colab interface. On the left, the 'Files' sidebar is open, displaying a message 'Connecting to a runtime to enable file browsing.' and a folder icon. A red box highlights the text 'Disconnecting mounted drive folder' in the sidebar. The main code area shows a Jupyter notebook with the following content:

```
[ ] print("hello")  
  
hello
```

Below this, a section titled '1. mount drive' is expanded, showing the following code:

```
[ ] import os, sys  
import importlib  
from google.colab import drive  
drive.mount('/content/drive')
```

The output of this code is 'Drive already mounted at /content/drive; to attempt'. Below this, the code '!pwd' is shown, with the output '/content/drive/My Drive/SIEB2024_class'. Finally, the code '!ls' is shown, with the output 'intro.ipynb package RefMemo.ipynb Share_for_stude'.

You have to do these processes again.

- 1) mount drive
- 2) Install modules with pip

So, for the next class, please prepare that you can import HydroAI libraries before the next class begins!

If you have any other questions related these processes, send me an email. (subinkim8774@gm.gist.ac.kr)

Thank You!

