

Tutorial on Datahub

ECE 176 - WI26

Overview

1. Datahub Basics
2. Jupyter Notebook Basics
3. How to Start with Assignment

Datahub

- Link: <https://datahub.ucsd.edu>
 - Log in with your UCSD account
 - Multiple types of machines are available, choose the gpu one when you need it:

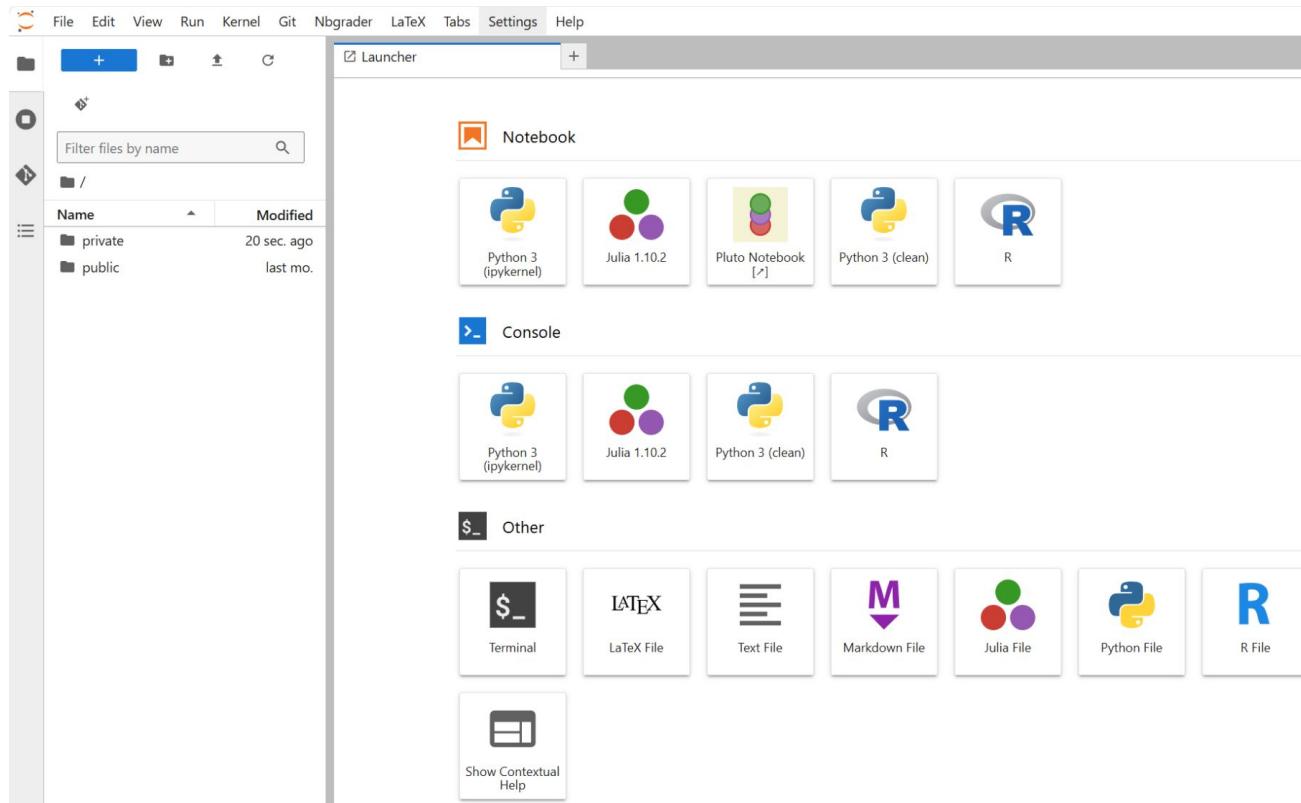
Select Your Notebook Environment

- ECE176_WI26_A00 - Xiaolong Wang [WI26]
ghcr.io/ucsd-ets/scipy-ml-notebook:2025.1-stable (8 CPU, 16G RAM)
- ECE176_WI26_A00 - Xiaolong Wang [WI26]
ghcr.io/ucsd-ets/scipy-ml-notebook:2025.1-stable (8 CPU, 16G RAM, 1 GPU)

Launch Environment

Datahub Interface

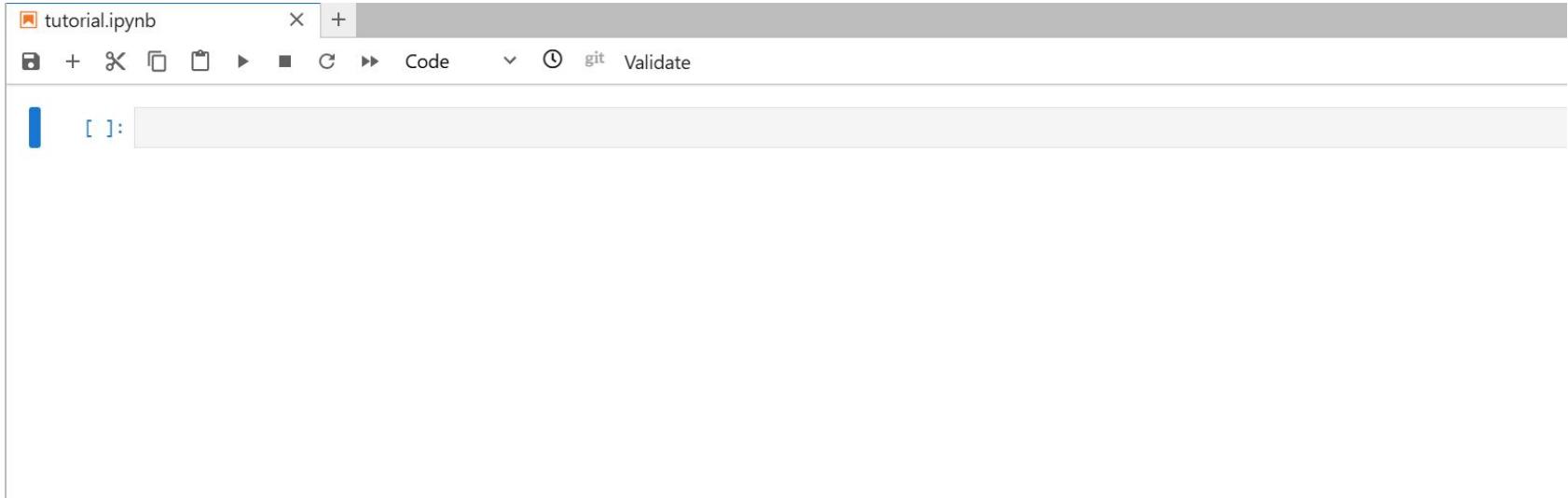
- JupyterLab
 - Jupyter Notebook
 - Terminal



Let's try it.

Jupyter Notebook

- A powerful tool for interactive python development.
 - It can run code, record output, visualize images, write Markdown, and more.



Code Block

- Contains python code
 - A block can be run many times
 - Blocks can be run in any order

```
[1]: import numpy as np
```

```
[2]: np.array((1, 2, 3))
```

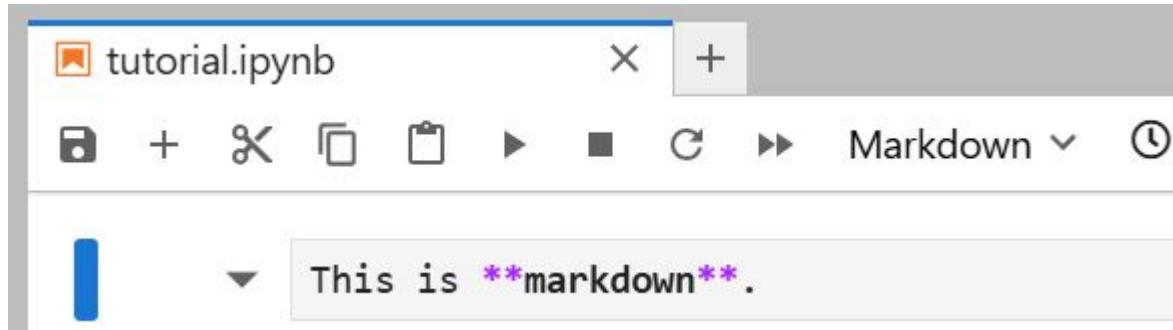
```
[2]: array([1, 2, 3])
```

```
[3]: np.zeros((2, 2))
```

```
[3]: array([[0., 0.],  
           [0., 0.]])
```

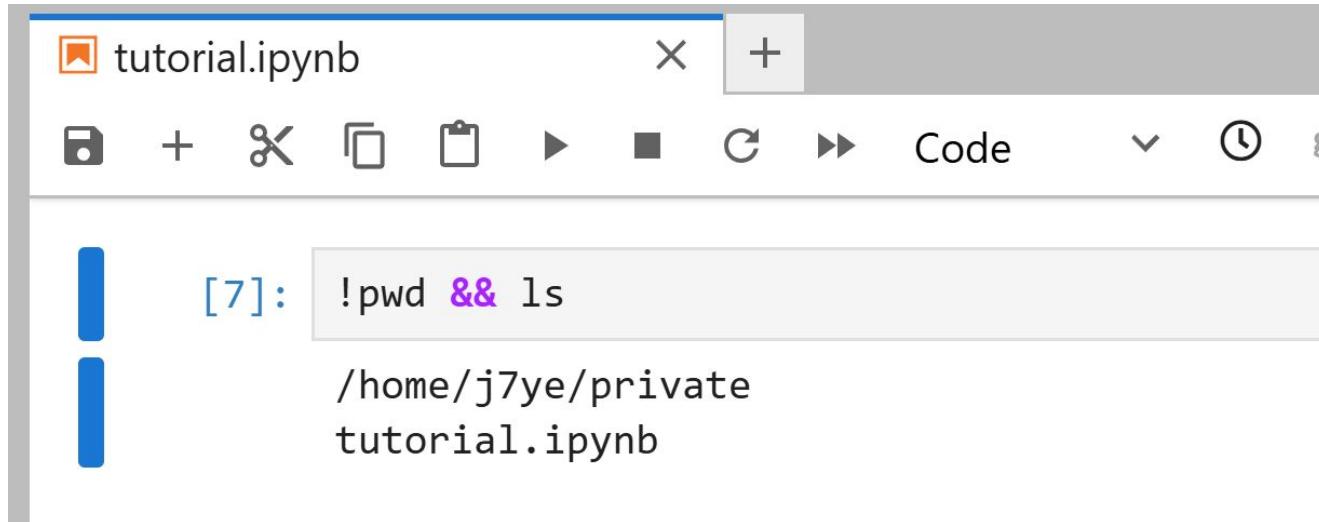
Markdown Block

- You can write markdown in notebook.



Run Shell Command

- Start with ! (exclamation mark)
 - For how to use shell, you can take a look at [the missing semester](#)



The screenshot shows a Jupyter Notebook interface. At the top, there is a toolbar with various icons: a file icon, a plus sign for creating a new notebook, a delete icon, a refresh icon, a copy icon, a forward arrow, a back arrow, a square icon, a circular arrow icon, a 'Code' button, a dropdown menu, a clock icon, and a gear icon. The main area shows a cell with the number [7]: followed by a command line. The command is !pwd && ls. The output of the command is displayed below the command line, showing the path /home/j7ye/private and the file tutorial.ipynb.

```
[7]: !pwd && ls
/home/j7ye/private
tutorial.ipynb
```

Visualize Image

- Show image with matplotlib

```
[10]: import matplotlib.pyplot as plt
import matplotlib.image as mpimg

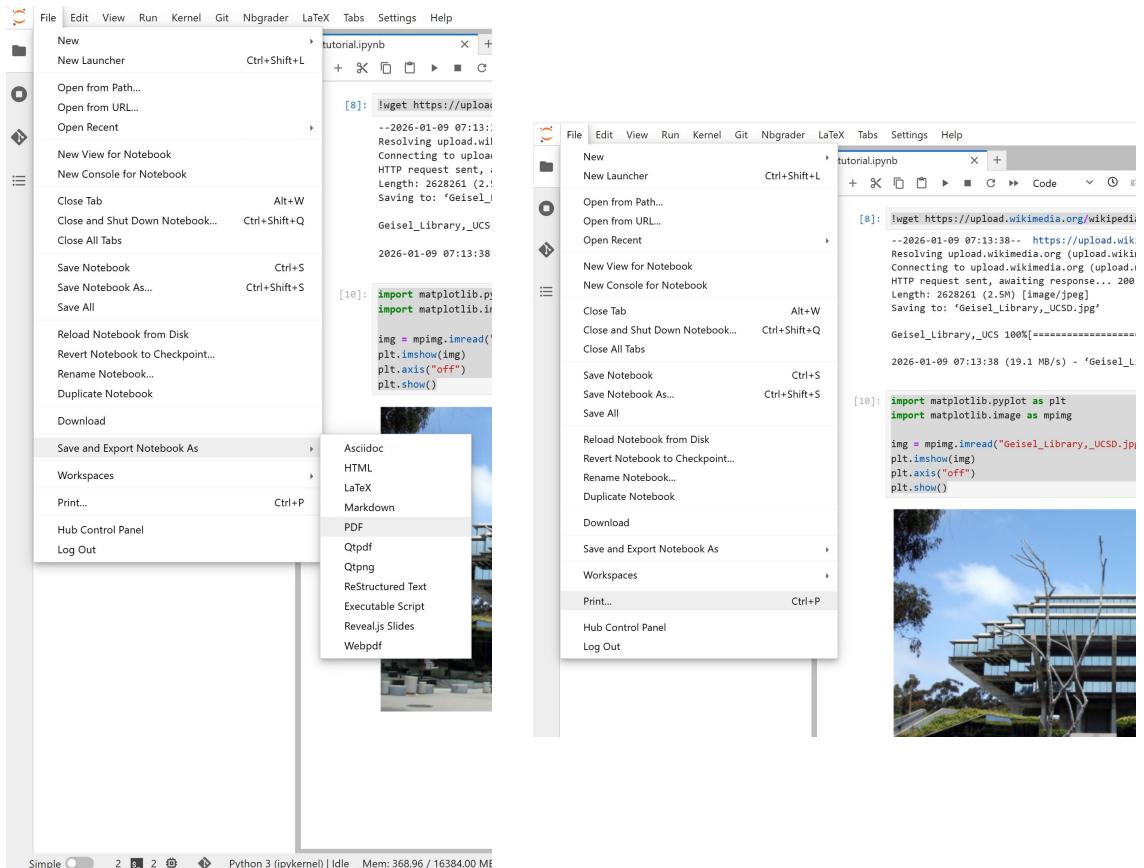
img = mpimg.imread("Geisel_Library,_UCSD.jpg", format="jpg")
plt.imshow(img)
plt.axis("off")
plt.show()
```

⟳ ⌂ ⌄ ⌂



Export as PDF

- You need to do this for the assignment
 - Upload generated PDF to Gradescope
 - Export as PDF or Print



The image shows a Jupyter Notebook interface with two tabs open. The left tab displays a command-line session with the command `!wget https://upload.wikimedia.org/wikipedia/commons/0/0b/Geisel_Library,_UCSD.jpg`. The right tab shows a Python script that imports `matplotlib.pyplot` and `matplotlib.image`, reads an image from the URL, and displays it. The 'File' menu is open on the left, with the 'Print...' option highlighted. The status bar at the bottom indicates 'Simple' mode, Python 3 (ipykernel) | Idle, and Mem: 368.96 / 16384.00 MB.

```
File Edit View Run Kernel Git Nbgrader LaTeX Tabs Settings Help
New New Launcher Ctrl+Shift+L
New View for Notebook
New Console for Notebook
Close Tab Alt+W
Close and Shut Down Notebook... Ctrl+Shift+Q
Close All Tabs
Save Notebook Ctrl+S
Save Notebook As... Ctrl+Shift+S
Save All
Reload Notebook from Disk
Revert Notebook to Checkpoint...
Rename Notebook...
Duplicate Notebook
Download
Save and Export Notebook As
Workspaces
Print... Ctrl+P
Hub Control Panel
Log Out
Asciidoc
HTML
LaTeX
Markdown
PDF
Qtpdf
Qtpng
ReStructured Text
Executable Script
Reveal.js Slides
Webpdf
```

```
[8]: !wget https://upload.wikimedia.org/wikipedia/commons/0/0b/Geisel_Library,_UCSD.jpg
--2026-01-09 07:13:38-- https://upload.wikimedia.org/wikipedia/commons/0/0b/Geisel_Library,_UCSD.jpg
Resolving upload.wikimedia.org (upload.wikimedia.org)... 192.168.1.1
Connecting to upload.wikimedia.org (upload.wikimedia.org)|192.168.1.1:443... connected.
HTTP request sent, awaiting response... 200
Length: 2628261 (2.5M) [image/jpeg]
Saving to: 'Geisel_Library,_UCSD.jpg'

Geisel_Library,_UCSD.jpg 100%[=====] 2628261 2026-01-09 07:13:38 (19.1 MB/s) - 'Geisel_Library,_UCSD.jpg' saved.
```

```
[10]: import matplotlib.pyplot as plt
import matplotlib.image as mpimg
img = mpimg.imread("Geisel_Library,_UCSD.jpg")
plt.imshow(img)
plt.axis("off")
plt.show()
```

```
File Edit View Run Kernel Git Nbgrader LaTeX Tabs Settings Help
New New Launcher Ctrl+Shift+L
New View for Notebook
New Console for Notebook
Close Tab Alt+W
Close and Shut Down Notebook... Ctrl+Shift+Q
Close All Tabs
Save Notebook Ctrl+S
Save Notebook As... Ctrl+Shift+S
Save All
Reload Notebook from Disk
Revert Notebook to Checkpoint...
Rename Notebook...
Duplicate Notebook
Download
Save and Export Notebook As
Workspaces
Print... Ctrl+P
Hub Control Panel
Log Out
```

```
[10]: import matplotlib.pyplot as plt
import matplotlib.image as mpimg
img = mpimg.imread("Geisel_Library,_UCSD.jpg")
plt.imshow(img)
plt.axis("off")
plt.show()
```



Let's try it.

How to Start with Assignment

- Upload and unzip assignment on JupyterLab

```
Terminal 4  x  +
```

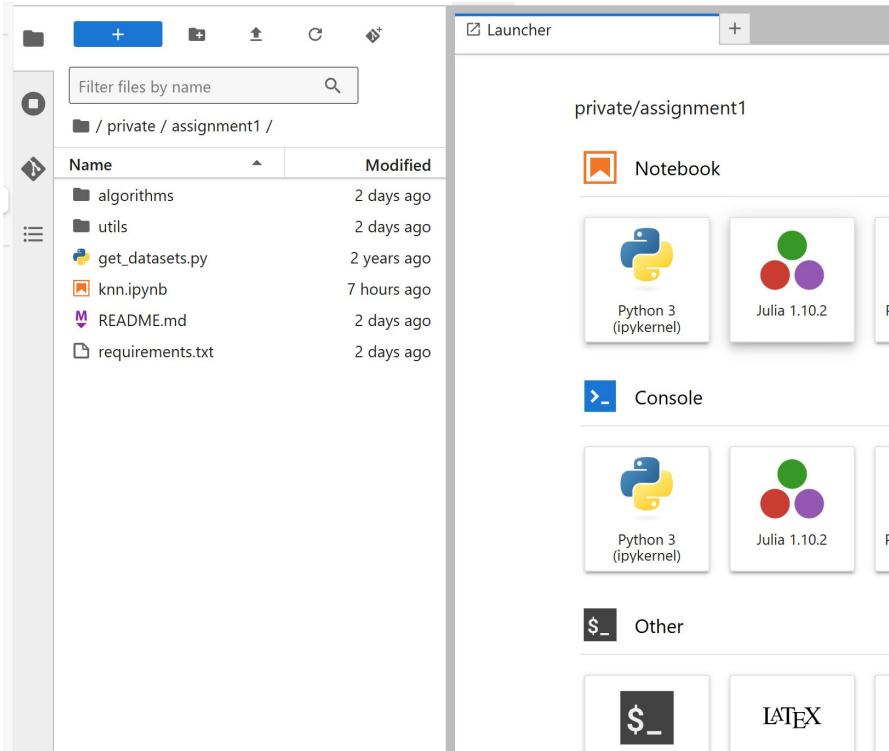
```
j7ye@dsmlp-jupyter-j7ye:~/private$ wget https://xiaolonw.github.io/ece176/assignments/assignment1.zip
--2026-01-09 07:26:40-- https://xiaolonw.github.io/ece176/assignments/assignment1.zip
Resolving xiaolonw.github.io (xiaolonw.github.io)... 185.199.109.153, 185.199.111.153, 185.199.108.153, ...
Connecting to xiaolonw.github.io (xiaolonw.github.io)|185.199.109.153|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 11200 (11K) [application/x-zip-compressed]
Saving to: 'assignment1.zip'

assignment1.zip          100%[=====] 10.94K  --.-KB/s   in 0s
=====
2026-01-09 07:26:40 (41.4 MB/s) - 'assignment1.zip' saved [11200/11200]

j7ye@dsmlp-jupyter-j7ye:~/private$ unzip assignment1.zip
Archive: assignment1.zip
  creating: assignment1/
  inflating: assignment1/requirements.txt
  creating: assignment1/algorithms/
  extracting: assignment1/algorithms/__init__.py
  inflating: assignment1/algorithms/knn.py
  inflating: assignment1/knn.ipynb
  creating: assignment1/utils/
  inflating: assignment1/utils/answer.py
  inflating: assignment1/utils/evaluation.py
  extracting: assignment1/utils/__init__.py
  inflating: assignment1/utils/data_processing.py
  inflating: assignment1/README.md
  inflating: assignment1/get_datasets.py
```

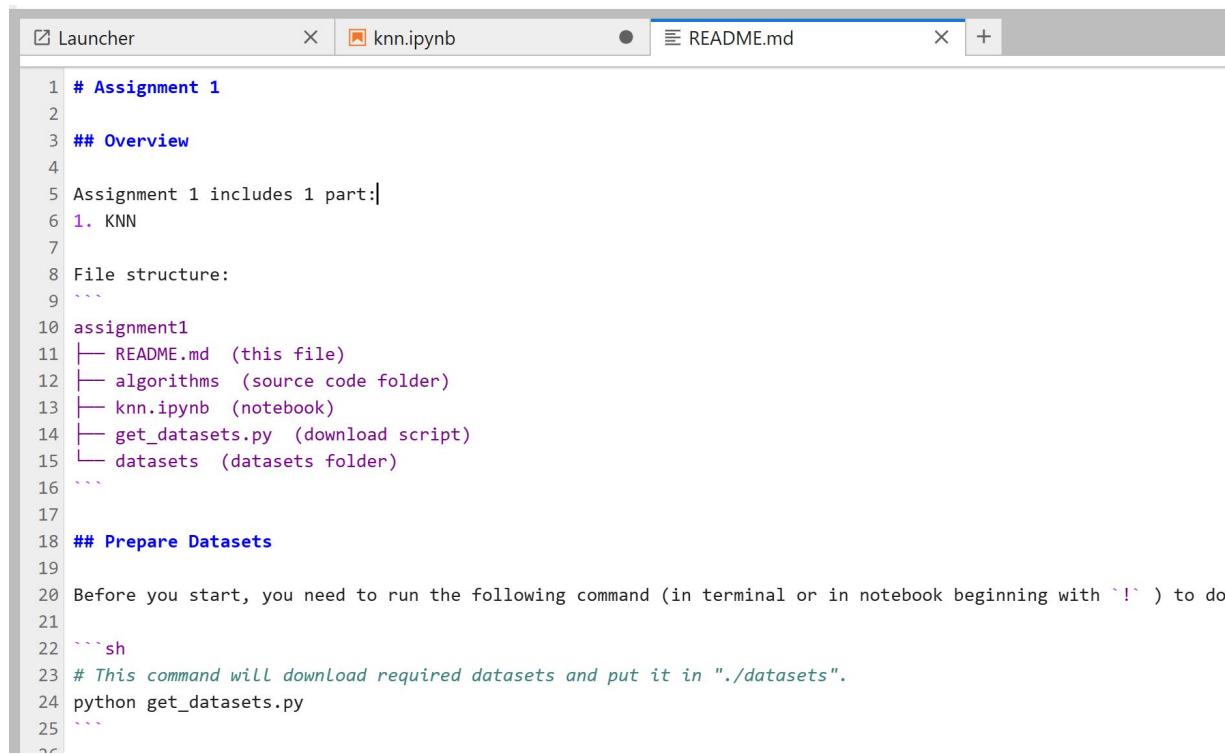
How to Start with Assignment

- Upload and unzip assignment on JupyterLab



How to Start with Assignment

- Read the README file!

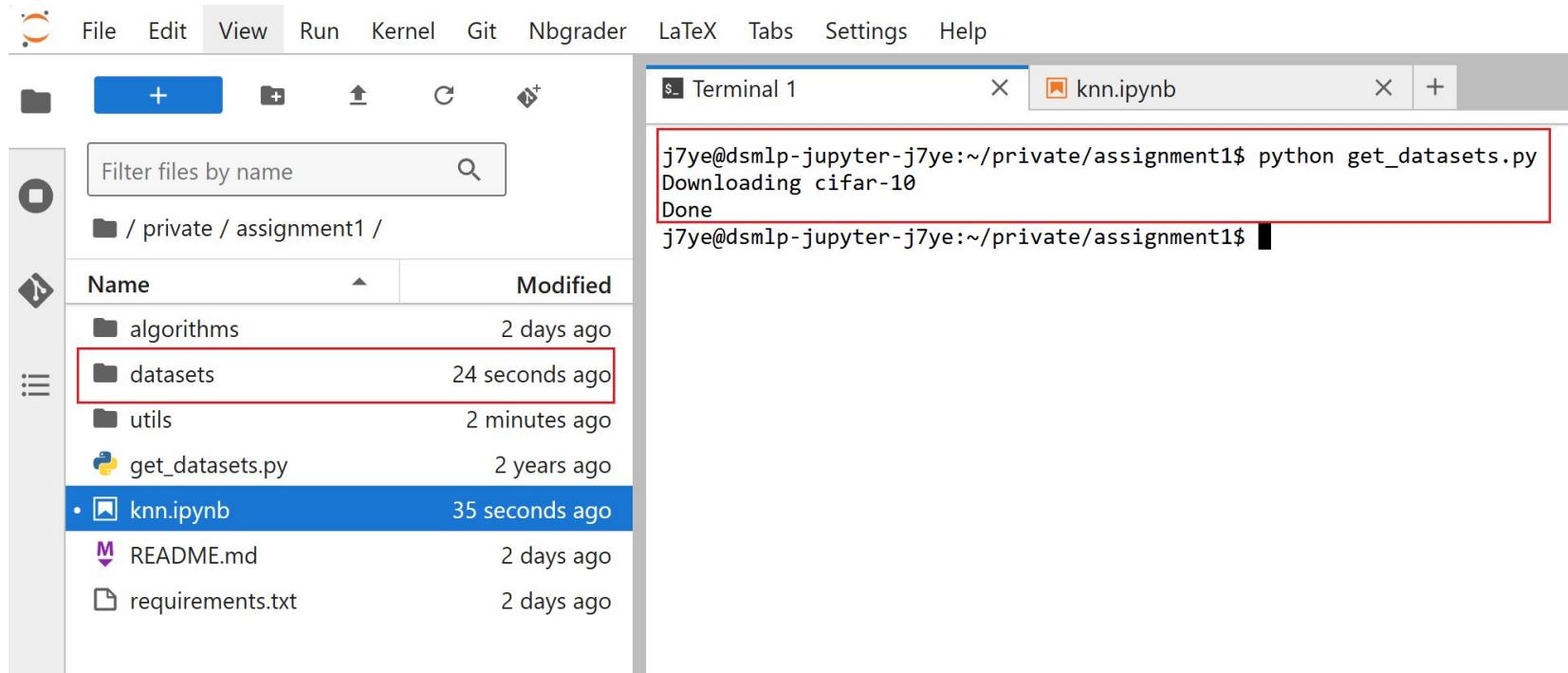


The screenshot shows a Jupyter Notebook interface with three tabs: 'Launcher', 'knn.ipynb', and 'README.md'. The 'README.md' tab is active, displaying the following content:

```
1 # Assignment 1
2
3 ## Overview
4
5 Assignment 1 includes 1 part:
6 1. KNN
7
8 File structure:
9 ~~~
10 assignment1
11   ├── README.md (this file)
12   ├── algorithms (source code folder)
13   ├── knn.ipynb (notebook)
14   ├── get_datasets.py (download script)
15   └── datasets (datasets folder)
16 ~~~
17
18 ## Prepare Datasets
19
20 Before you start, you need to run the following command (in terminal or in notebook beginning with `!` ) to do
21
22 ~~~sh
23 # This command will download required datasets and put it in "./datasets".
24 python get_datasets.py
25 ~~~
```

How to Start with Assignment

- Download the dataset.



The image shows a Jupyter Notebook interface with a file browser on the left and a terminal window on the right.

File Browser (Left):

- File menu icon
- File, Edit, View, Run, Kernel, Git, Nbgrader, LaTeX, Tabs, Settings, Help
- Toolbar: +, folder, up, refresh, dropdown
- Filter files by name: knn.ipynb
- Current directory: / private / assignment1 /
- File list:
 - algorithms (modified 2 days ago)
 - datasets (modified 24 seconds ago)
 - utils (modified 2 minutes ago)
 - get_datasets.py (modified 2 years ago)
 - knn.ipynb (selected, modified 35 seconds ago)
 - README.md (modified 2 days ago)
 - requirements.txt (modified 2 days ago)

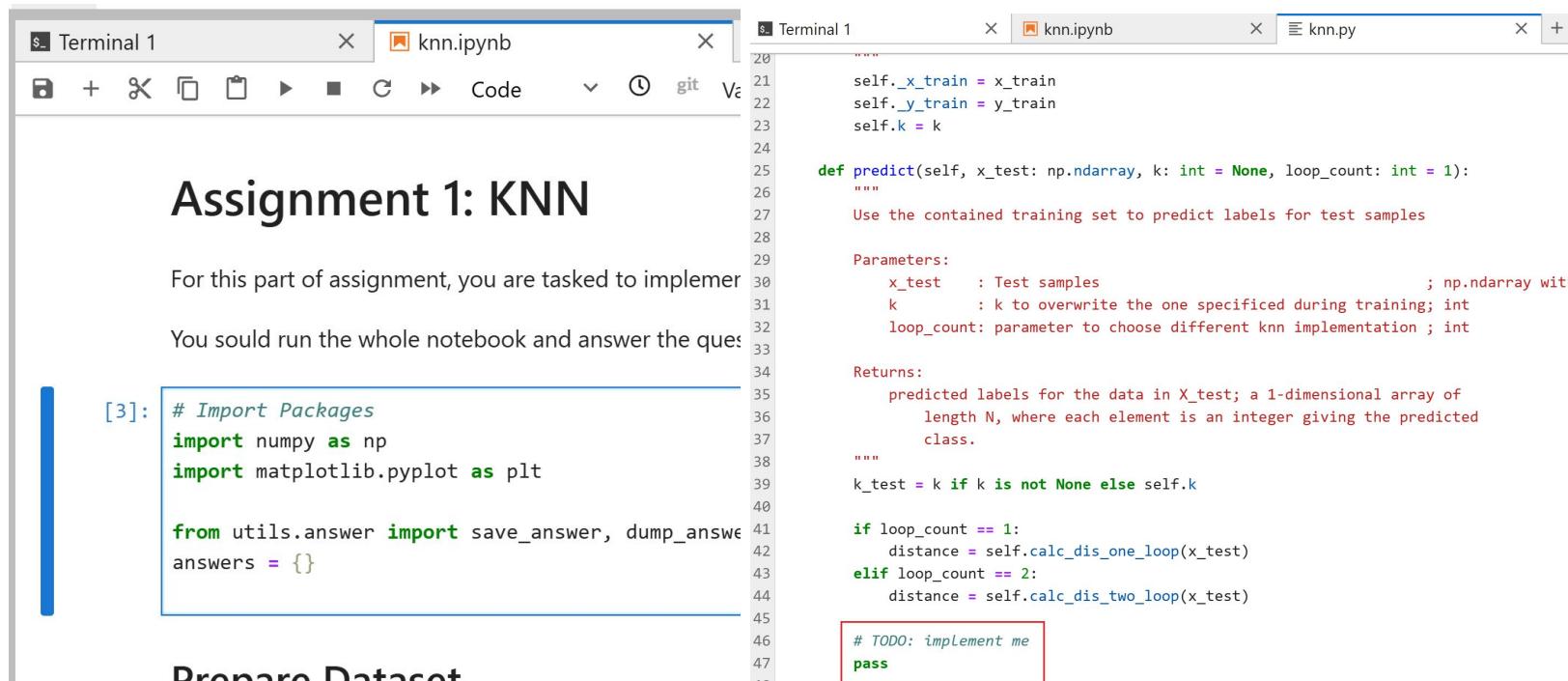
Terminal Window (Right):

- Terminal 1 tab
- knn.ipynb tab
- Terminal content:

```
j7ye@dsmlp-jupyter-j7ye:~/private/assignment1$ python get_datasets.py
Downloading cifar-10
Done
j7ye@dsmlp-jupyter-j7ye:~/private/assignment1$
```

How to Start with Assignment

- Run the whole knn.ipynb, implement knn.py



Assignment 1: KNN

For this part of assignment, you are tasked to implement KNN. You should run the whole notebook and answer the questions.

```
[3]: # Import Packages
import numpy as np
import matplotlib.pyplot as plt

from utils.answer import save_answer, dump_answer
answers = {}
```

```
20
21     self._x_train = x_train
22     self._y_train = y_train
23     self.k = k
24
25     def predict(self, x_test: np.ndarray, k: int = None, loop_count: int = 1):
26         """
27             Use the contained training set to predict labels for test samples
28
29             Parameters:
30                 x_test      : Test samples
31                 k          : k to overwrite the one specified during training; int
32                 loop_count: parameter to choose different knn implementation ; int
33
34             Returns:
35                 predicted labels for the data in X_test; a 1-dimensional array of
36                 length N, where each element is an integer giving the predicted
37                 class.
38         """
39         k_test = k if k is not None else self.k
40
41         if loop_count == 1:
42             distance = self.calc_dis_one_loop(x_test)
43         elif loop_count == 2:
44             distance = self.calc_dis_two_loop(x_test)
45
46         # TODO: implement me
47         pass
```

Prepare Dataset

How to Start with Assignment

- Enable auto-reload of jupyter notebook for faster iteration
 - This is super helpful!

```
[34]: %load_ext autoreload  
%autoreload 2
```

How to Start with Assignment 1

- Submit answers.txt and pdf to Assignment 1
- Submit knn.py to Assignment 1 - Code

Active Assignments	Released	Due (PST) ▾	Submission
Assignment 1 - Code	JAN 8, 2026 12:00 AM	JAN 16, 2026 11:59 PM	Late Due Date: JAN 19, 2026 11:59 PM
Assignment 1	JAN 8, 2026 12:00 AM	JAN 16, 2026 11:59 PM	Late Due Date: JAN 19, 2026 11:59 PM

Submit Programming Assignment

 Upload all files for your submission

Submission Method

 Upload  GitHub  Bitbucket

Add files via Drag & Drop or [Browse Files](#).

Name	Size	Progress	X
answers_hw1.txt	0.1 KB	<div style="width: 10%;">10%</div>	
knn.pdf	63.6 KB	<div style="width: 10%;">10%</div>	

Student Name (Optional)

Enter student name

Cancel

Upload

Let's try it.

Thanks