

Tutorial on Datahub

ECE 176 - W126

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:

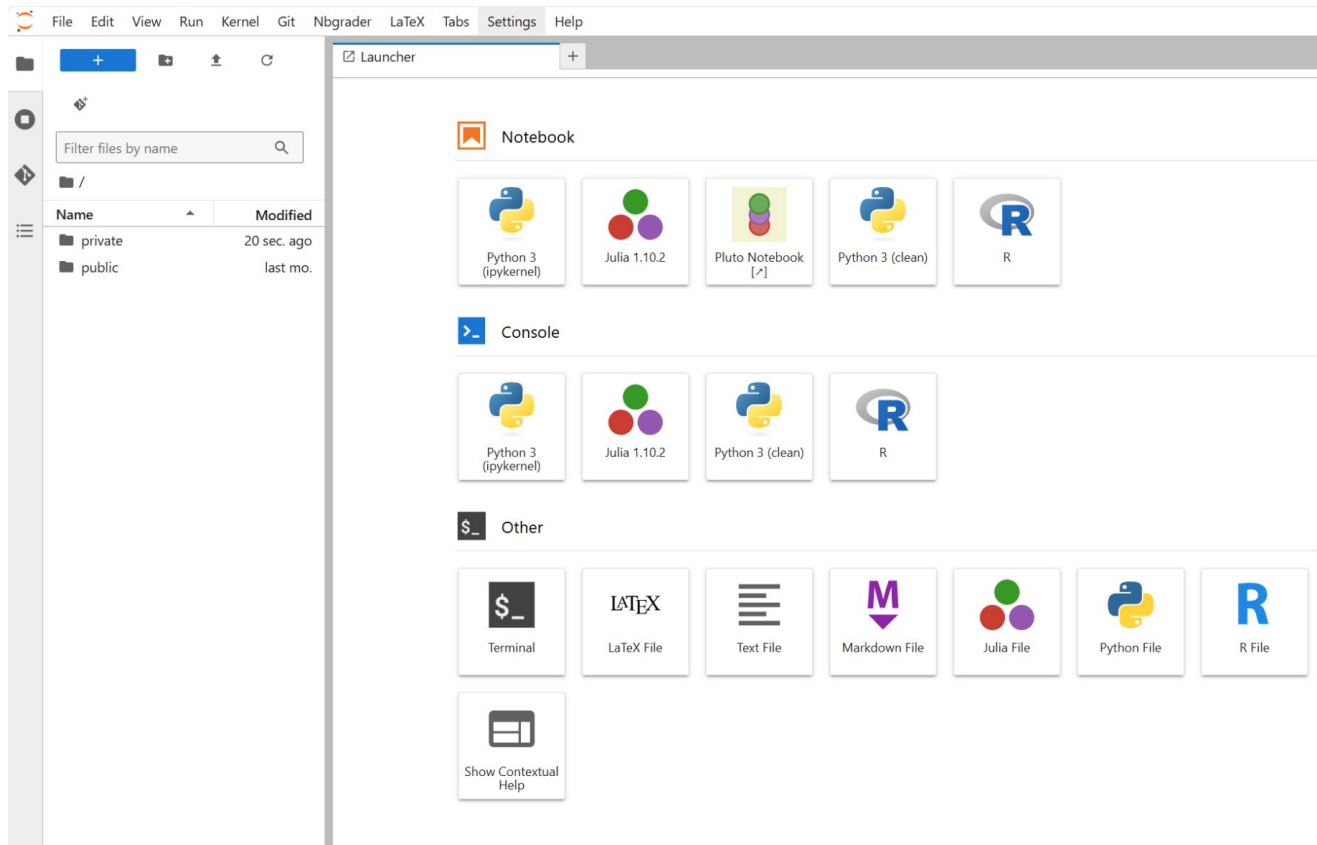
Select Your Notebook Environment

- ☐ 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

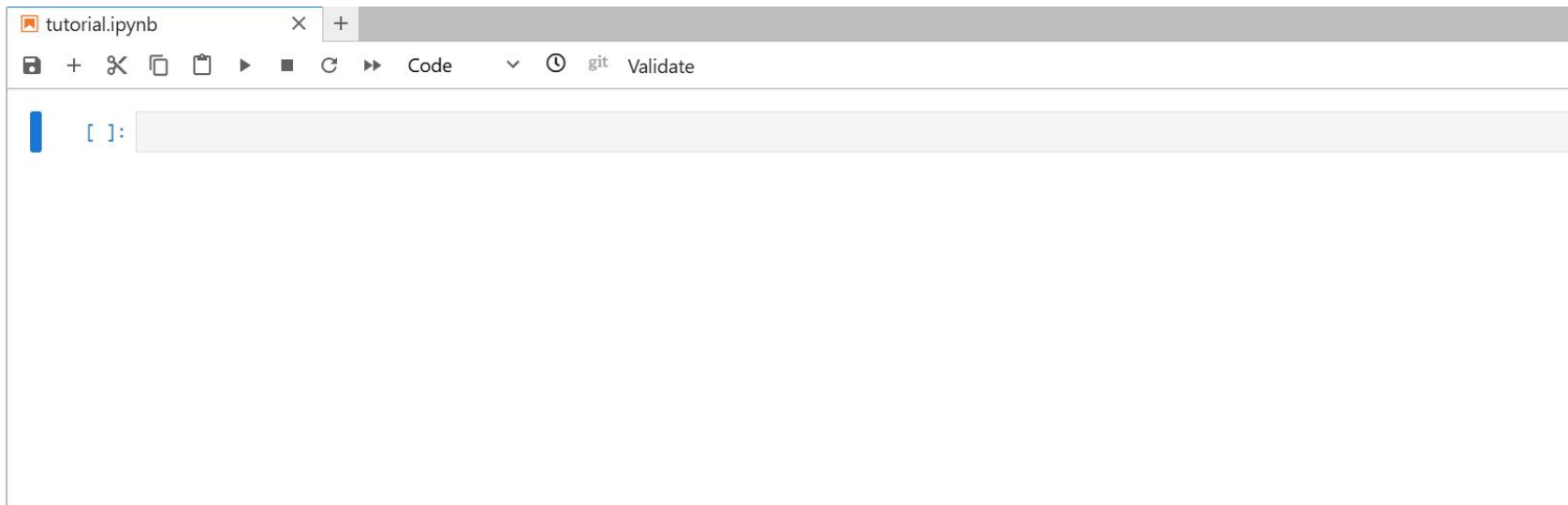
- JupyterLab
 - Jupyter Notebook
 - Terminal



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))
```

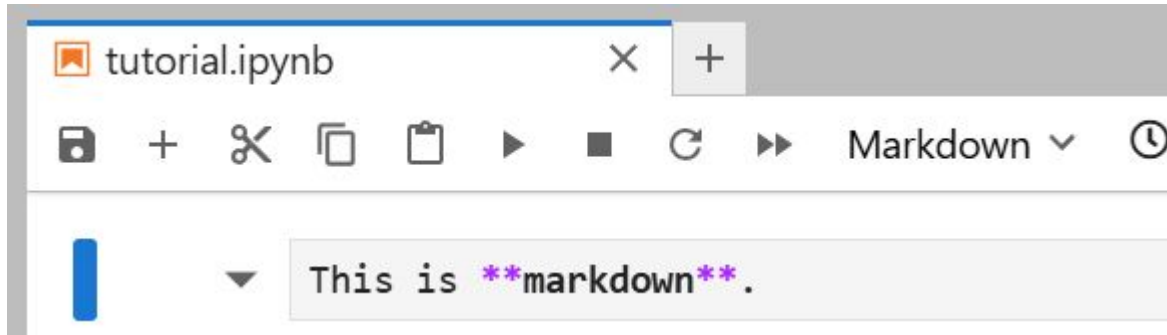
```
[2]: array([1, 2, 3])
```

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

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

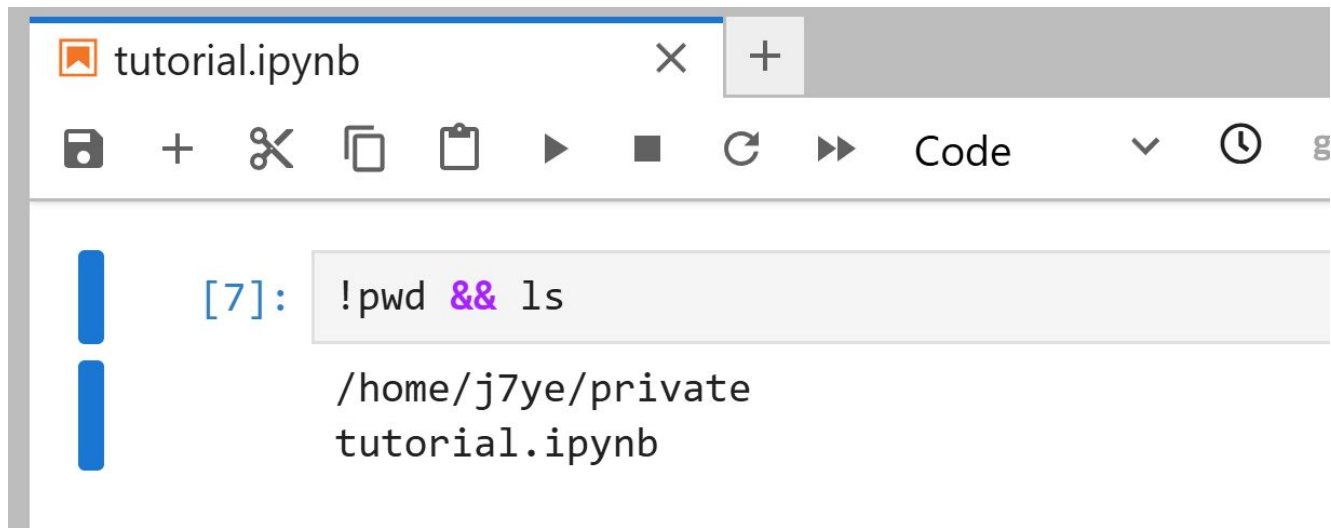
Markdown Block

- 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 window titled 'tutorial.ipynb'. The toolbar includes icons for saving, adding, deleting, copying, pasting, running, and other functions. The code cell, labeled '[7]:', contains the shell command `!pwd && ls`. The output of the command is displayed below the code: `/home/j7ye/private` and `tutorial.ipynb`.

```
[7]: !pwd && ls
```

```
/home/j7ye/private
tutorial.ipynb
```

Visualize Image

- Show image with matplotlib

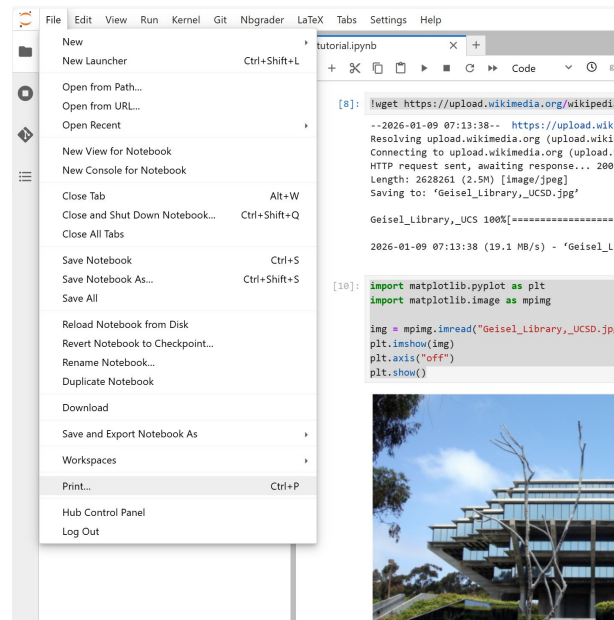
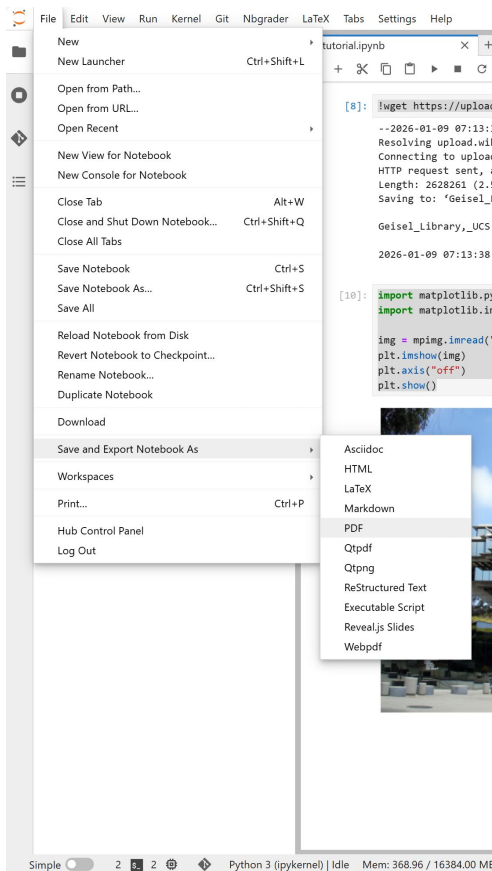
```
[10]: import matplotlib.pyplot as plt
import matplotlib.image as mpimg

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



Let's try it.

How to Start with Assignment

- Upload and unzip assignment on JupyterLab

```
Terminal 4 × +
j7ye@dsm1p-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'

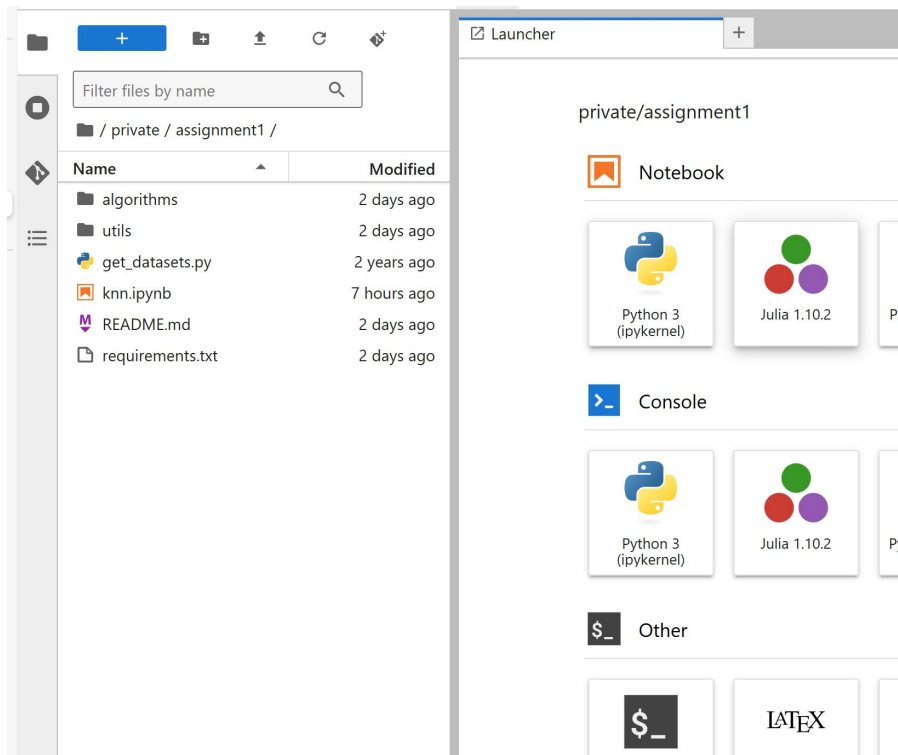
assignment1.zip                               100%[=====] 10.94K  --.-KB/s    in 0s

2026-01-09 07:26:40 (41.4 MB/s) - 'assignment1.zip' saved [11200/11200]

j7ye@dsm1p-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



The screenshot displays the JupyterLab interface. On the left, a file browser shows the directory structure: `/ private / assignment1 /`. The files listed are:

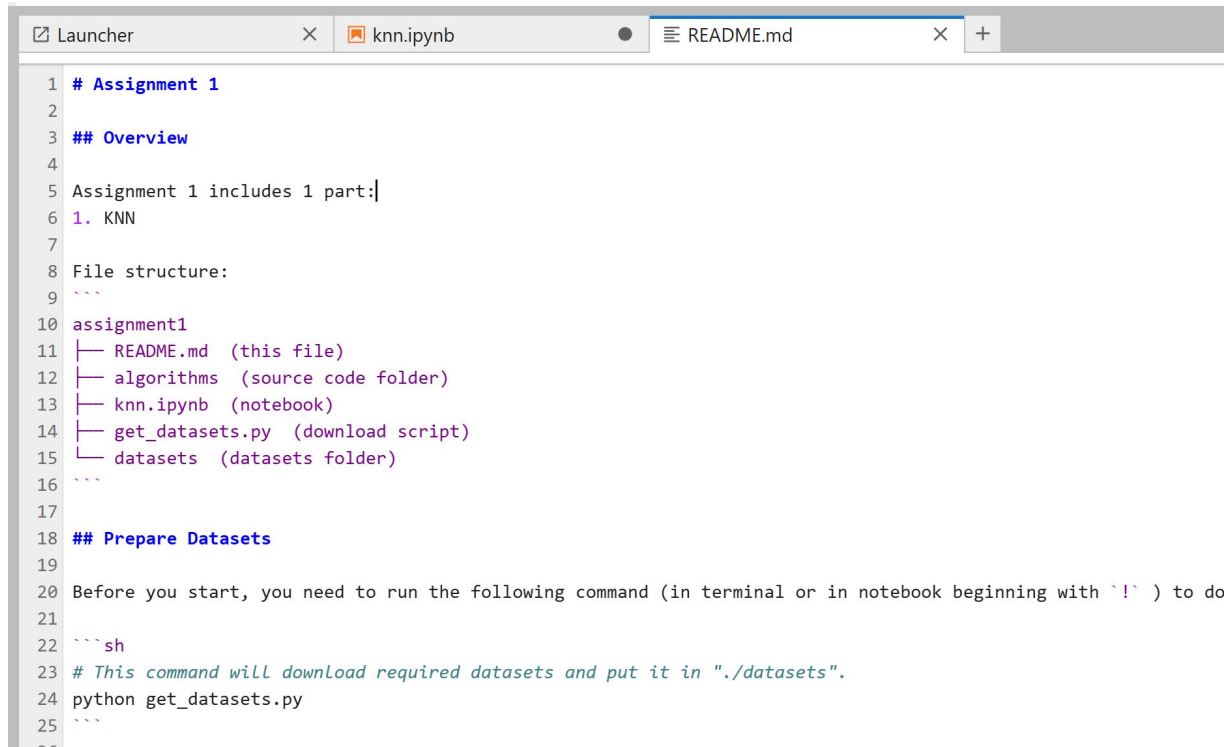
Name	Modified
algorithms	2 days ago
utils	2 days ago
get_datasets.py	2 years ago
knn.ipynb	7 hours ago
README.md	2 days ago
requirements.txt	2 days ago

On the right, the 'Launcher' tab is active, showing the path `private/assignment1`. It contains three sections:

- Notebook**: Displays two options: `Python 3 (ipykernel)` and `Julia 1.10.2`.
- Console**: Displays two options: `Python 3 (ipykernel)` and `Julia 1.10.2`.
- Other**: Displays two options: `$_` and `LATEX`.

How to Start with Assignment

- Read the README file!

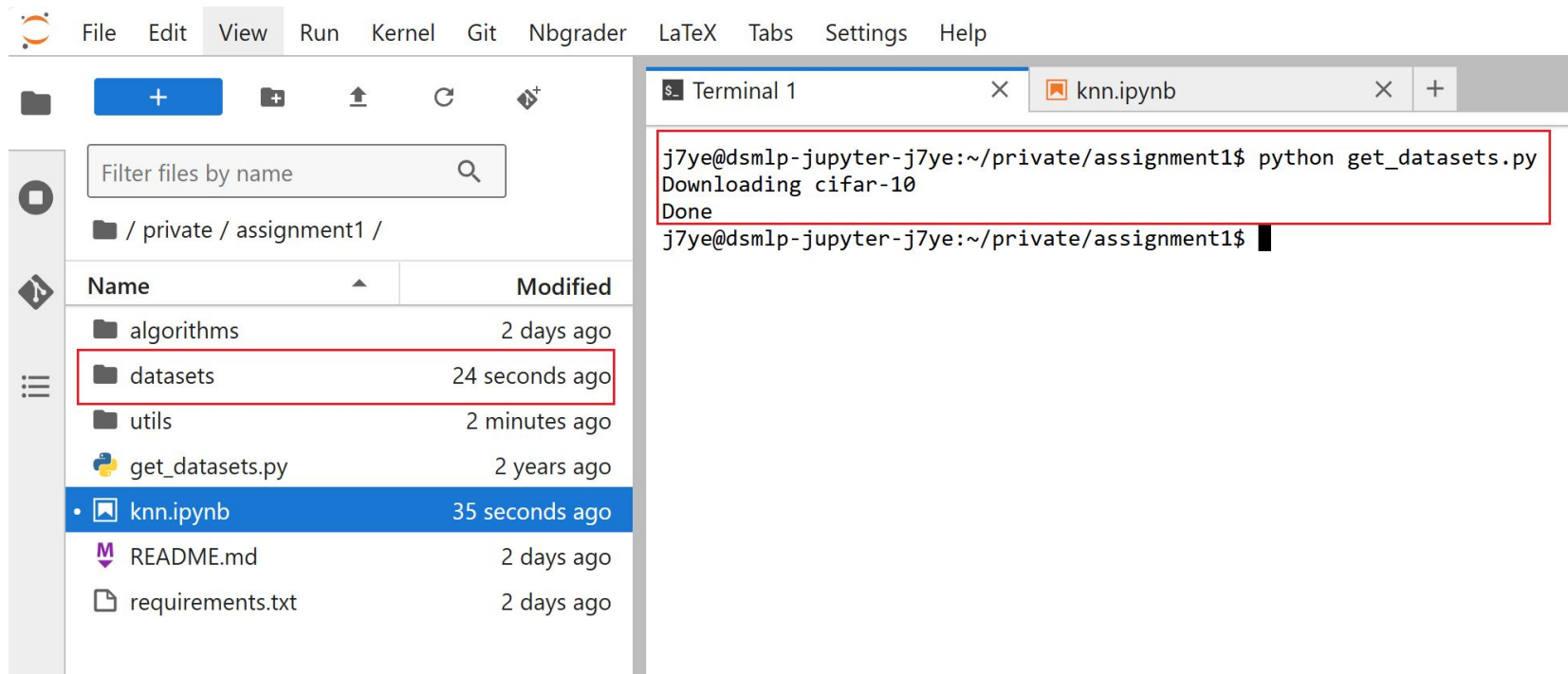


The screenshot shows a Jupyter Notebook window with three tabs: 'Launcher', 'knn.ipynb', and 'README.md'. The 'README.md' tab is active, displaying the following content:

```
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 ```
26
```

How to Start with Assignment

- Download the dataset.



The screenshot displays the JupyterLab interface. On the left, the file browser shows the directory structure of the current workspace. The 'datasets' folder is highlighted with a red box. On the right, a terminal window titled 'Terminal 1' shows the execution of a Python script to download the CIFAR-10 dataset. The terminal output is also highlighted with a red box.

File Browser:

Name	Modified
algorithms	2 days ago
datasets	24 seconds ago
utils	2 minutes ago
get_datasets.py	2 years ago
knn.ipynb	35 seconds ago
README.md	2 days ago
requirements.txt	2 days ago

Terminal 1:

```
j7ye@dsm1p-jupyter-j7ye:~/private/assignment1$ python get_datasets.py
Downloading cifar-10
Done
j7ye@dsm1p-jupyter-j7ye:~/private/assignment1$
```


How to Start with Assignment

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

The image shows a Jupyter Notebook interface with a terminal window and a code editor. The notebook is titled "Assignment 1: KNN" and contains instructions for the assignment. The code editor shows the implementation of the KNN algorithm in Python.

Assignment 1: KNN

For this part of assignment, you are tasked to implement the K-Nearest Neighbors (KNN) algorithm.

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 = {}
```

Prepare Dataset

```
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 ; np.ndarray with
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
48
```

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

- 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	✕
answers_hw1.txt	0.1 KB	<div></div>	✕
knn.pdf	63.6 KB	<div></div>	✕

Student Name (Optional)

Enter student name

Cancel

Upload

Let's try it.

Thanks