Colab Tutorial

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2023.02.20

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Link of this Tutorial

https://reurl.cc/eWj6jL

(Things mentioned in this tutorial will be covered in this notebook)

Outline

- Introduction
- Getting Started
- Changing Runtime
- Executing Code Block
- Check GPU type
- File Manipulation
- Mounting Google Drive
- Saving Notebook
- Useful Linux Commands
- Problems You May Encounter… (very important)
- References

Introduction

What is Colab?

Colab, or "Colaboratory", allows you to write and execute Python in your browser, with

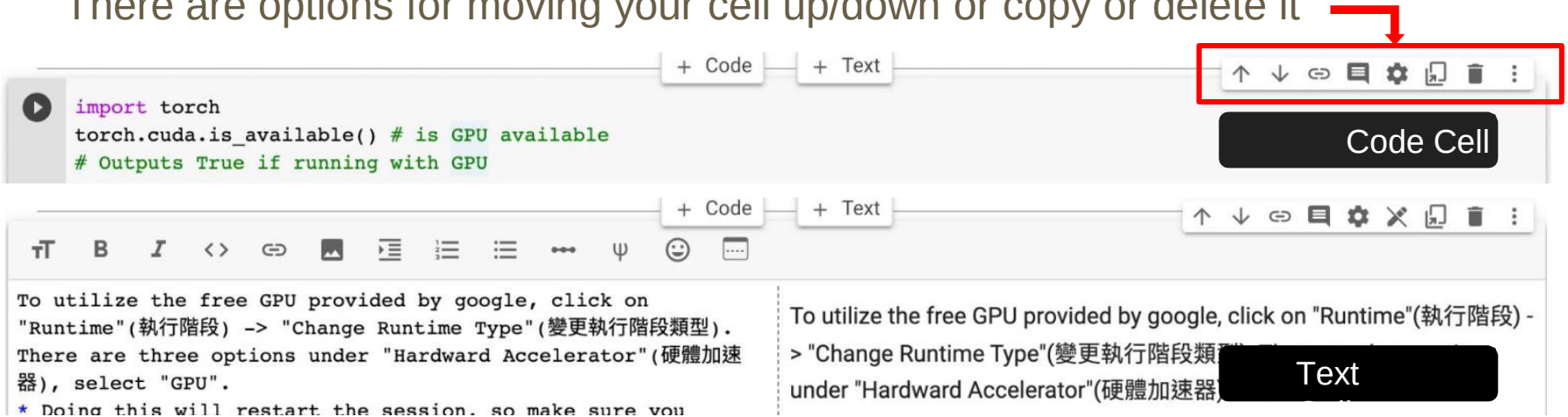
- Zero configuration required
- Free access to GPUs
- Easy sharing

Getting Started

Creating a new cell

You can create a new code cell by clicking on +Code, clicking on +Text generates a text cell

There are options for moving your cell up/down or copy or delete it



Getting Started

You can type python code in the code cell, or use a leading exclamation mark ! to change the code cell to treating the input as a shell script

```
[ ]  import torch
     torch.cuda.is_available() # is GPU available
     # Outputs True if running with GPU
```

→ **python**

```
[ ]  # List all the files under the working directory
     !ls
```

→ **shell script**

Getting Started

Using an exclamation mark (!) starts a new shell, does the operations, and then kills that shell, while percentage (%) affects the process associated with the notebook, and it is called a magic command.

Use % instead of ! for cd (change directory) command

other magic commands are listed here

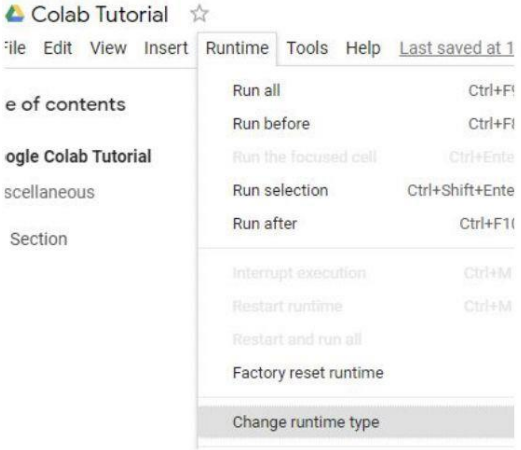
Changing Runtime

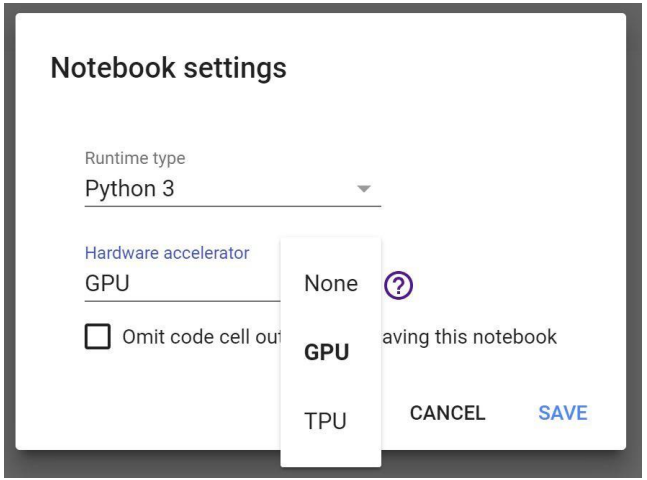
To utilize the free GPU provided by google,

click on "Runtime"(執行階段) → "Change Runtime Type"(變更執行階段類型).

select "**GPU**" for "Hardware Accelerator"(硬體加速器)

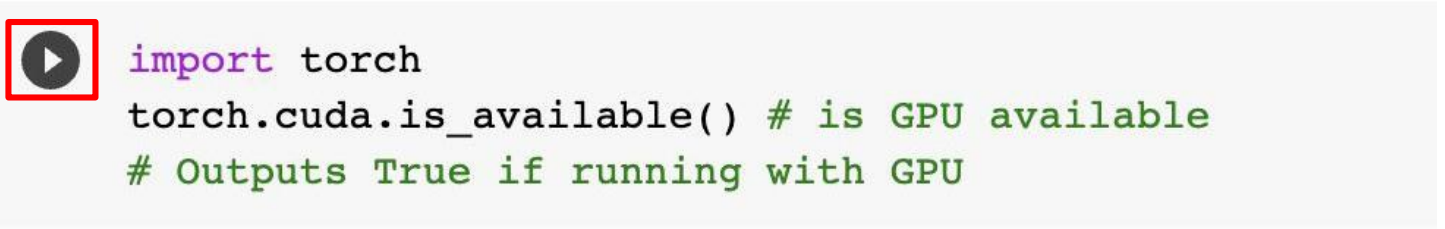
Doing this will restart the session, so make sure you change to the desired runtime before executing any code.





Executing Code Block

Click on the play button to execute a specific code cell



Executing Code Block

Other options to run your code

Check GPU Type

Use the command **nvidia-smi** to check the allocated GPU type

Available GPUs:

T4 > K80

(but most of the time you get K80 using the free Colab)

```
[ ]  # check allocated GPU type
     !nvidia-smi
```

```
Sun Feb  5 07:30:36 2023
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 510.47.03    Driver Version: 510.47.03    CUDA Version: 11.6     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|                               |                      |               MIG M. |
|===============================+======================+======================|
|   0  Tesla T4            Off  | 00000000:00:04.0 Off |                    0 |
| N/A   43C    P0    26W /  70W |      3MiB / 15360MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                                  |
|  GPU   GI   CI        PID   Type   Process name                  GPU Memory |
|        ID   ID                                                   Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
```

File Manipulation

Download files via Google Drive

1. Download Files via google drive

A file stored in Google Drive has the following sharing **link**：

https://drive.google.com/file/d/14FK5G6DOh7EdLyoj4D5teRSzriTOUPD7/view?usp=sharing

It is possible to download the file via Colab knowing the **link**, using the **--fuzzy** command.

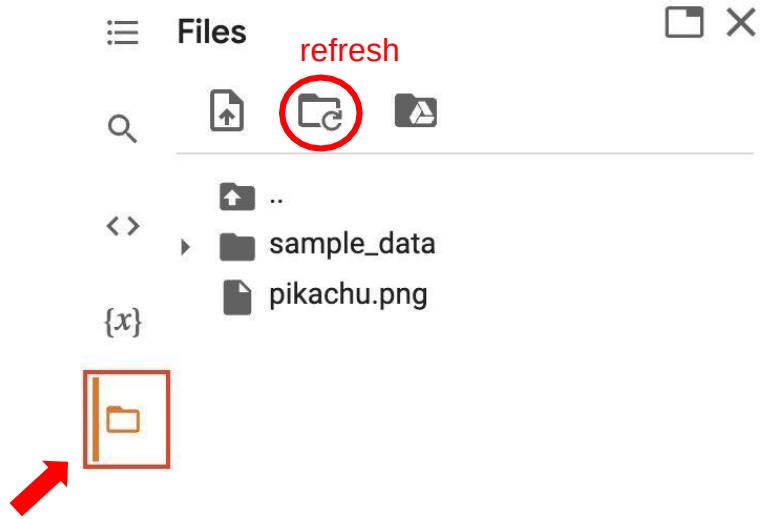
```
[ ]  # Download the file with the following link,  and rename it to pikachu.png
     !gdown --fuzzy https://drive.google.com/file/d/14FK5G6DOh7EdLyoj4D5teRSzriTOUPD7/view?usp=sharing --output pikachu.png
```

```
Downloading...
From: https://drive.google.com/uc?id=14FK5G6DOh7EdLyoj4D5teRSzriTOUPD7
To: /content/pikachu.png
100% 890k/890k [00:00<00:00, 155MB/s]
```

File Manipulation

File Structure

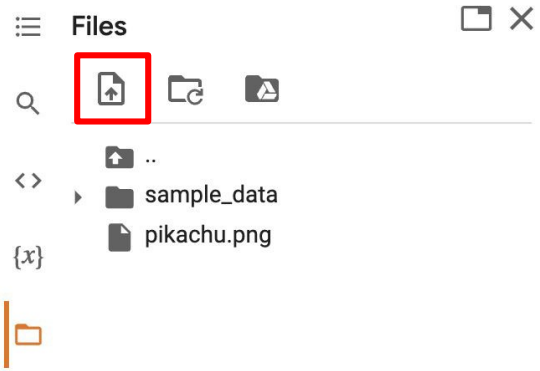
- You may click on the folder icon on the left to view your current files
- After downloading files, if the files are not immediately shown, click the refresh button
- Files are temporarily stored, and will be removed once you end your session.



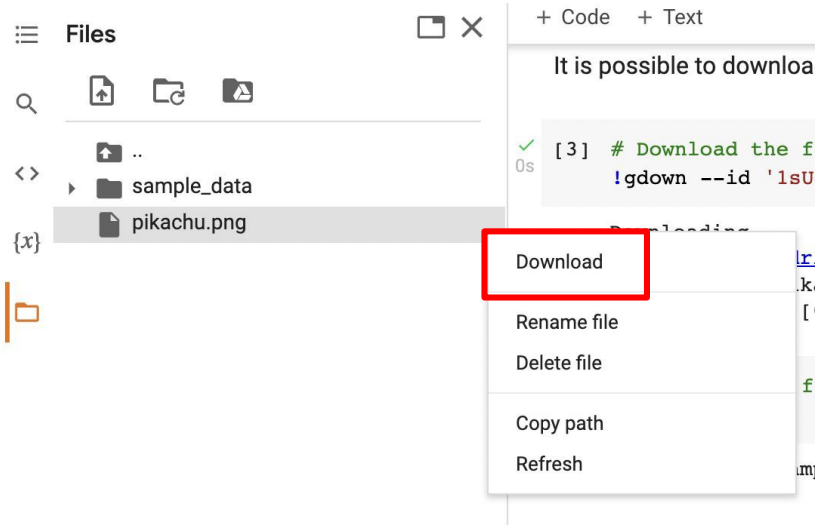
File Manipulation

Upload and Download Files

Click the upload icon to upload local files to your session



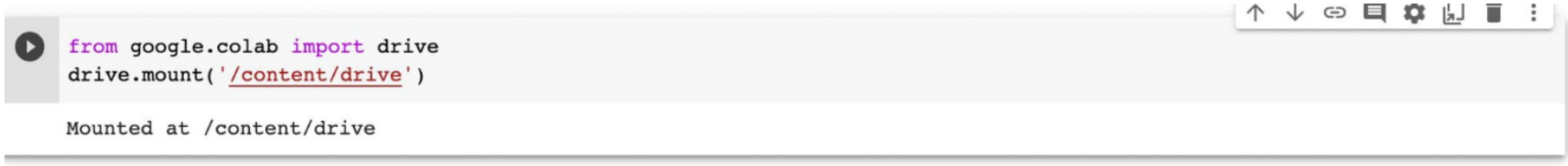
click ⋮ to download files to your local



Mounting Google Drive

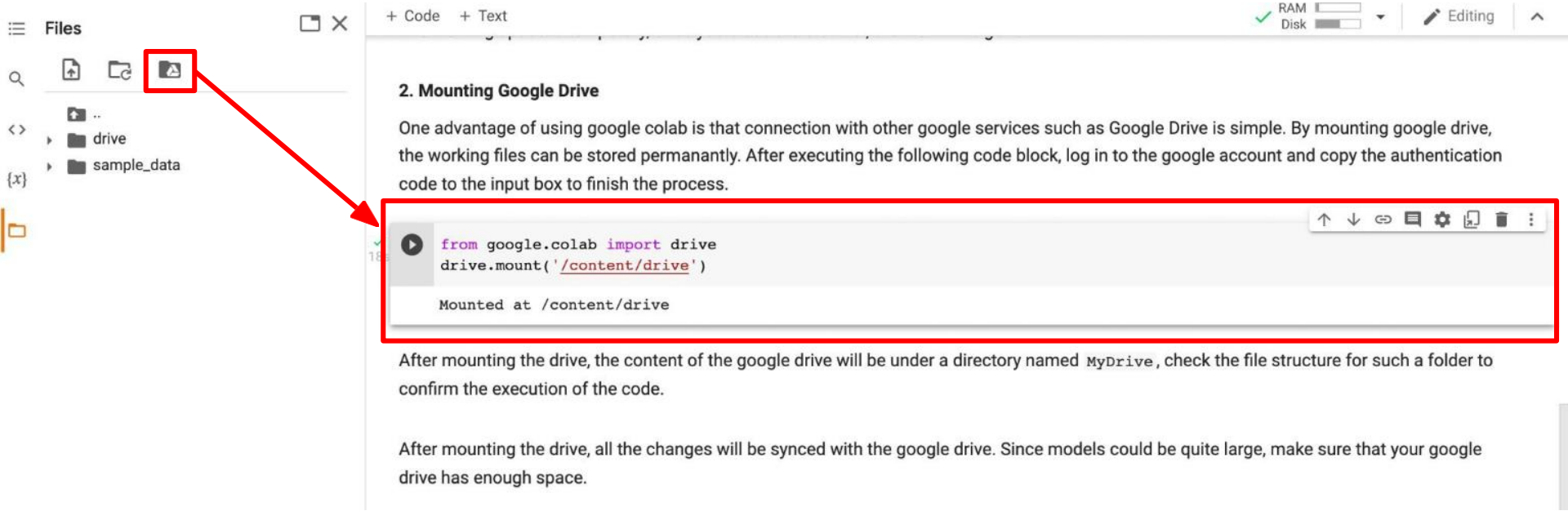
If you don’t want to download the data every time you start a new session, or you want some files to be saved permantly,

you can mount your own google drive to colab and directly download/save the data to your google drive.



Mounting Google Drive

Click on the Google Drive icon, the **Mount Drive** code block will be generated



Mounting Google Drive

Execute the following three code blocks in order

This will download the image to your google drive, and you can access it later

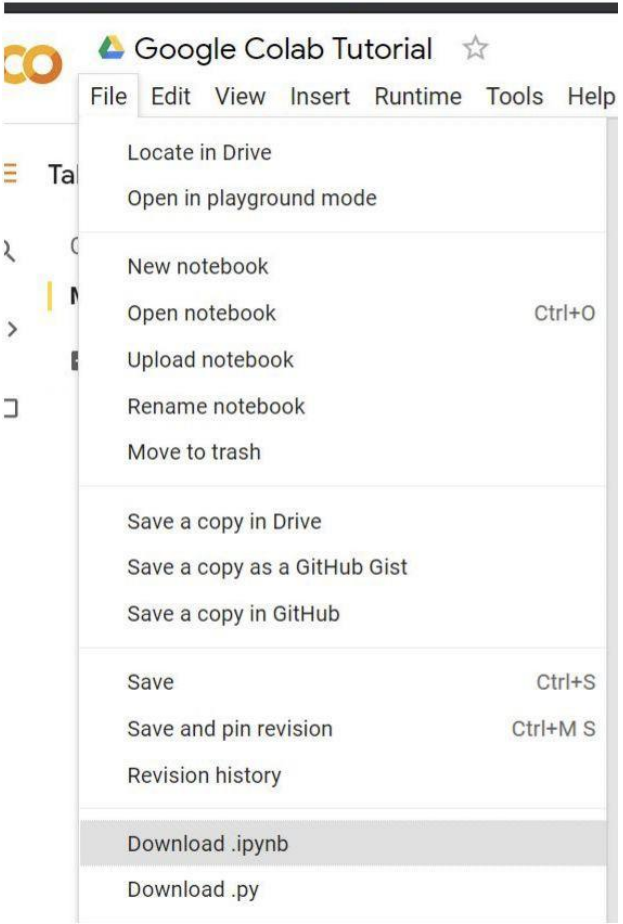
```
[ ]  %cd /content/drive/MyDrive
     #change directory to google drive
     !mkdir ML2023 #make a directory named ML2023
     %cd ./ML2023
     #change directory to ML2023
```

```
[ ]  !pwd #output the current directory
```

```
[ ]  !gdown --fuzzy https://drive.google.com/file/d/14FK5G6DOh7EdLyoj4D5teRSzriTOUPD7/view?usp=sharing --output pikachu.png
```

Saving Notebook

- Download the .ipynb file to your local device (File > Download .ipynb)
- Save the colab notebook to your google drive (File > Save a copy in Drive).
- Convert .ipynb to .py and download (File > Download .py)



Useful Linux Commands (in Colab)

ls : List all files in the current directory

ls -l : List all files in the current directory with more detail

pwd : Output the working directory

mkdir <dirname> : Create a directory <dirname>

cd <dirname> : Move to directory <dirname>

gdown : Download files from google drive

wget : Download files from the internet

python <python_file>: Executes a python file

Problems You May Encounter…

- Colab will **automatically disconnect** if idle timeout(90 min., sometimes varying) or when your screen goes black

  → solution: keep your screen on or try using javascript

- GPU usage is **not unlimited** ! (your account will be stopped for a period if you reached the max gpu usage 12 hrs)

  *** The cooldown period before you can connect to another GPU will extend from hours to days to weeks depending on your usage**

  → solution: open another account

Best solution:

1. buy colab pro :)
2. use your own resource (if able)

Reminder: TAs are not required to help you solve environment problems

Reference

- https://colab.research.google.com
- https://research.google.com/colaboratory/faq.html