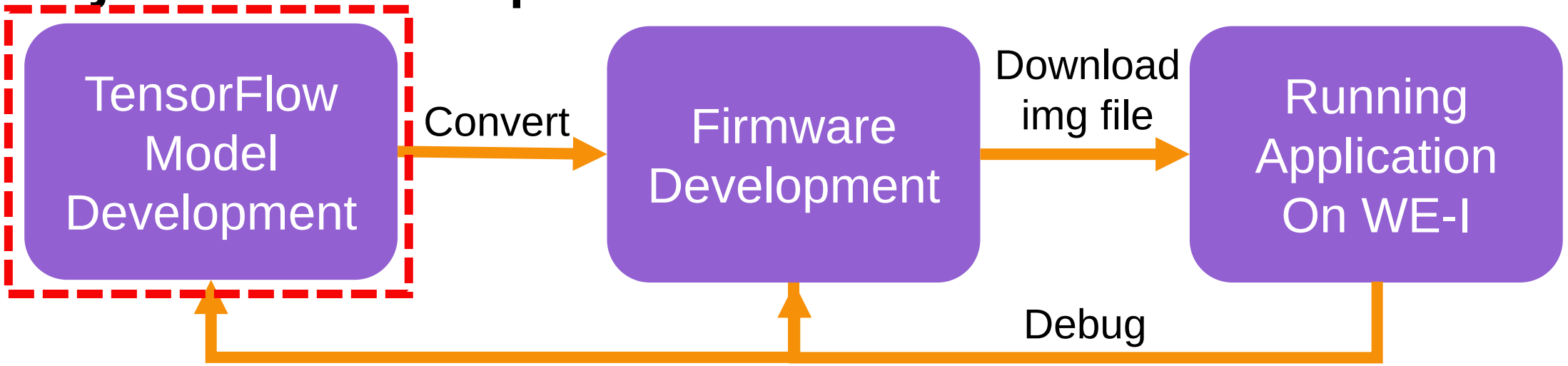
Workshop on Synopsys ARC CPU with TensorFlow Lite

Tutorial 3 – TensorFlow Project Environment Setup & Development Flow

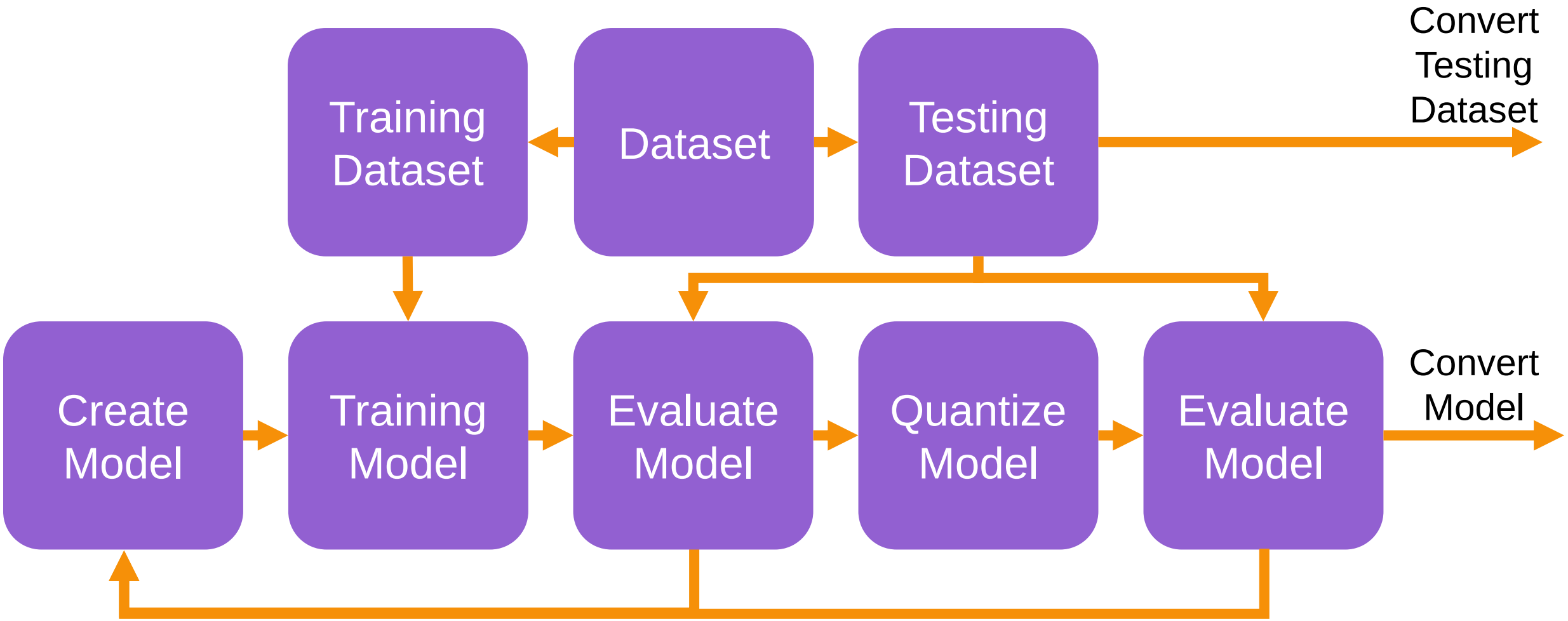
主辦單位：國立清華大學電機系、新思科技
協辦單位：智慧製造電子應用聯盟
指導單位：教育部資訊及科技教育司

Project Development Flow



Stage	TensorFlow Model Development	Firmware Development	Running Application On WE-I
Tool	Anaconda Cygwin	Cygwin Metaware or ARC GNU VirtualBox (Ubuntu)	Tera Term USB Micro
Language	Python 3	C language C++ language	

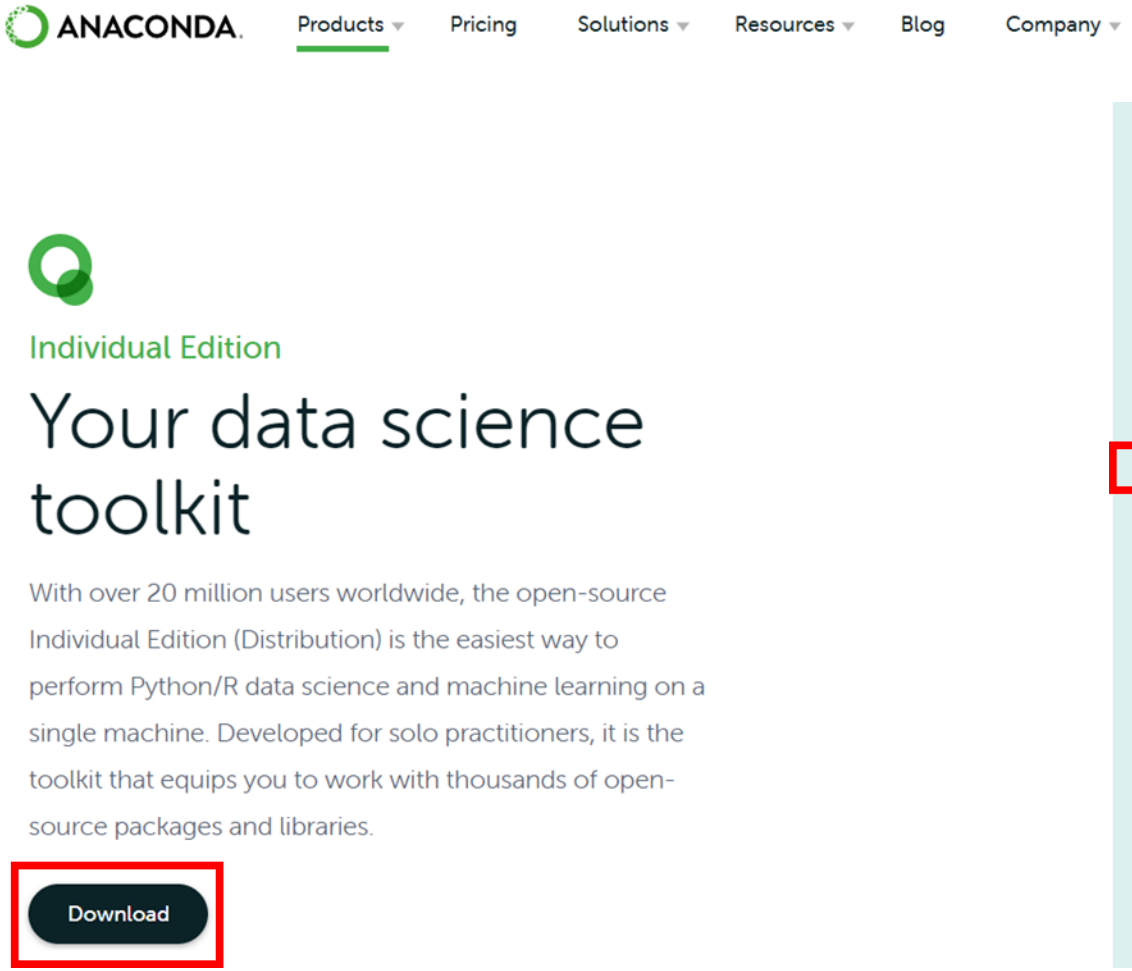
TensorFlow Model Development

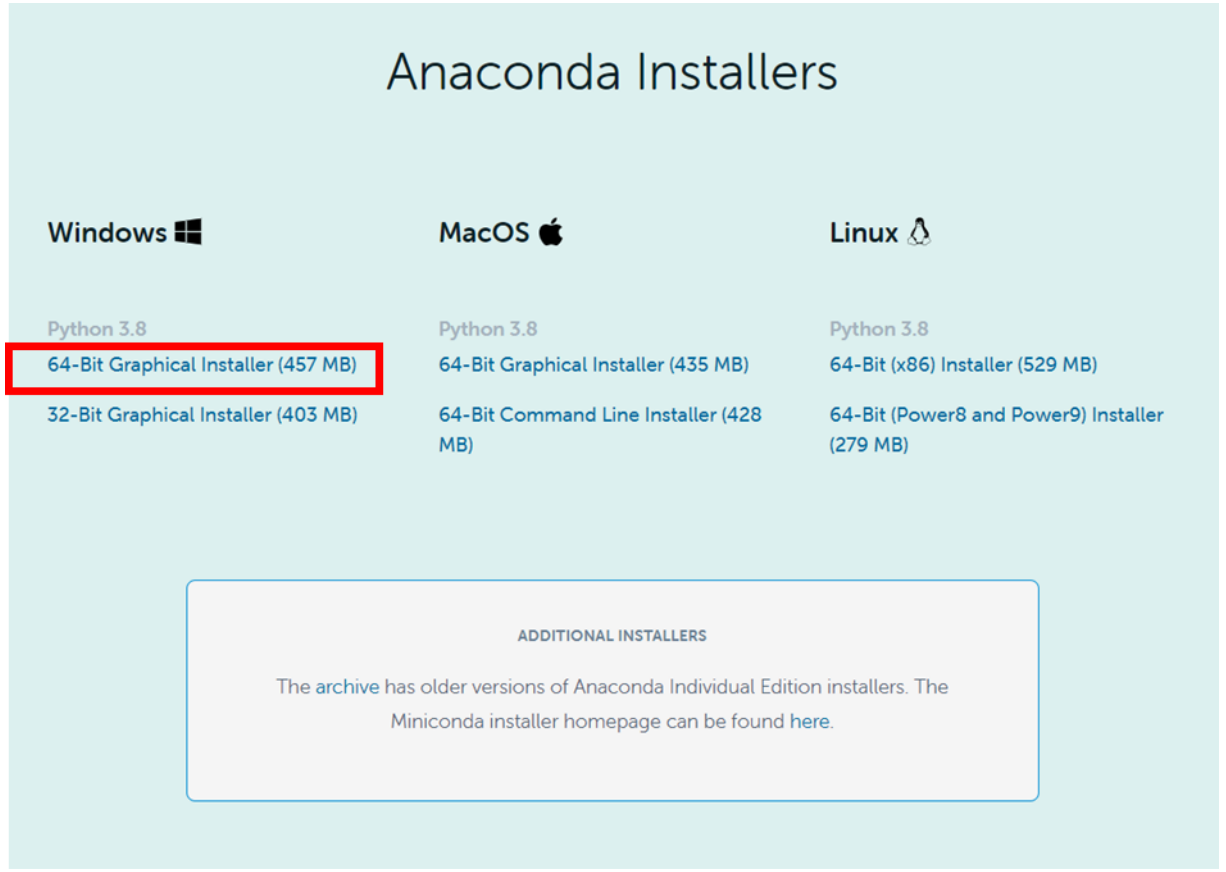


Anaconda3 Setup

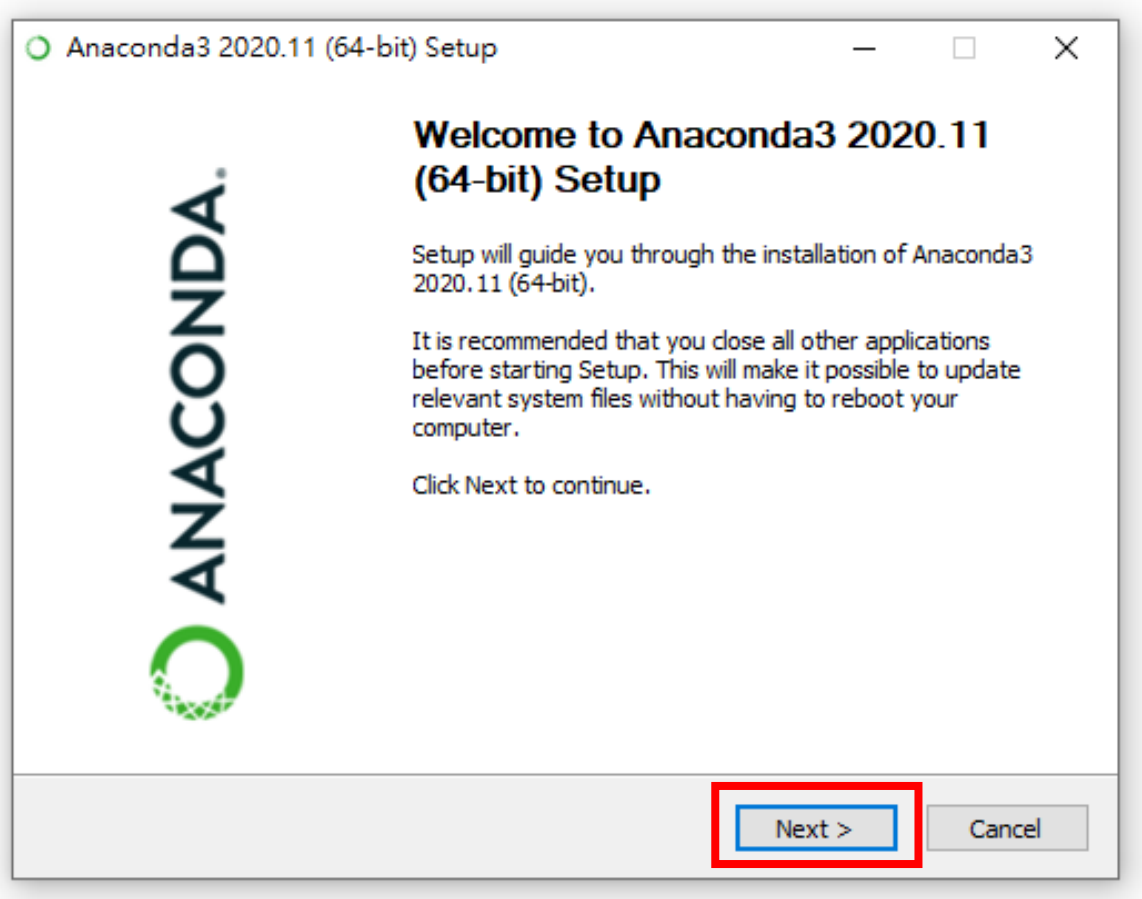
Download

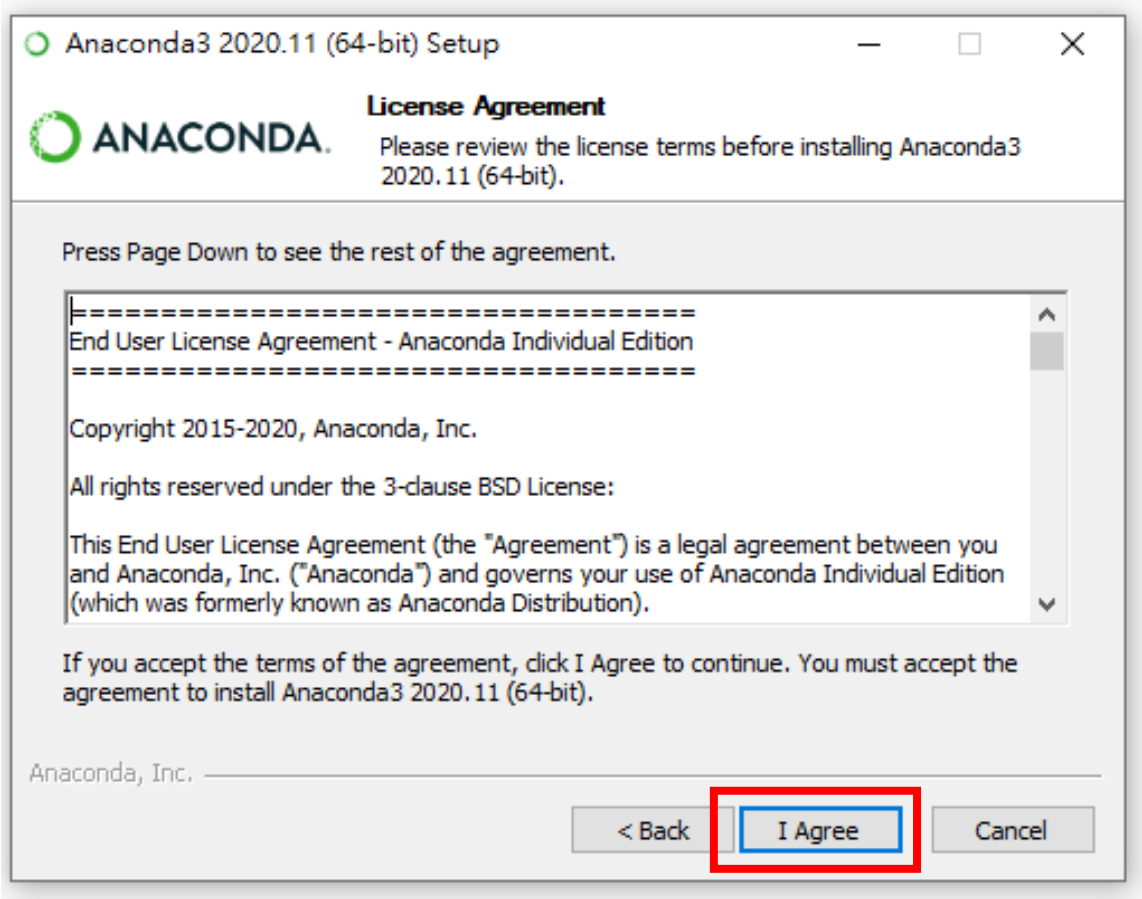
ANACONDA URL: https://www.anaconda.com/products/individual



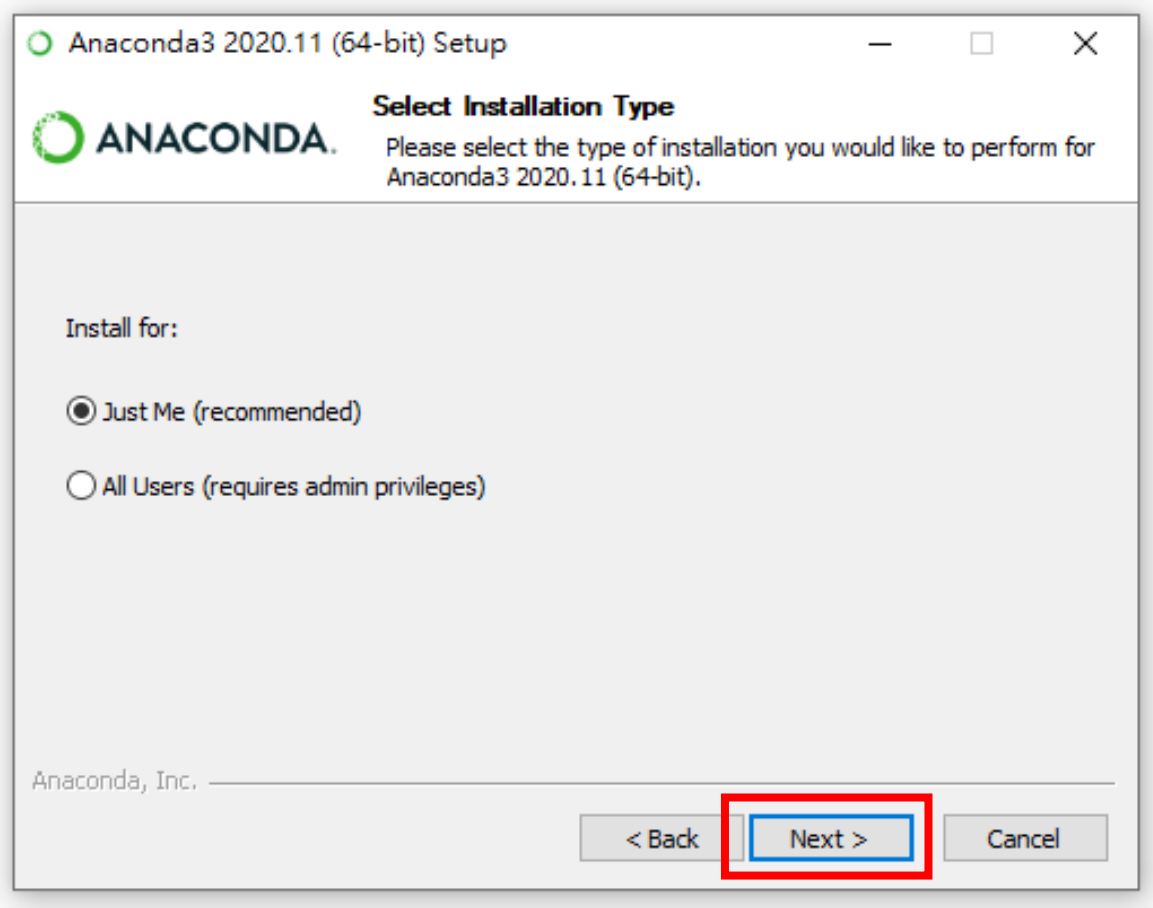


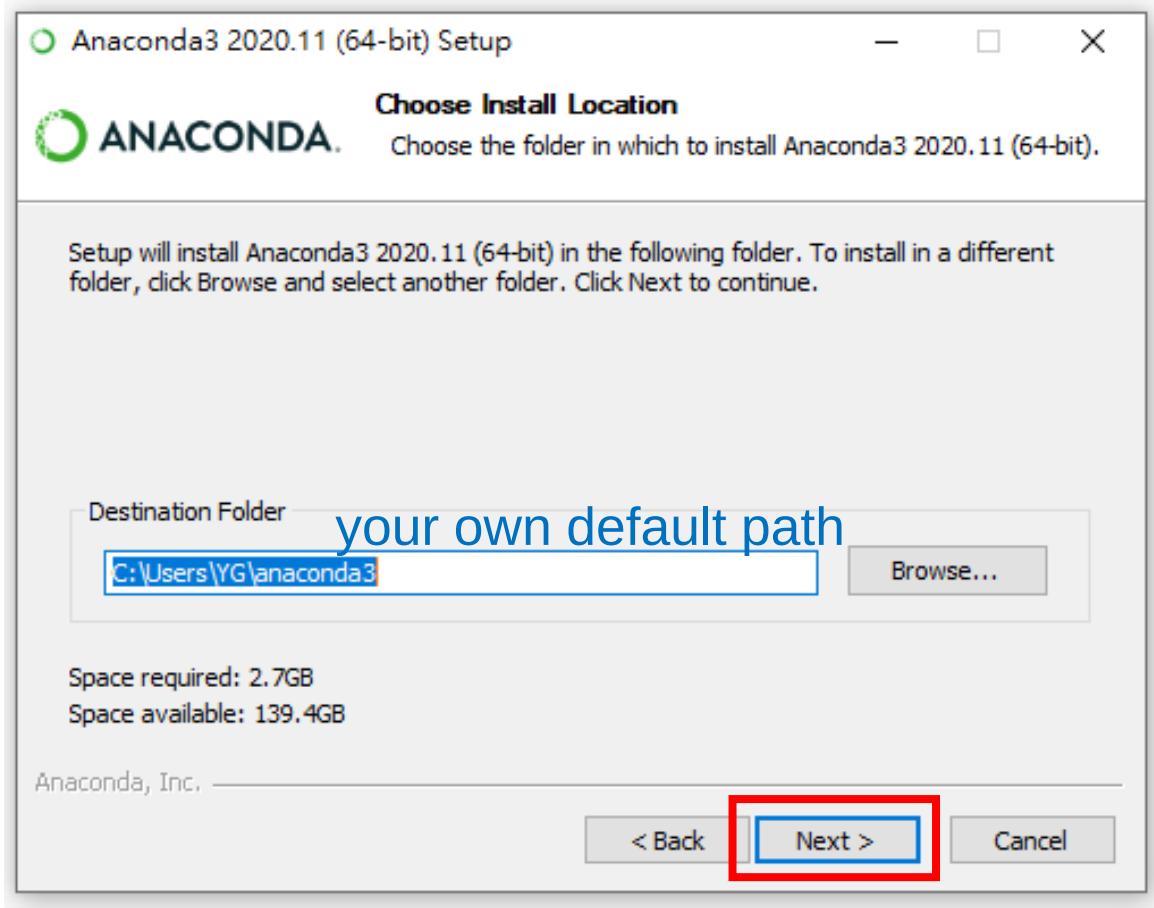
Anaconda3 Setup



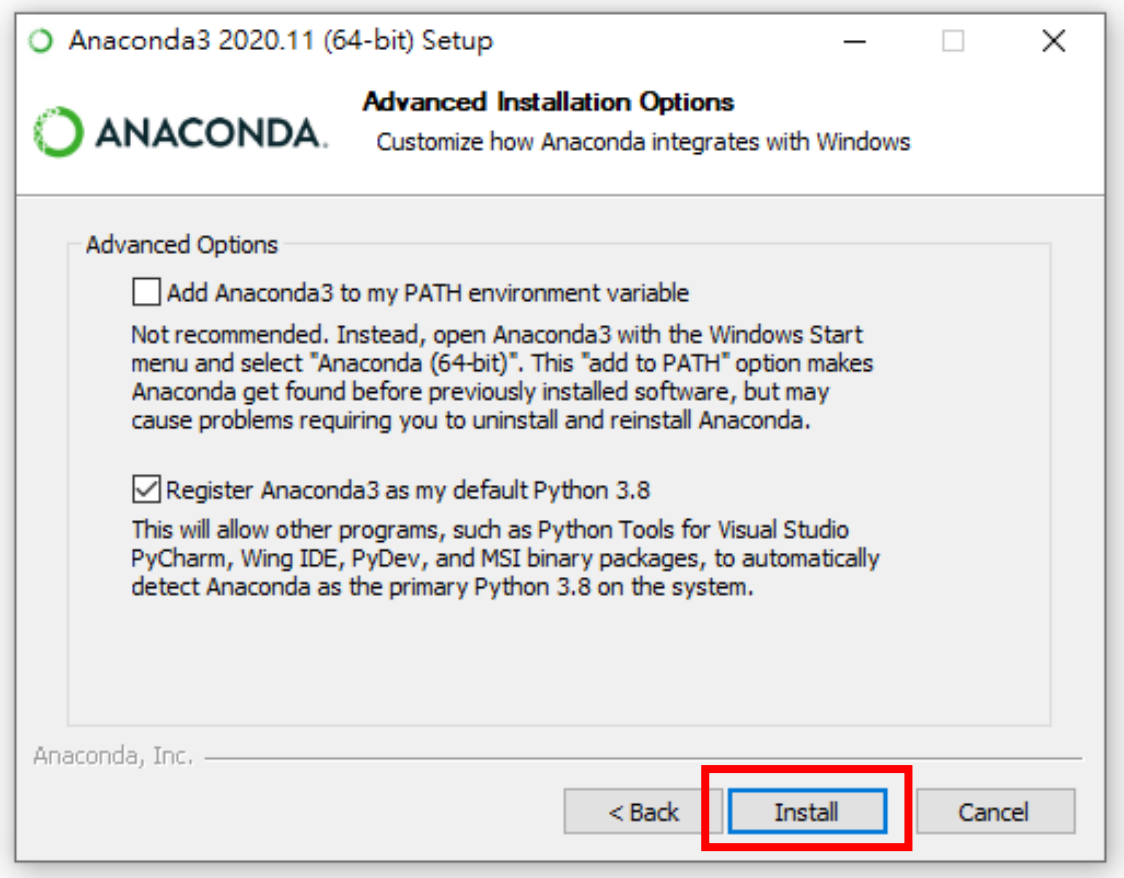


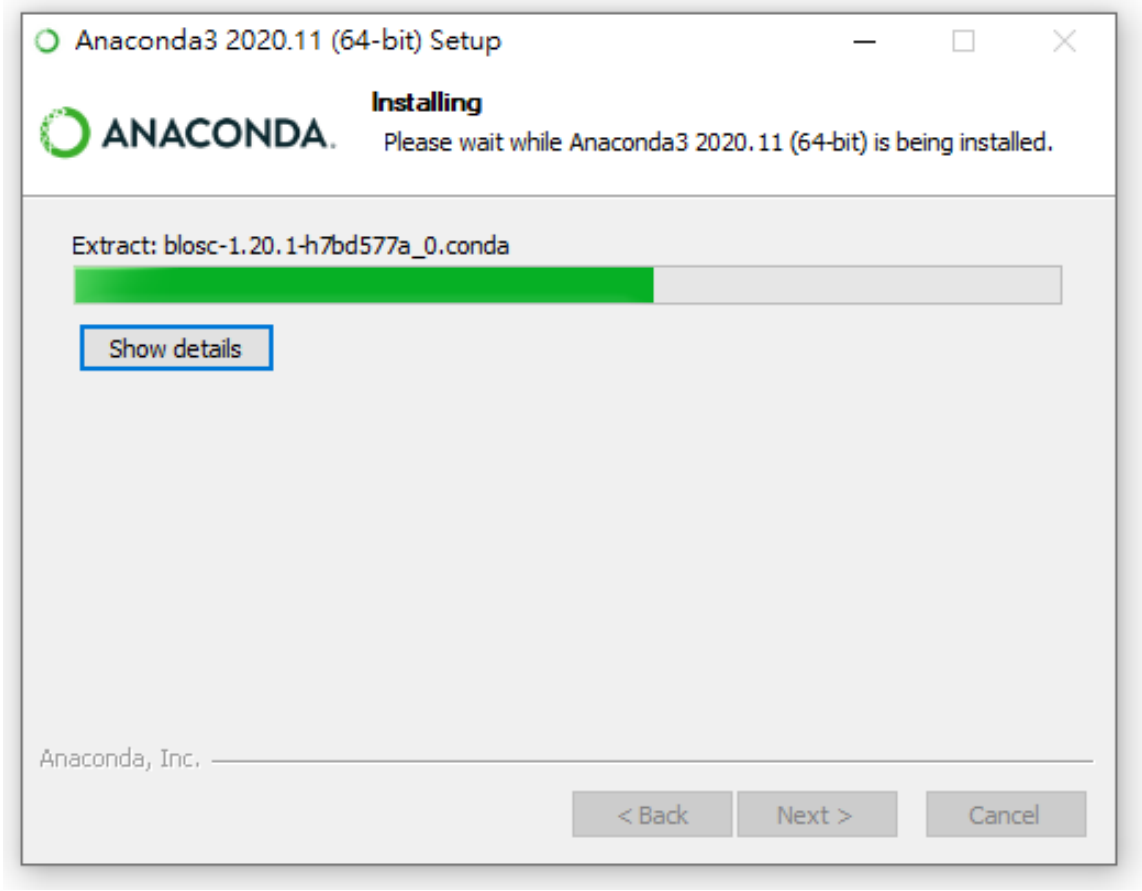
Anaconda3 Setup



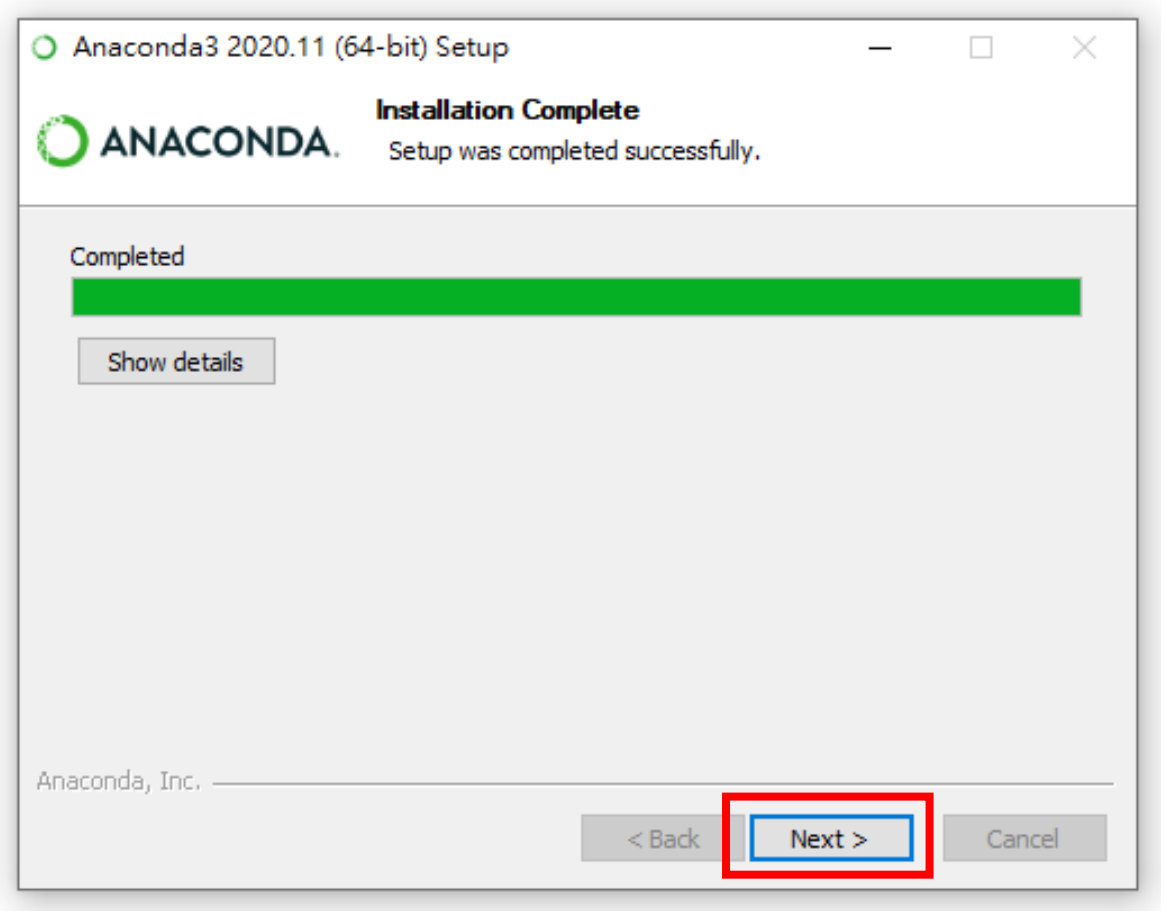


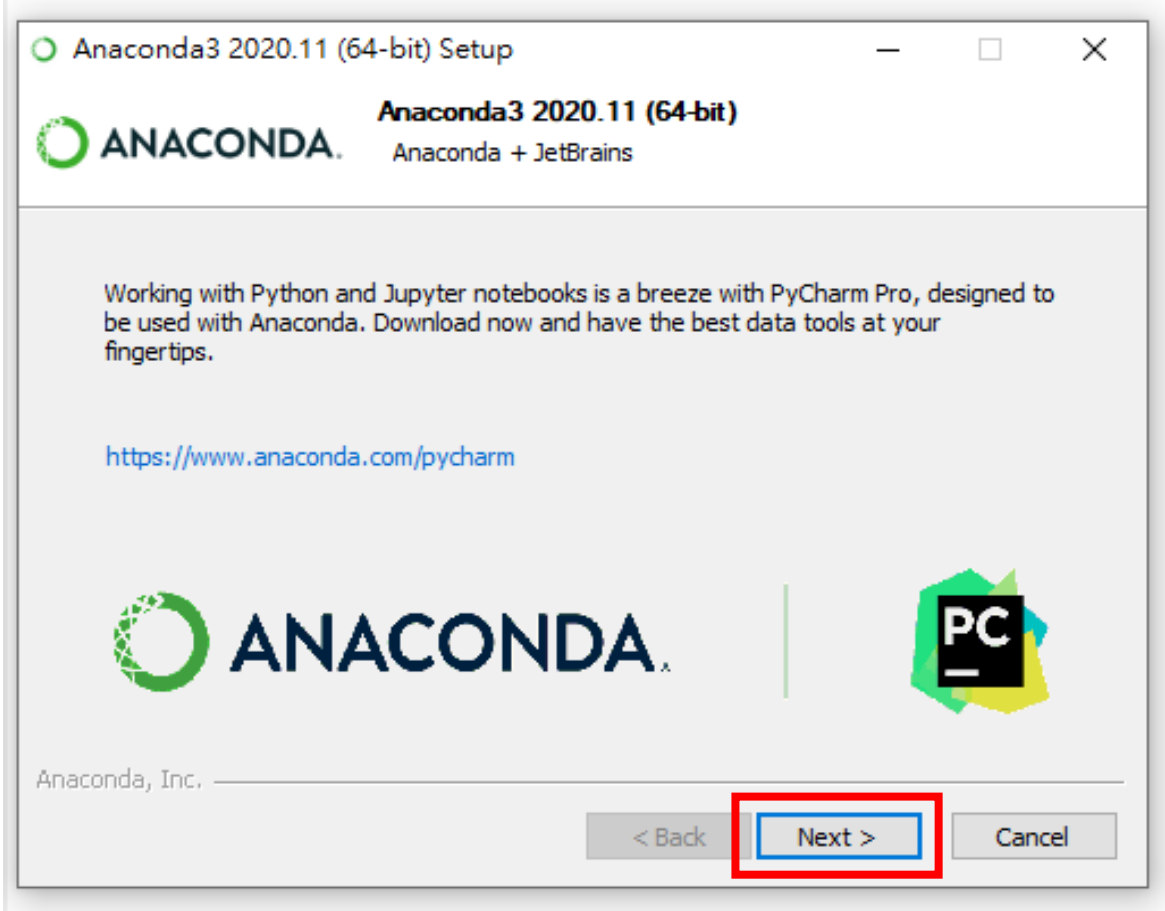
Anaconda3 Setup



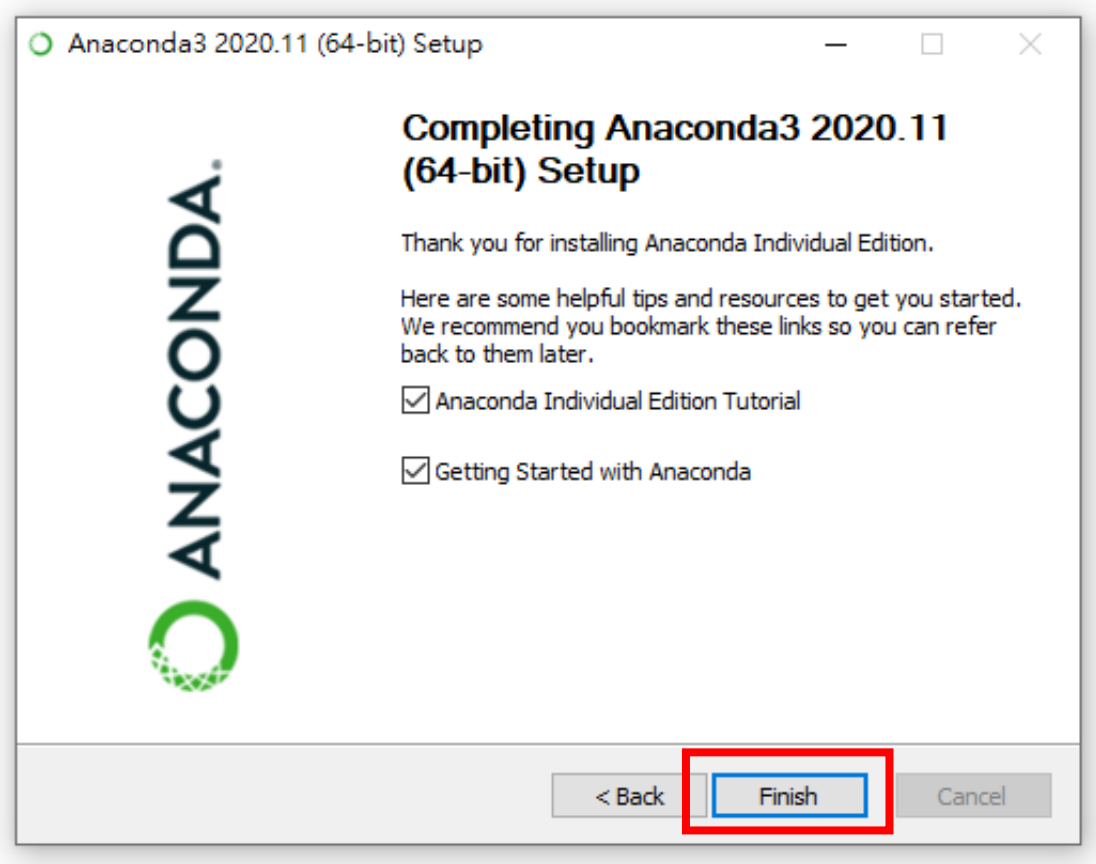


Anaconda3 Setup





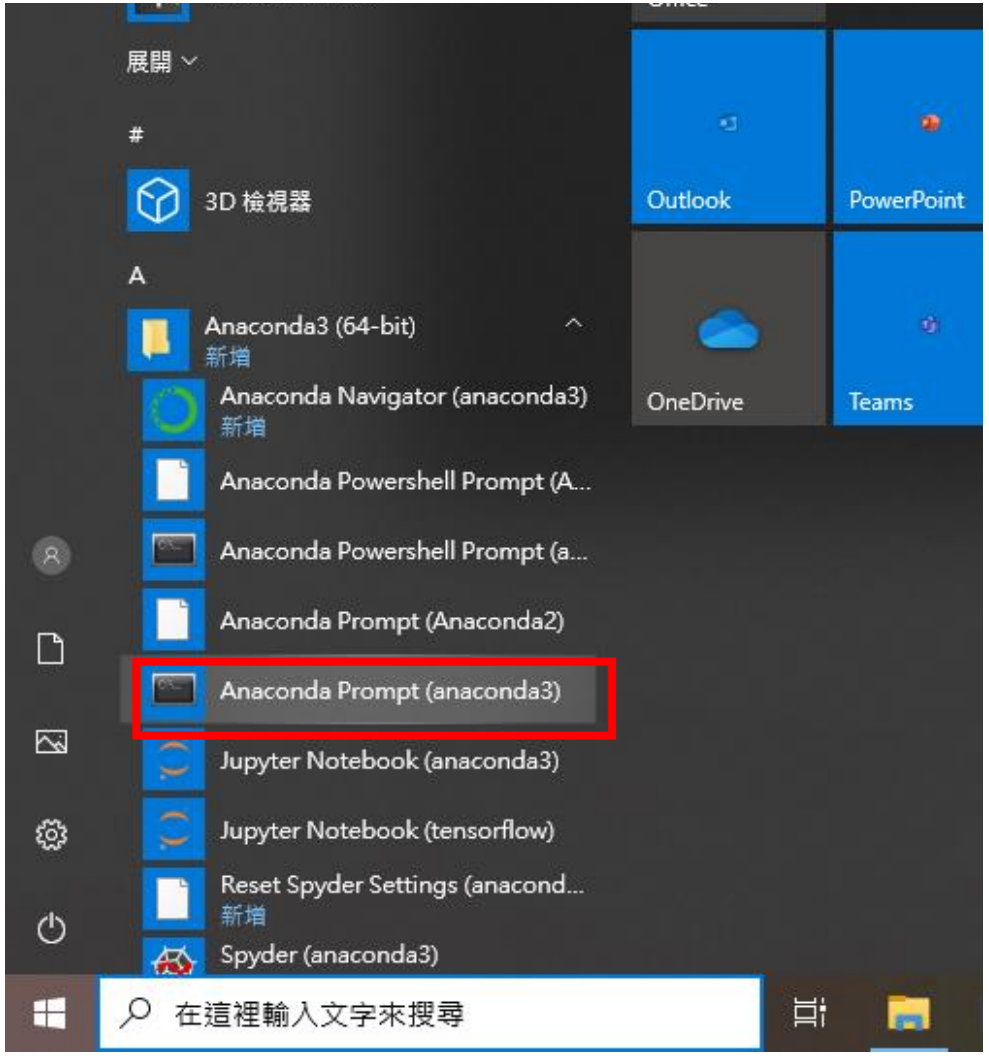
Anaconda3 Setup

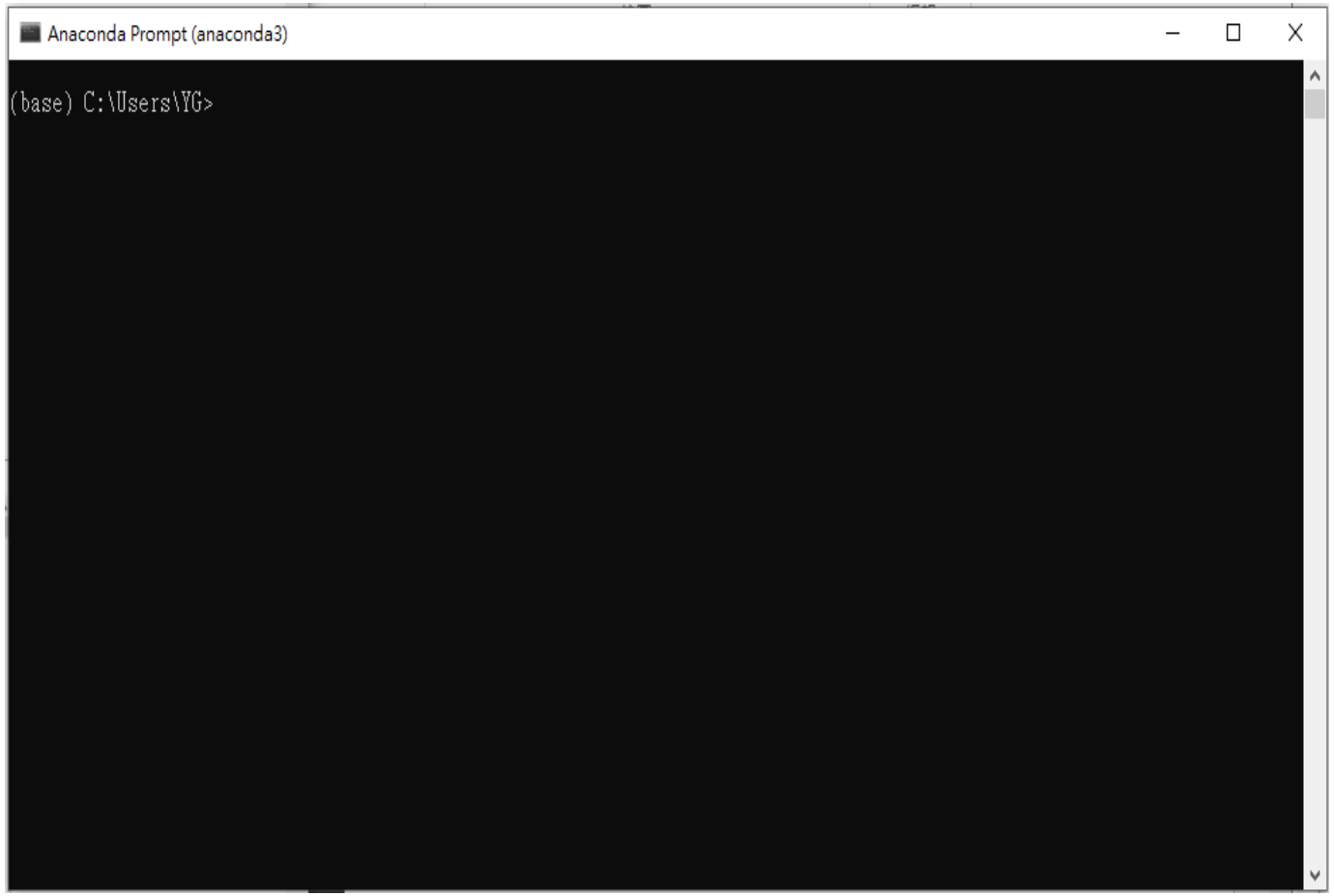


Tensorflow Environment Setup

Tensorflow Environment Setup

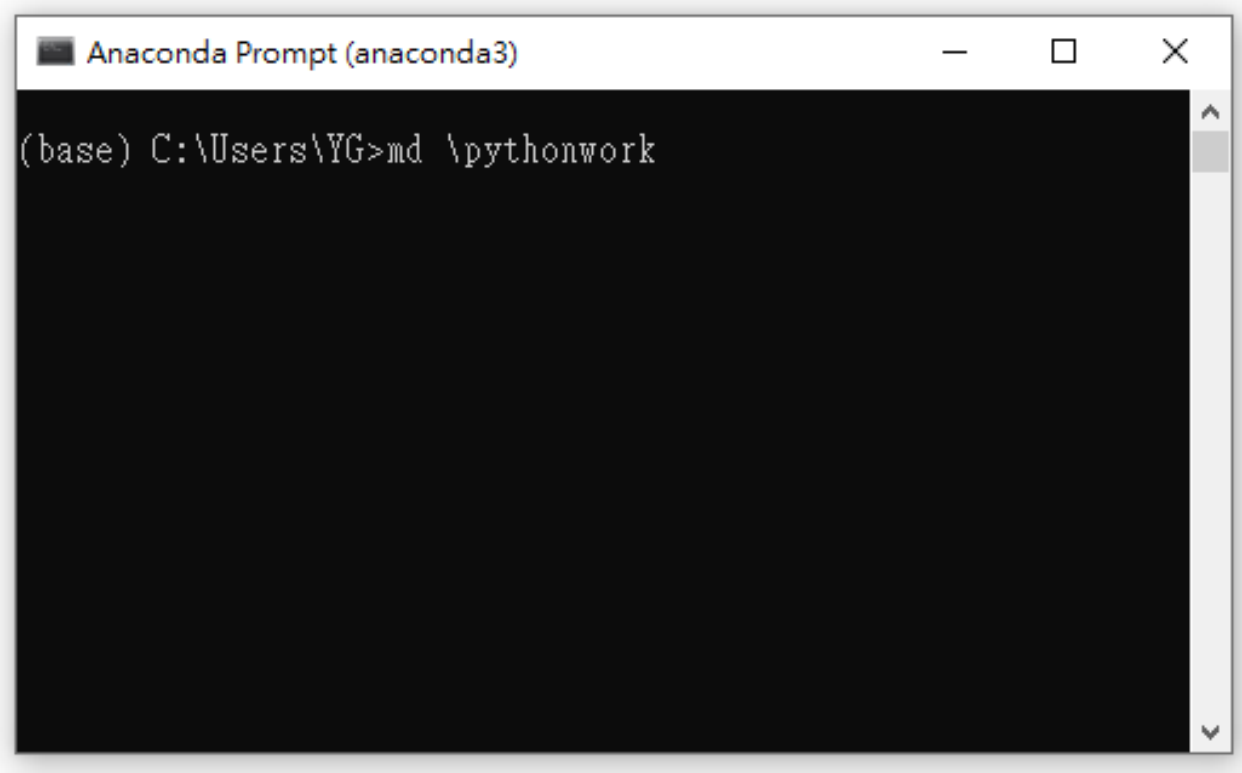
開始 > Anaconda3 (64-bit) > Anaconda Prompt (anaconda3)

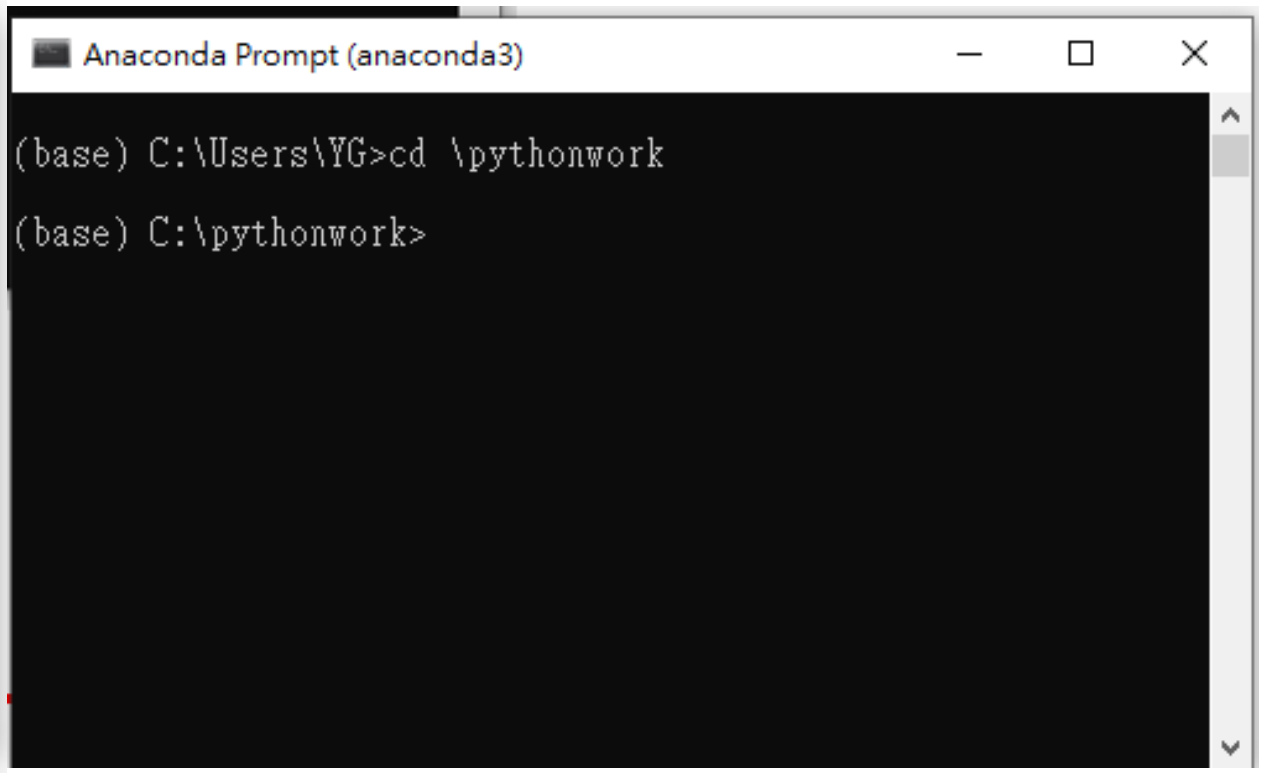




Tensorflow Environment Setup

$ md \pythonwork (建立工作資料夾pythonwork)
$ cd \pythonwork



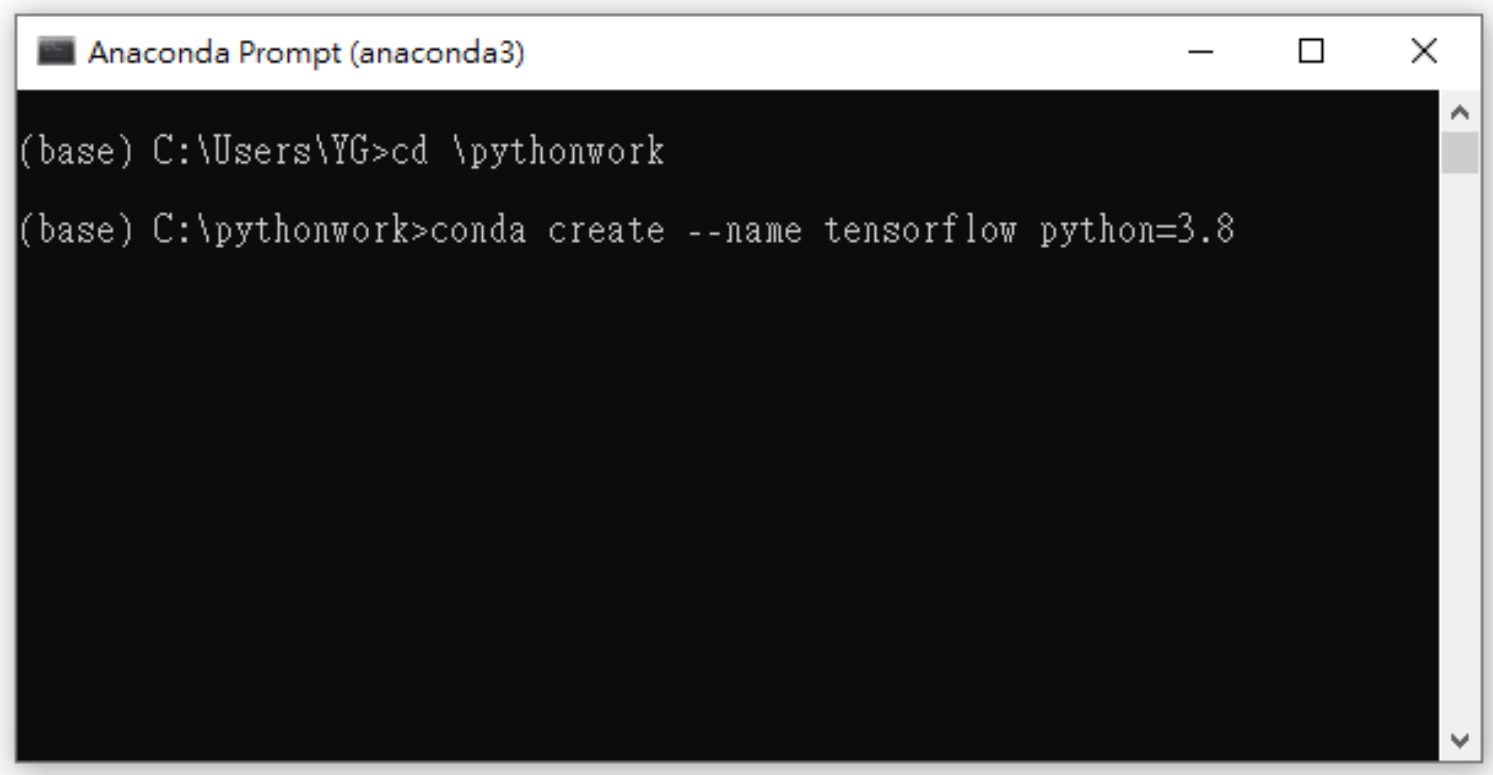


Tensorflow Environment Setup

使用 conda 命令來建立一個命名為 tensorflow 的虛擬環境
並在裡面安裝 Python 3.8 版本

```
$ conda create --name tensorflow python=3.8
```

畫面出現“Proceed([y]/n)?”
請按 y 繼續



TensorFlow Environment Setup

1. 啟動剛建立的anaconda虛擬環境

$ conda activate tensorflow

2. 安裝 Tensorflow

$ conda install tensorflow==2.3.0

3. 安裝 Keras

$ conda install –c conda-forge keras

4. 安裝 matplotlib

$ conda install matplotlib

5. 安裝 numpy

$ conda install numpy

6. 安裝 emnist

$ pip install emnist

7. 安裝 Jupyter notebook

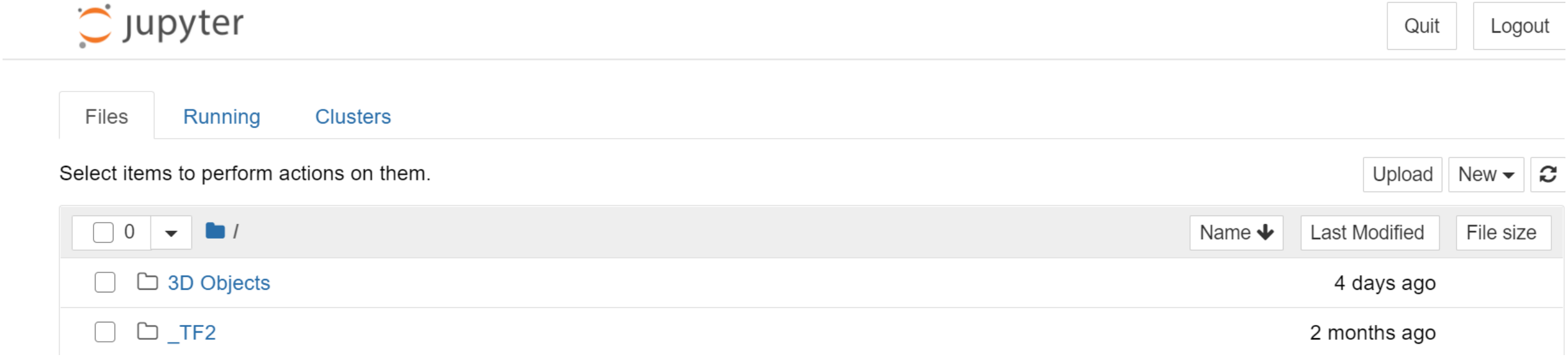
$ conda install jupyter notebook

- 如果安裝過程遇到問題，可以上網查詢相關強制安裝指令。

TensorFlow Environment Test

TensorFlow Environment Test

1. 複製資料夾
   “C:\workshop\himax_tflm\Synopsys_WEI\Example_Project\Lab5_tflm_conversion_tutorial”
   到資料夾 “C:\Users\{username}\”
   (Jupyter Notebook預設路徑)
2. 開始 > Aanaconda3 (64-bit) > Jupyter Notebook (tensorflow)

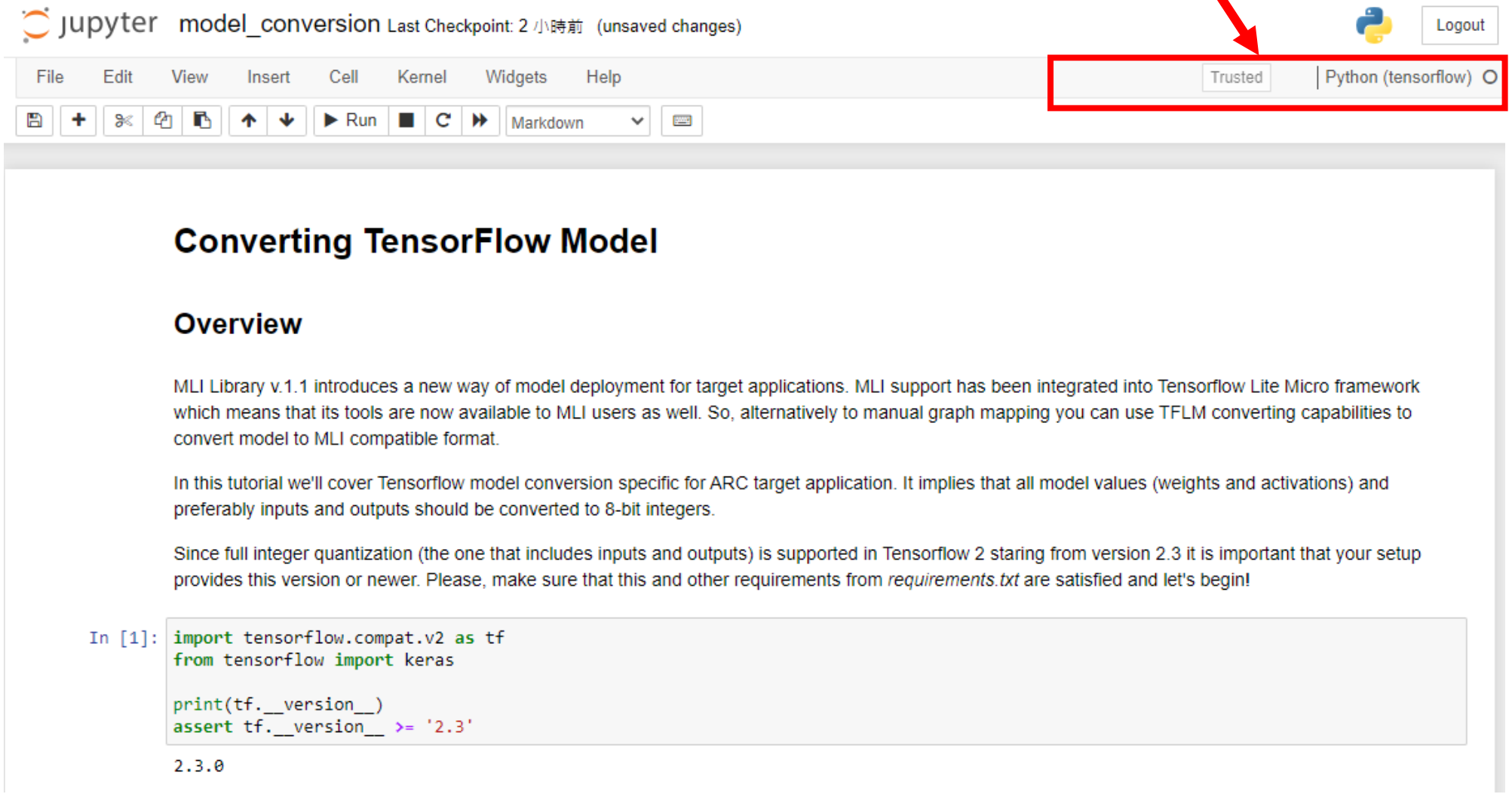


TensorFlow Environment Test

1. 回到 Jupyter Notebook
2. 點選資料夾 Lab5_tflm_conversion_tutorial
3. 開啟 model_conversion.ipynb

TensorFlow Environment Test

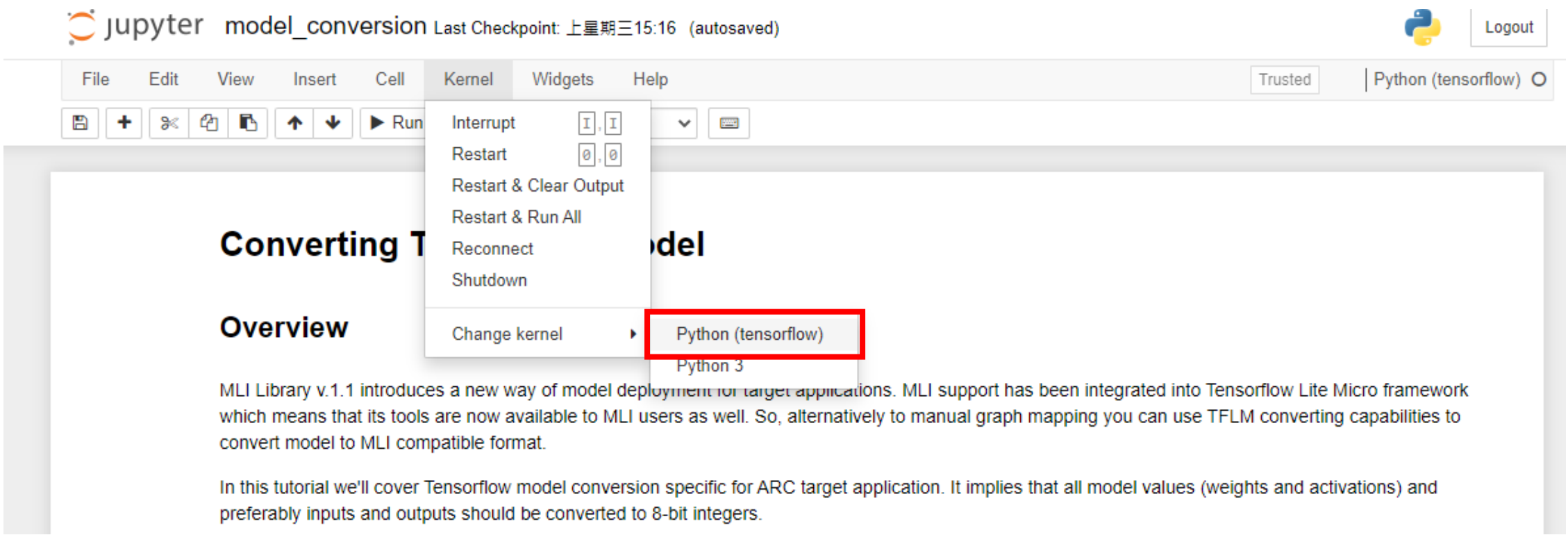
4. 請先確認紅框內是否顯示Python (tensorflow)，且()中的環境是否正確



TensorFlow Environment Test

5. 若上頁有誤請試著做以下步驟修正:

TensorFlow Environment Test



TensorFlow Environment Test

6. 若Kernel沒有Python(tensorflow)的選項:

安裝 ipykernel

```
$ pip install ipykernel
```

在(tensorflow)環境下輸入

```
$ python -m ipykernel install --name tensorflow
```

然後啟動jupyter notebook，點選kernel會發現有tensorflow

TensorFlow Environment Test

7. 若執行過程有錯誤，請確認下列module是否有安裝，或版本正確。
   Numpy>=1.16.4
   matplotlibjupyterlab>=1.1.0
   tensorflow==2.3.0
   keras>=2.2.4
   emnist

TensorFlow Environment Test

8. evaluate_model會執行較久，請耐心等候

```
        if prediction_values[index] == test_labels[index]:
            accurate_count += 1
    accuracy = accurate_count * 1.0 / len(prediction_values)

    return accuracy * 100
```

Please, keep in mind that full test dataset evaluation on int8 model may take several minutes.

In [*]:
```
print(str(evaluate_model(interpreter)) + "%")
```

Create a test set for target application

TensorFlow Environment Test

9. 執行完成後，回到Lab5_tflm_conversion_tutorial資料夾
   會產生generated/emnist_model_int8.tflite與test_samples.cc
   代表TensorFlow開發環境已經安裝完成

```
Lab5_tflm_conversion_tutorial
|
----mli_cnn_bn.h5
----model_conversion.ipynb
----requirements.txt
---- test_samples.cc
----generated
    |
    ---- emnist_model_int8.tflite
```

TensorFlow Environment Test

10. 開啟Cygwin，並移動到Lab5_tflm_conversion_tutorial/generated
    ```
    $ cd c:
    $ cd Users/{username}/ (Jupyter Notebook Path)
    $ cd Lab5_tflm_conversion_tutorial/generated/
    ```
11. Convert tflite to C model
    ```
    $ cd Lab5_tflm_conversion_tutorial/generated/
    $ xxd -i emnist_model_int8.tflite > model.h
    ```
12. You will see your TensorFlow model file model.h
13. Integrate model.h and test_samples.cc to your WE-I project (Later tutorial)