

APSC 258: Training CNN with your computers GPU

Andre Cox

May 20, 2022

Contents

1	Introduction	2
1.1	The Problem	2
1.2	The Solution	2
1.3	Prerequisites	2
2	Dependencies	4
2.1	Deep Learning Libraries	4
2.2	Development Dependencies	4
3	Testing your GPU	6
3.1	Finishing Up	6

Chapter 1

Introduction

1.1 The Problem




In APSC 258 we have been using Google Colab to train our Convolutional Neural Networks. This is a great tool however recent versions of Colab have limited the GPU compute time. This is a problem for us as we have a lot of data to train our CNN with.

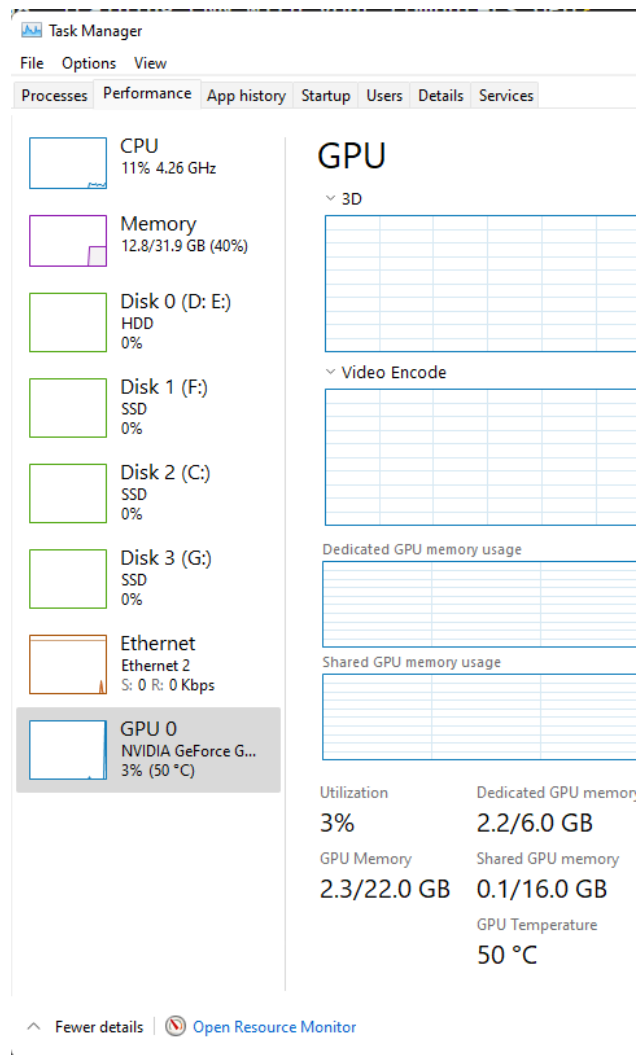
1.2 The Solution

However the solution to this problem is simple. We can use the dedicated GPU in your system to train your network. Unfortunately only Nvidia GPUs are supported at this time. If you do not have a Nvidia GPU you could use an alternative to Colab such as [Kaggle](#).

1.3 Prerequisites

Before we begin we need to check if your system has a Nvidia GPU. To do this follow the steps below. Please note this only works on windows 10 and 11.

- Enter the keyboard shortcut  +  + 



You should see the task manager window. Select Performance tab and then note if the GPU is a Nvidia GPU.

- If this is a Nvidia GPU then you can continue.
- If you have installed Anaconda or Python It is recommended that you uninstall these first before continuing.
- You can do this through "add or remove programs" in Windows 10/11.

Chapter 2

Dependencies

2.1 Deep Learning Libraries

Pay attention to the version numbers, If these are incorrect this will not work. The correct versions have been linked for your convenience.

- First we need to install [Cuda Toolkit 11.2.2](#). IMPORTANT when installing this make sure you click "Custom (Advanced)" and deselect everything except "Development" and "Runtime".
- Next we need [CUDNN 11.2 - 8.1.0.77](#). You will need a developer account which you can create.
- Now Unzip the CUDNN zip file.
- Inside there should be 3 folders called bin, lib and include.
- Now open up Windows file explorer and paste in

```
C:/Program Files/NVIDIA GPU Computing Toolkit/CUDA/v11.2
```

to the top bar.

- To finish installing CUDNN drag and drop lib, bin, and include folders into the

```
C:/Program Files/NVIDIA GPU Computing Toolkit/CUDA/v11.2 folder.
```

- If any dialog boxes appear select yes.

2.2 Development Dependencies

We will be using winget to install our dependencies easily and quickly.

- Open a new terminal by typing "CMD" in the search bar and selecting the first option.
- Install a specific version of python using

```
winget install python3 -v 3.9.6150.0
```

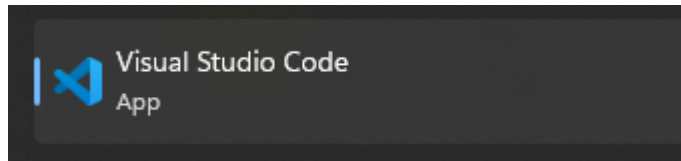
- You may need to restart your computer now.
- Reopen the terminal and install your dependencies using

```
pip install tensorflow keras numpy matplotlib pandas scipy pickle  
↪ imgaug
```

- To install a Jupyter Notebook editor use

```
winget install vscode
```

- Restart your computer.
- In your search bar you should now have a new program for working with .ipynb files.



- When opening an ipynb file vscode will let you know that there are extensions to help with these files. Allow these extensions to be installed.
- You're all finished! Now let's check if everything worked.

Chapter 3

Testing your GPU

We can create a new ipynb file to test if your GPU is working. Paste this code into a Jupyter Notebook Cell and execute it.

```
import tensorflow as tf
device_name = tf.test.gpu_device_name()
if device_name != '/device:GPU:0':
    raise SystemError('GPU device not found')
print('Found GPU at: {}'.format(device_name))
```

You should see this output.



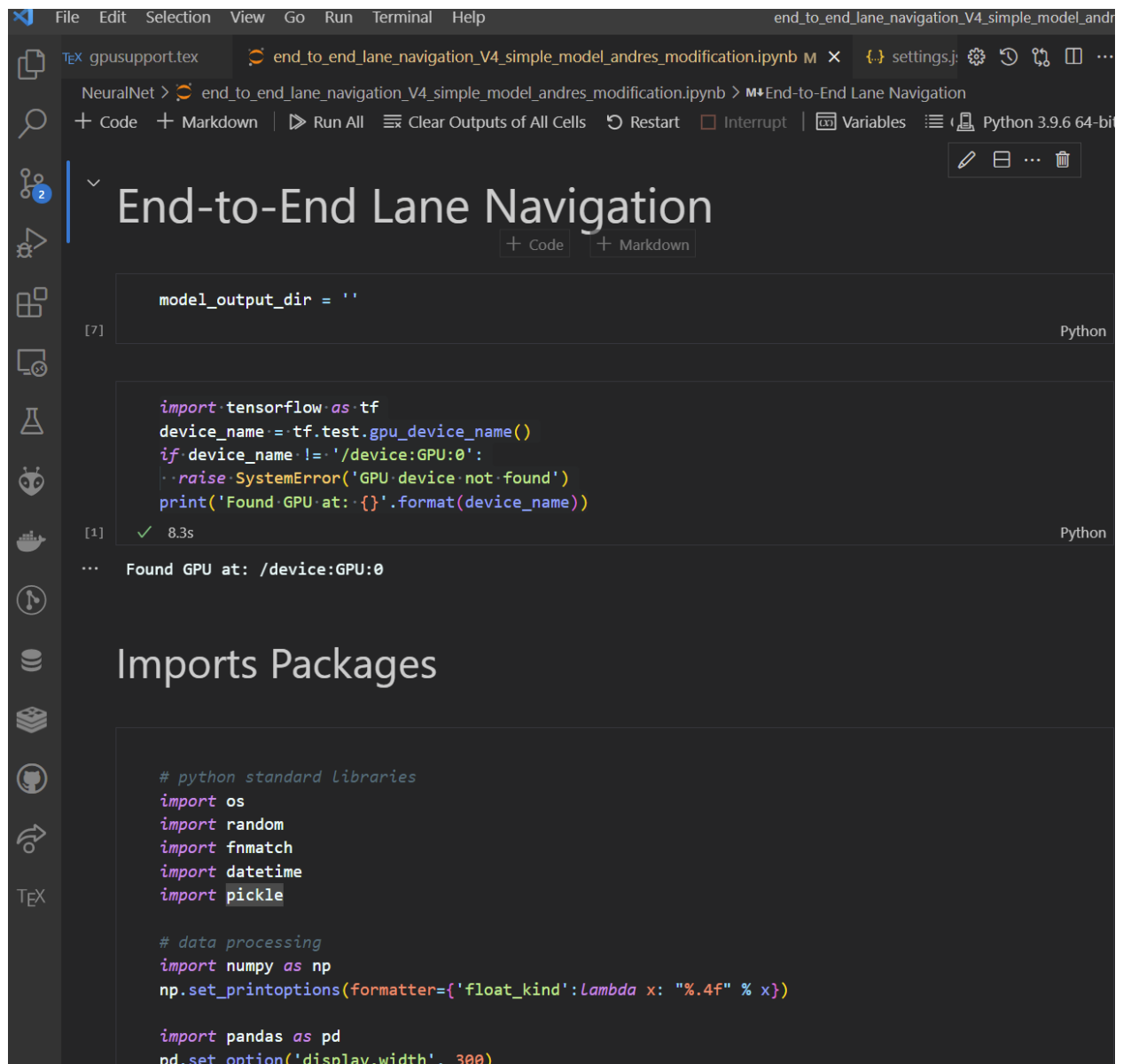
```
import tensorflow as tf
device_name = tf.test.gpu_device_name()
if device_name != '/device:GPU:0':
    raise SystemError('GPU device not found')
print('Found GPU at: {}'.format(device_name))
```

[1] ✓ 8.3s Python

... Found GPU at: /device:GPU:0

3.1 Finishing Up

Congratulations you have completed the installation of your GPU. You can now begin to train your CNN.



Your Editor should look something like this.