

Tutorial on installing TensorFlow GPU on Jetson Nano

Today's goal is to install the TensorFlow GPU version. To install the TensorFlow GPU version, you need to successfully configure CUDA. If you have not configured it, please refer to Tutorial 1. However, before installing TensorFlow GPU, some installation packages that are necessary for machine learning also need to be installed. Note that the configured image has already installed tensorflow, so there is no need to install it.

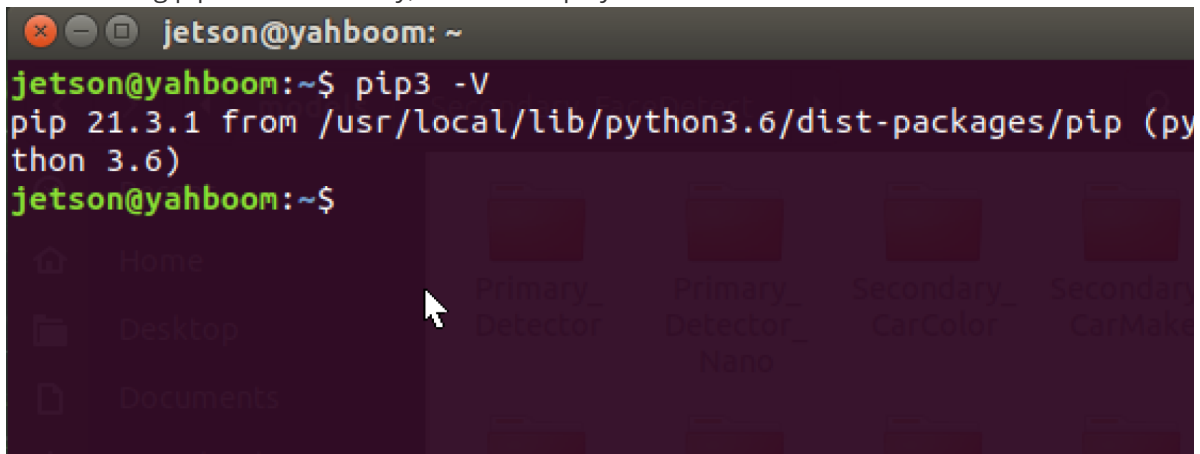
1. Install pip

Because Python 3.6 is already installed in Jetson Nano, installing pip is relatively simple

```
sudo apt-get install python3-pip python3-dev
```

After installation, pip is an older version and needs to be upgraded to the latest version
`python3 -m pip install --upgrade pip` #Upgrade pip

After running `pip3 -V` successfully, it will be displayed

A terminal window screenshot from a Jetson Nano device. The prompt is 'jetson@yahboom: ~'. The command 'pip3 -V' has been executed, and the output is 'pip 21.3.1 from /usr/local/lib/python3.6/dist-packages/pip (python 3.6)'. The terminal background is dark purple with a sidebar on the left showing 'Home', 'Desktop', and 'Documents'. On the right, there are some faint, semi-transparent labels like 'Primary_Detector', 'Secondary_CarColor', and 'Secondary_CarMake'.

2. Install those packages that are very important in the field of machine learning

```
sudo apt-get install python3-numpy
```

(It is an extension library of the Python language that supports a large number of dimensional arrays and matrix operations. In addition, it also provides a large number of mathematical function libraries for array operations.)

```
sudo apt-get install python3-scipy
```

(Scipy is a commonly used software package for mathematics, science, and engineering that can handle interpolation, integration, optimization, image processing, numerical solution of ordinary differential equations, signal processing, and other problems.)

```
sudo apt-get install python3-pandas
```

(pandas is a tool based on NumPy that was created to solve data analysis tasks. Pandas incorporates a large number of libraries and some standard data models, providing the tools needed to efficiently operate large data sets. Pandas provides a large number of functions and methods that allow us to process data quickly and easily. You will soon find that it is one of the important factors that make Python a powerful and efficient data analysis environment.)

```
sudo apt-get install python3-matplotlib
```

(Matplotlib is a 2D drawing library for Python that generates publication-quality graphics in various hardcopy formats and cross-platform interactive environments)

```
sudo apt-get install python3-sklearn
```

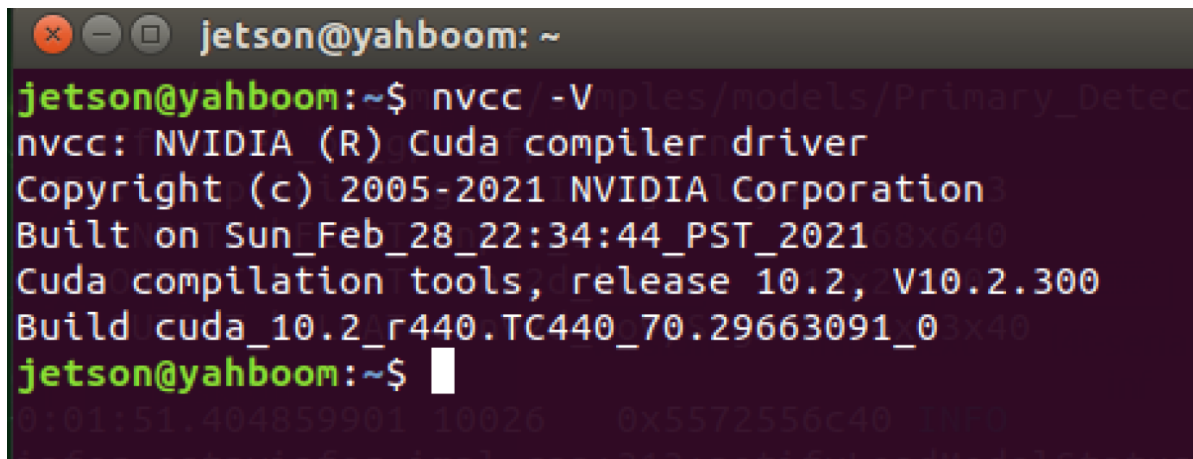
(Simple and efficient data mining and data analysis tools)

3. Install TensorFlow GPU version

(1) Confirm that CUDA has been installed properly

```
nvcc -V
```

If you can see the CUDA version number, it is installed correctly



```
jetson@yahboom: ~  
jetson@yahboom:~$ nvcc -V  
nvcc: NVIDIA (R) Cuda compiler driver  
Copyright (c) 2005-2021 NVIDIA Corporation  
Built on Sun_Feb_28_22:34:44_PST_2021  
Cuda compilation tools, release 10.2, V10.2.300  
Build cuda_10.2_r440.TC440_70.29663091_0  
jetson@yahboom:~$
```

If an error occurs, refer to this link for a solution

<https://zhuanlan.zhihu.com/p/513220749>

Install the required packages

```
sudo apt-get install libhdf5-serial-dev hdf5-tools libhdf5-dev zlib1g-dev zip libjpeg8-dev liblapack-dev libblas-dev gfortran
```

Install Python dependencies

```
sudo pip3 install -U numpy==1.16.1 future==0.18.2 mock==3.0.5 h5py==3.10.0  
keras_preprocessing==1.1.1 keras_applications==1.0.8 gast==0.2.2 futures protobuf pybind11
```

Install TensorFlow GPU version (online installation is often interrupted, it is recommended to use offline installation)

(3.1) Online installation

```
sudo pip3 install --pre --extra-index-url  
https://developer.download.nvidia.com/compute/redist/jp/v461  
tensorflow
```

The following are the tensorflow installation instructions on the official website. <https://docs.nvidia.com/deeplearning/frameworks/install-tf-jetson-platform/index.html#install>

(3.2) Offline installation

Because the online installation download is too slow, we can choose offline package installation, and the installation package needs to be downloaded online. You need to install the corresponding TensorFlow according to the JetPack version of the current system. There is also an offline package in our environment construction attachment, but you need to see if it matches the jetpack version of your current system.

<https://docs.nvidia.com/deeplearning/frameworks/install-tf-jetson-platform-release-notes/tf-jetson-rel.html#tf-jetson-rel>

Table 1. TensorFlow compatibility with NVIDIA containers and Jetpack

TensorFlow Version	NVIDIA TensorFlow Container	JetPack Version
<u>2.11.0</u>	23.03, 23.02, 23.01	5.1.x
<u>2.10.1</u>	22.12	5.0.2
<u>2.10.0</u>	22.11, 22.10	
<u>2.9.1</u>	22.09, 22.07	
	22.06	5.0.1
<u>2.8.0</u>	22.05, 22.04, 22.03	5.0
<u>2.7.0</u>	22.01	4.6.1
<u>2.6.2</u>	21.12	4.6
<u>2.6.0</u>	21.11, 21.09	
<u>2.5.0</u>	21.08, 21.07	

1) Upload the WHL file directly to the /home/nano folder on jetton nano through winSCP software.

2) After uploading, enter the command (pip3 install + your corresponding version installation package)

```
pip3 install xxx.whl
```

During the download, you may also need to install some software packages online. Just click Y (YES) to pass.

3) After the installation is completed, enter the following command to check whether tensorflow is successfully installed.

```
python3
```

```
import tensorflow as tf
```

No error means that the installation is successful.

Appendix

Other reference tutorials: <https://blog.csdn.net/yihuajack/article/details/121234463>

