Setting Up the Programming Environment (Ubuntu)

The Deep Learning course includes 3 programming assignments which you will need to finish to complete the course. We will use `Python` and `PyTorch` for the programming assignments. This instruction will help you set up the programming environment on your laptops. There are two ways. One is installation using `pip` , the other is installation using `conda` (the recommended way)

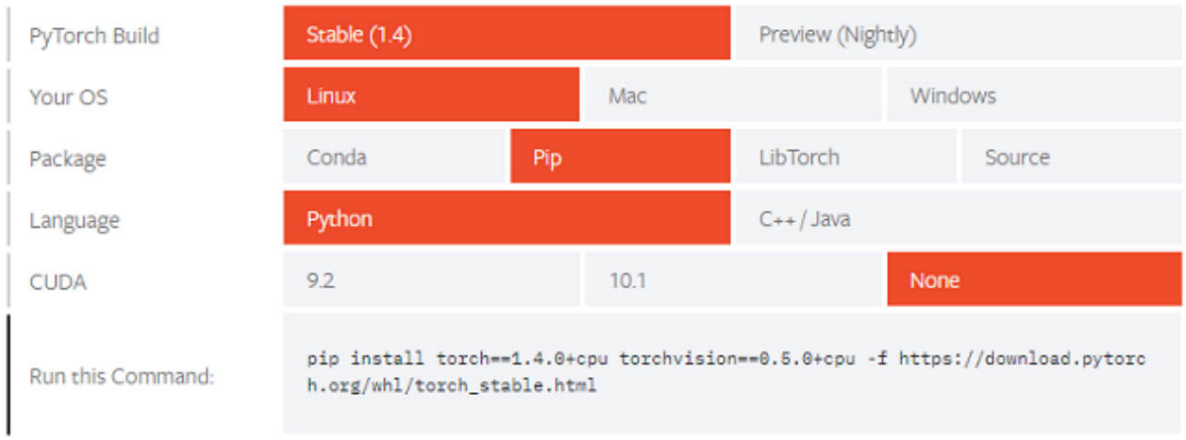
- **Installation using pip**

If you already have a working installation of Python 3, you should be able to install `NumPy` , `matplotlib` , `scikit-learn` , `SciPy` , `jupyter` , `PyTorch` and other packages using `pip` . (While Python 3.x is installed by default on Linux, pip is not installed by default. You can install `pip` on Ubuntu using `sudo apt install python3-pip`)

```
pip3 install numpy
pip3 install matplotlib
pip3 install scipy
pip3 install scikit-learn
pip3 install jupyter
```

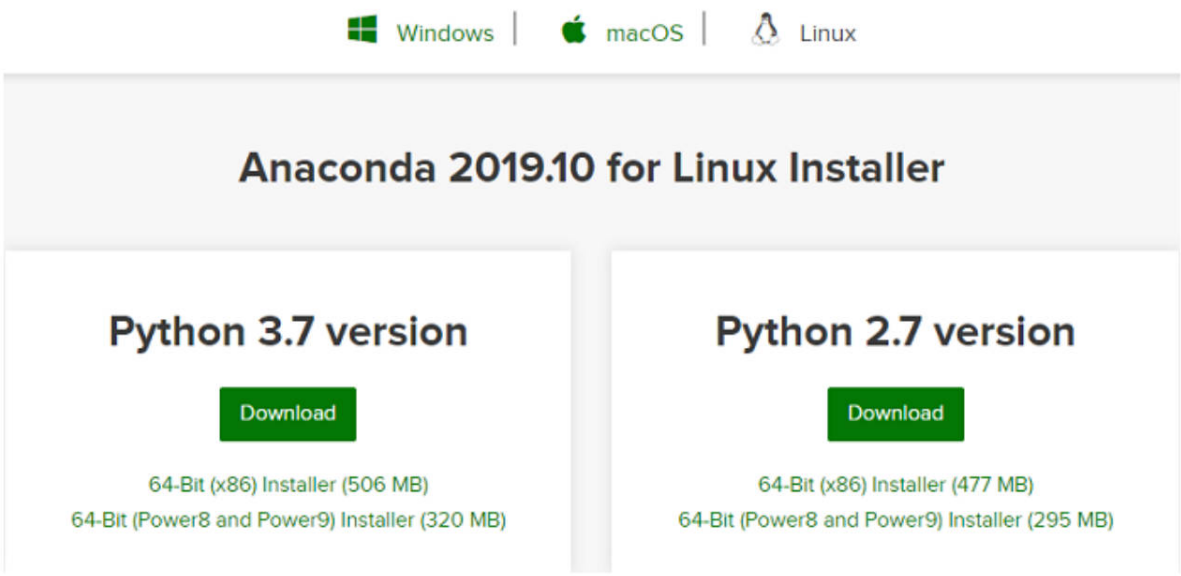
For `PyTorch` , follow the instructions on https://pytorch.org/ to install from pip repository corresponding to your system. CUDA is not necessary in this course.

In the above commands, you can replace `pip3` with `python3 -m pip` to make sure you are installing the packages for the version of python your system is currently using



- **Installation using conda**

However, the recommended way of configuring your system is by using a conda environment. We recommend that you install the latest version of Anaconda from https://www.anaconda.com/ or Miniconda from https://docs.conda.io/en/latest/miniconda.html. If you install Anaconda, `NumPy` , `matplotlib` , `scikit-learn` , `SciPy` , and `jupyter` will be installed automatically for the `base` environment.



Here is the main procedure of installing Miniconda and PyTorch **on Ubuntu.**

1. Change the path to the location where `Miniconda3-latest-Linux-x86_64.sh` is stored.

```
# luojing @ DESKTOP-8RP4OLK in /mnt/c/Users/luojing [16:57:05]
$ cd /mnt/e/Installer/linux

# luojing @ DESKTOP-8RP4OLK in /mnt/e/Installer/linux [16:58:23]
$ ll
total 8.0G
-rwxrwxrwx 1 luojing luojing 506M Oct 16 00:20 Anaconda3-2019.10-Linux-x86_64.sh
-rwxrwxrwx 1 luojing luojing 462M Oct 16 00:23 Anaconda3-2019.10-Windows-x86_64.exe
-rwxrwxrwx 1 luojing luojing  17K Jan 12 10:37 DownloadZip.html
-rwxrwxrwx 1 luojing luojing  69M Oct 26 03:35 Miniconda3-latest-Linux-x86_64.sh
-rwxrwxrwx 1 luojing luojing 2.4G Sep 20 18:43 manjaro-kde-18.1.0-stable-x86_64.iso
-rwxrwxrwx 1 luojing luojing 2.3G Sep 11 23:11 manjaro-xfce-18.1.0-stable-x86_64.iso
-rwxrwxrwx 1 luojing luojing  90M Sep 17 21:28 otp_win64_22.1.exe
-rwxrwxrwx 1 luojing luojing 1.1M Sep  4 23:42 rufus-3.6.exe
drwxrwxrwx 1 luojing luojing 4.0K Oct 20 12:41 rufus_files
-rwxrwxrwx 1 luojing luojing 2.3G Oct 17 20:54 ubuntu-19.10-desktop-amd64.iso
```

2. Install Miniconda. Use the "space" key to read the license quickly.

```
# luojing @ DESKTOP-8RP4OLK in /mnt/e/Installer/linux [16:58:25]
$ zsh Miniconda3-latest-Linux-x86_64.sh

Welcome to Miniconda3 4.7.12

In order to continue the installation process, please review the license
agreement.
Please, press ENTER to continue
>>>
==================================
Miniconda End User License Agreement
==================================

Copyright 2015, Anaconda, Inc.

All rights reserved under the 3-clause BSD License:
```

3. Choose the location where Miniconda will be installed.

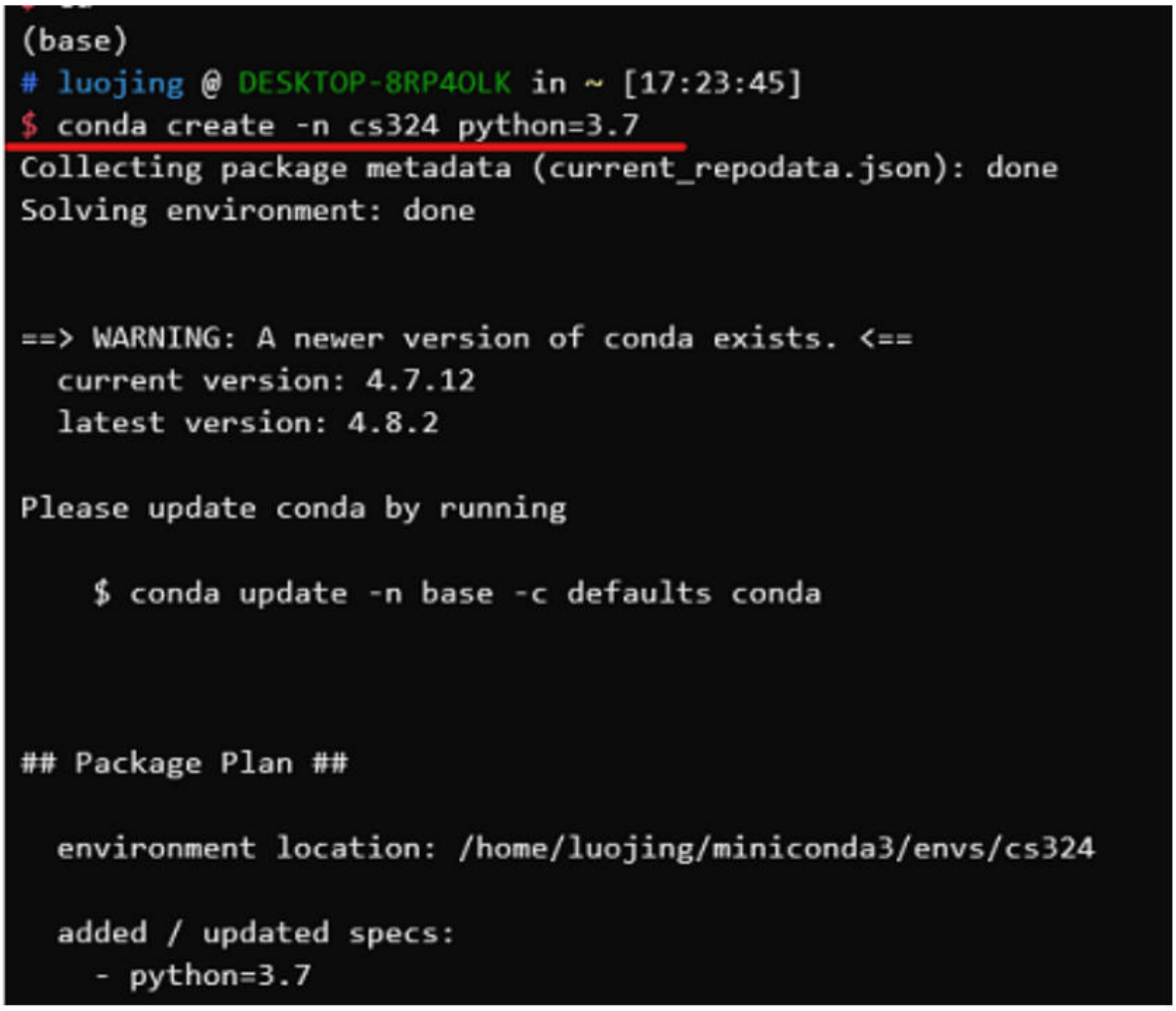
```
Do you accept the license terms? [yes|no]
[no] >>> yes

Miniconda3 will now be installed into this location:
/home/luojing/miniconda3

  - Press ENTER to confirm the location
  - Press CTRL-C to abort the installation
  - Or specify a different location below

[/home/luojing/miniconda3] >>>
PREFIX=/home/luojing/miniconda3
Unpacking payload ...
Collecting package metadata (current_repodata.json): done
Solving environment: done

## Package Plan ##

  environment location: /home/luojing/miniconda3
```

4. Initialize Miniconda3, which will modify the `` `.bashrc` `` file. If you use `zsh` or `fish` , you need to modify the corresponding file manually

```
installation finished.
Do you wish the installer to initialize Miniconda3
by running conda init? [yes|no]
[no] >>> yes
no change     /home/luojing/miniconda3/condabin/conda
no change     /home/luojing/miniconda3/bin/conda
no change     /home/luojing/miniconda3/bin/conda-env
no change     /home/luojing/miniconda3/bin/activate
no change     /home/luojing/miniconda3/bin/deactivate
no change     /home/luojing/miniconda3/etc/profile.d/conda.sh
no change     /home/luojing/miniconda3/etc/fish/conf.d/conda.fish
no change     /home/luojing/miniconda3/shell/condabin/Conda.psm1
no change     /home/luojing/miniconda3/shell/condabin/conda-hook.ps1
no change     /home/luojing/miniconda3/lib/python3.7/site-packages/xontrib/conda.xsh
no change     /home/luojing/miniconda3/etc/profile.d/conda.csh
modified      /home/luojing/.bashrc

==> For changes to take effect, close and re-open your current shell. <==

If you'd prefer that conda's base environment not be activated on startup,
   set the auto_activate_base parameter to false:

conda config --set auto_activate_base false

Thank you for installing Miniconda3!
```

5. Then you can create a conda environment for the course using (It is optional. You can also use the base environment.)

```
conda create -n cs324 python=3.7
# cs324 is the name of the conda environment. It can be modified.
```



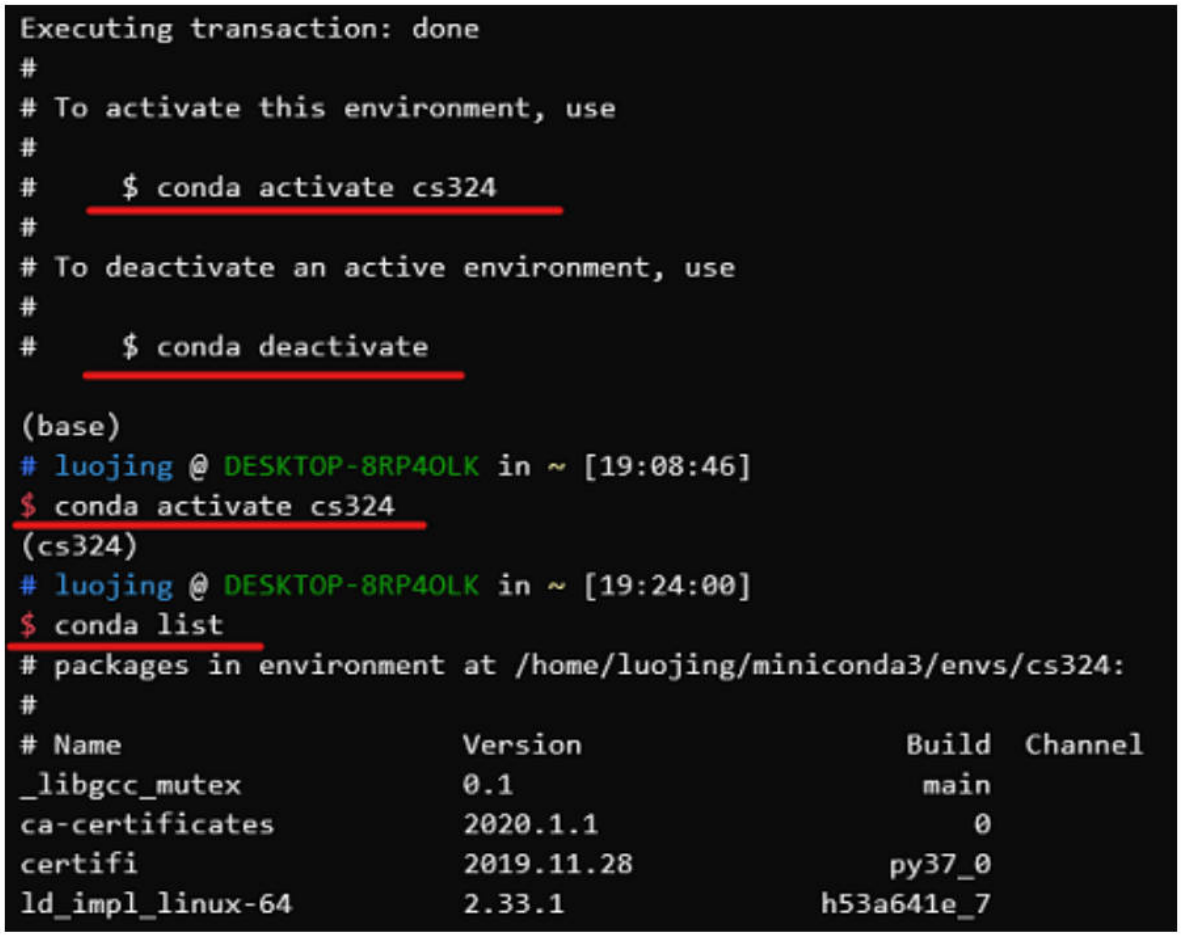
6. To activate this environment, use

```
conda activate cs324
```

To deactivate this environment, use

```
conda deactivate
```

You can use `conda list` to list the installed packages in the environment



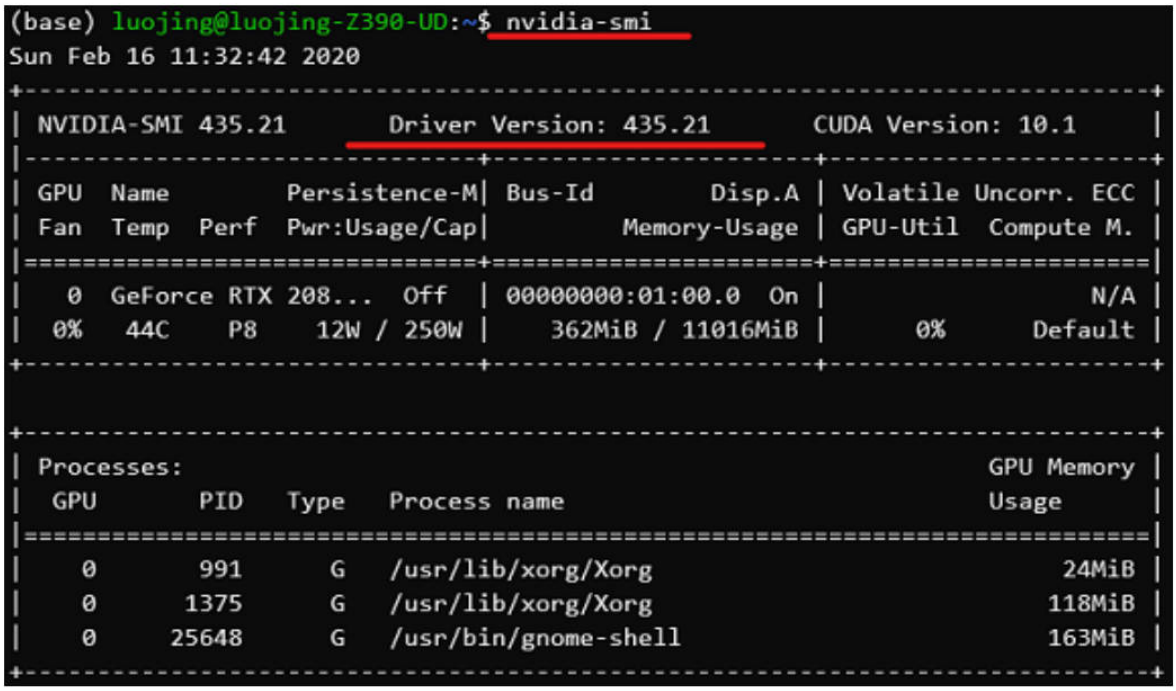
7. Finally, install the required packages:

```
conda activate cs324
# cpu only
conda install pytorch torchvision cpuonly -c pytorch
# gpu cuda 10.1
conda install pytorch torchvision cudatoolkit=10.1 -c pytorch
# when you install PyTorch, numpy will be installed automatically.
# Now you only need to install other packages.
conda install matplotlib
conda install scipy
conda install scikit-learn
conda install jupyter
```

8. Run `jupyter notebook`.

```
conda activate cs324
jupyter notebook
```

Please note that if you want to use GPU, you need to make sure that the GPU driver has been installed correctly and then install `PyTorch` with `cuda` . You can use nvidia-smi to check the GPU driver.



When you choose the version of `cuda` , you need to check the version of GPU driver.

Table 1. CUDA Toolkit and Compatible Driver Versions

CUDA Toolkit	Linux x86_64 Driver Version	Windows x86_64 Driver Version
CUDA 10.2.89	>= 440.33	>= 441.22
CUDA 10.1 (10.1.105 general release, and updates)	>= 418.39	>= 418.96
CUDA 10.0.130	>= 410.48	>= 411.31
CUDA 9.2 (9.2.148 Update 1)	>= 396.37	>= 398.26
CUDA 9.2 (9.2.88)	>= 396.26	>= 397.44
CUDA 9.1 (9.1.85)	>= 390.46	>= 391.29
CUDA 9.0 (9.0.76)	>= 384.81	>= 385.54
CUDA 8.0 (8.0.61 GA2)	>= 375.26	>= 376.51
CUDA 8.0 (8.0.44)	>= 367.48	>= 369.30
CUDA 7.5 (7.5.16)	>= 352.31	>= 353.66
CUDA 7.0 (7.0.28)	>= 346.46	>= 347.62

Finally, if you have any trouble, please send e-mail to all the TAs, you can find them on Blackboard.

Thanks for the contribution of previous TAs.