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Anaconda, Jupyter Notebook, TensorFlow and Keras for Deep Learning

[Update: you no longer need to install Keras separately since it is part of the core TensorFlow API. “import tensorflow as tf” then use tf.keras in your code. You will notice the strikethrough of any mention of Keras installation in this blog post]

So you want to get started to study deep learning? The first step is to set up the tools. In this post I will share with you how to set up Anaconda and Jupyter Notebook, and then install TensorFlow (including Keras).

Set up Anaconda, Jupyter Notebook
Install TensorFlow and Keras
for studying Deep Learning
ANACONDA
jupyter
TensorFlow
K Keras

There are different ways of installing TensorFlow:

- “native” pip or install from source
- install in a virtual environment with Virtualenv, Anaconda, or Docker. This post will be using Anaconda.

While Jupyter Notebook is not a pre-requisite for using TensorFlow (or Keras), I find that using Jupyter Notebook very helpful for beginners who just started with machine learning or deep learning. I plan to use Jupyter Notebook for all the tutorials that I will be writing in order to share my deep learning knowledge.

There are other deep learning frameworks out there but my future tutorials will be mostly using TensorFlow and tf.keras.

Let's get started -

Download Anaconda

Anaconda will enable you to create virtual environments and install packages needed for data science and deep learning. With virtual environments you can install specific package versions for a particular project or a tutorial without worrying about version conflicts.

Download Anaconda for your platform and choose the **Python 3.6 version**: https://www.anaconda.com/download

By downloading Anaconda, you get **conda**, **Python**, **Jupyter Notebook** and hundreds of other open source packages.

Conda is a package manager to manage virtual environment and install packages. Here are some helpful commands using conda:

```
# update conda in your default environment
$ conda upgrade conda
$ conda upgrade --all

# create a new environment with conda
$ conda create -n [my-env-name]

# activate the environment you created
$ source activate [my-env-name]

# take a look at the environment you created
$ conda info
$ conda list

# install a package with conda and verify it's installed
$ conda install numpy
$ conda list
```

```
# take a look at the list of environments you currently have
$ conda info -e

# remove an environment
$ conda env remove --name [my-env-name]
```

I highly recommend you download and print out the Anaconda cheatcheet here -

Source — https://conda.io/docs/_downloads/conda-cheatsheet.pdf

Conda vs Pip install

You can use either ***conda*** or ***pip*** for installation in an virtual environment created with conda. They are both open source package managers. Here are some differences:

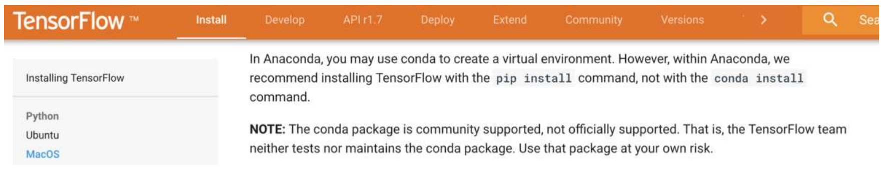
- `conda install` —installs any software package.
- `pip install` —installs python packages only and it's the defacto python package manager.

Note: pip and conda use different packaging formats so they do not operate interchangeably.

> ***protip****: use* `conda list` *to see the list of packages installed and whether they are installed with conda or pip.*

Install TensorFlow (including Keras)

Next we will install TenslowFlow in the virtual environment you created with conda. Note: we will be using `pip install` instead of `conda install` per the TensorFlow official installation documentation.



In Anaconda, you may use conda to create a virtual environment. However, within Anaconda, we recommend installing TensorFlow with the `pip install` command, not with the `conda install` command.

NOTE: The conda package is community supported, not officially supported. That is, the TensorFlow team neither tests nor maintains the conda package. Use that package at your own risk.

Source: TensorFlow official install documentation for MacOS

You can either install one package at a time or install several packages at once from a requirements.txt file.

```
# install pip in the virtual environment
$ conda install pip


# install Tensorflow
$ pip install --upgrade tensorflow # for python 2.7
$ pip3 install --upgrade tensorflow # for python 3.*

# install Keras (Note: please install TensorFlow first)
$ pip install Keras


#_ _i_n_s_t_a_l_l_ _K_e_r_a_s_ _(_N_o_t_e_:_ _p_l_e_a_s_e_
_i_n_s_t_a_l_l_ _T_e_n_s_o_r_F_l_o_w_ _f_i_r_s_t_)_
```

```
$ pip install Keras

# Alternatively, install multiple packages from a
requirements file
$ pip install -r requirements.txt
```

After installing TensorFlow you can verify its installation with python in command line:

Invoke python from your shell as follows:

```
# invoke python from your shell
$ python

# create a simple TensorFlow program inside the python
interactive shell
>>> import tensorflow as tf
>>> hello = tf.constant('Hello, TensorFlow!')
>>> sess = tf.Session()
>>> print(sess.run(hello))

# Exit the python shell
Ctrl+D
```

If you see `Hello, TensorFlow!` printed then it confirms that TensorFlow is stalled correctly.

Launch Jupyter Notebook

Jupyter Notebook is a web application that contain both computer code such as Python and rich text elements such as paragraph, equations, figures, links, etc. It's an essential tool for data analysis and visualization.

As I said earlier, you get Jupyter Notebook already by downloading Anaconda.

Start/Stop Jupyter Notebook

You will start / stop the Jupyter Notebook server from the command line:

```
# launch the Jupyter Notebook server
$ jupyter notebook

# stop the Jupter Notebook server
Ctrl+C
```

Alternatively you can shut down individual notebooks from the Notebook server UI.

When opening your notebook, if you get a Kernel not found error, use the drop down (with virtual environments) to select and set a kernel.

Running Jupyter Notebook with GPU

When you just start out with deep learning with some Hello World examples, you can run your training on CPU. As you progress in your learning, most likely you will need to run your training on a GPU. Check out my post on how to set up Jupyter Notebook on Floydhub or Amazon AWS.

Here is an informative Jupyter Notebook blog including a cheat sheet -

Jupyter Notebook Cheat Sheet

You'll probably know the Jupyter notebooks pretty well - it's one of the most well-known parts of t…

www.datacamp.com

Verify Jupyter Notebook is working

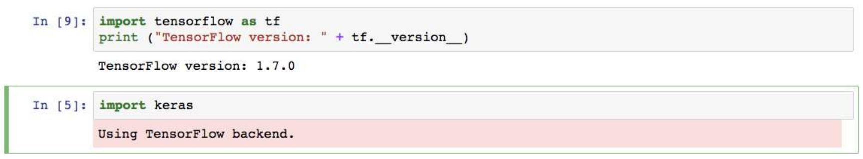
Now that you have a conda virtual environment and installed the required packages, and launch Jupyter Notebook. Let's verify everything is working.

Create a new Notebook and create a new cell with

```
import tensorflow as tf
print ("TensorFlow version: " + tf.__version__)
```

```
# Note you no longer need to import keras, use tf.keras
instead
~~import keras~~
```

~~Execute the cell(s), and you should see the version of TensorFlow and that Keras is using TensorFlow backend.~~ You will only see "Using TensorFlow backend" if you explicitly import keras. Please use tf.keras instead.



```
In [9]: import tensorflow as tf
        print ("TensorFlow version: " + tf.__version__)

        TensorFlow version: 1.7.0

In [5]: import keras

        Using TensorFlow backend.
```

If you see an error in your notebook complaining about TensorFlow ~~or Keras~~
module not found, even though you already install it in your conda environment, make sure you are setting the right kernel. You can install nb_conda for you to easily switch kernel in Jupyter Notebook (`conda install nb_conda`)

Summary

To summarize, here are the steps to take for setting up everything:

- Download Anaconda
- Create a virtual environment and activate it
- Install ~~Keras and~~ TensorFlow etc.
- Launch Jupyter Notebook
- Start writing some code!

```
# create a new environment
$ conda create -n fasion-mnist-tutorial

# activate the environment you just created
$ source activate fasion-mnist-tutorial

# install pip
$ conda install pip
```

```
# install latest version of Tensorflow
$ pip install --upgrade tensorflow


# if you are prompted to upgrade pip
$ pip install --upgrade pip

~~# install the latest version of Keras~~
~~$ pip install --upgrade keras~~


# install nb_conda for easily managing/switching notebook
kernel
$ conda install nb_conda

# launch Jupyter Notebook
$ jupyter notebook
```