Computer Vision: Python Setup

CS482, Professor Gregory J. Stein

We will be using python (specifically python3) for all the assignments and breakout sessions in this class. As such, it is incredibly important that you have python3 installed and are capable of installing packages and loading the Jupyter (formerly iPython) notebooks we will use. This document will walk you through the installation.

Note: I highly recommend that you use either MacOS or Linux for these assignments. If you are experienced with Python on Windows, that's no problem, but I can only provide limited help (as I do not have access to a Windows machine) if you become stuck. If you have a Windows computer, I recommend you look into a virtual machine, either via VirtualBox (easier) or Docker (harder).

Quick Start (for the experienced)

We will be using a virtual environment for this course and I have provided the packages you will be using in the requirements.txt file found in the same directory as this guide. Setup will proceed as follows:

```
# Move to this folder
cd $THIS_FOLDER

# Create a virtual environment and activate it
python3 -m venv cs482venv
source cs482venv/bin/activate

# Install the packages
pip3 install -r requirements.txt

# Add the new virtual environment "kernel" to iPython/Jupyter
# (needed to use packages in this environment)
ipython kernel install --user --name=cs482venv --display-name "Python3 (CS482)"

# Launch Jupyter
jupyter notebook
```

Install Python3

We will be using python (specifically python3) for all the assignments in the class.

Open a terminal window, terminal on MacOS and Linux and Command Prompt on Windows, and type python3 --version. If this succeeds without error, you can move on to the next step. If not, you may need to install python3. Installation varies based upon the operating system:

- On the Mac, typing python3 at the command line might prompt install via the command line utilities (via Xcode). Alternatively, the recommended install uses the Homebrew package manager (with brew install python)
- Some versions of Linux already have python3 installed, but the most common way to install python3 on Debian systems is with sudo apt install python3 (see this guide for more details).

Create a Python3 Virtual Environment

Since we will require a number of packages to run code, it is most convenient to use a *python virtual environment* to install the packages, so that the installation does not happen operating-system-wide and conflict with other projects you may be working on elsewhere. The Virtual Environment installs packages *locally* so that they do not conflict. If you are using Windows, you might want to follow the instructions here instead: https://docs.python.org/3/library/venv.html

The following code will create a virtual environment in a folder called cs482venv in the current directory and "activate it":

```
# Move to this folder (example: cd /Users/gjstein/Documents/L01/ )
cd $THIS_FOLDER

# Create a virtual environment and activate it
python3 -m venv cs482venv
source cs482venv/bin/activate
```

Once activated, you might notice that your prompt changes at the command line to include cs482venv before your cursor; this indicates success. If that succeeds, we can install the packages via pip, the python package manager:

```
# Install the packages
pip3 install -r requirements.txt
```

This will take a few minutes.

Configure and run the Jupyter Notebook

We will be using a Jupyter Notebook (formerly iPython) for running code in this class. It provides an excellent way to write snippets of code, create figures, and include helpful information and LaTeX all in a single document. Before running, Jupyter needs to be "told" about your virtual environment and the packages you have installed (the "kernel" which will be running the code in the background). To do so, run the following command:

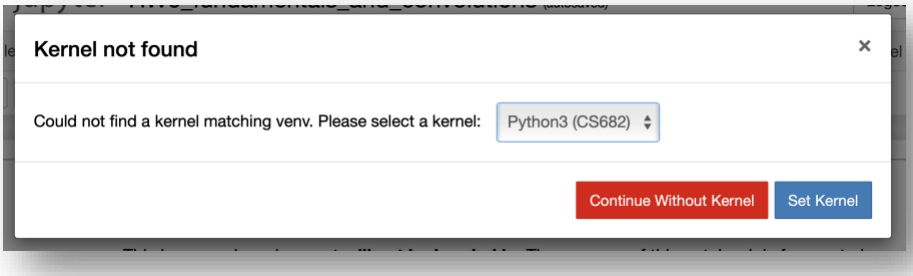
```
# Add the new virtual environment "kernel" to iPython/Jupyter
# (needed to use packages in this environment)
ipython kernel install --user --name=cs482venv --display-name "Python3 (CS482)"
```

Once this is done, you should be able to run the Jupyter environment:

```
# Launch Jupyter
jupyter notebook
```

You should be greeted with a page that looks something like this:

Click navigate to this folder and then open the basics_python_numpy.ipynb notebook contained inside. Upon opening the notebooks I have provided for the course, you *may* get an error message prompting you to select a new kernel (if the names are slightly different, this will occur). Select the one you just created as follows (but for CS482):



You should then see a screen that looks like this:

Once you have opened the notebook, you can follow the instructions there to move forward and practice/learn Python and Numpy.