Virtual Environments

Python Environments

In the next part of the lesson, you'll be given a workspace where you can upload files into a Python package and pip install the package. If you decide to install your package on your local computer, you'll want to create a virtual environment. A virtual environment is a silo-ed Python installation apart from your main Python installation. That way you can install packages and delete the virtual environment without affecting your main Python installation

Let's talk about two different Python environment managers: conda and venv. You can create virtual environments with either one. Below you'll read about each of these environment managers including some advantages and disadvantages. If you've taken other data science, machine learning or artificial intelligence courses at Udacity, you're probably already familiar with conda.

Conda

Conda does two things: manages packages and manages environments.

As a package manager, conda makes it easy to install Python packages especially for data science. For instance, typing `conda install numpy` will install the numpy package.

As an environment manager, conda allows you to create silo-ed Python installations. With an environment manager, you can install packages on your computer without affecting your main Python installation.

The command line code looks something like this:

```
conda create --name environmentname
source activate environmentname
conda install numpy
```

Pip and Venv

There are other environmental managers and package managers besides conda. For example, venv is an environment manager that comes pre-installed with Python 3. Pip is a package manager.

Pip can only manage Python packages whereas conda is a language agnostic package manager. In fact, conda was invented because pip could not handle data science packages that depended on libraries outside of Python. If you look at the history of conda, you'll find that the software engineers behind conda needed a way to manage data science packages (NumPy, Matplotlib, etc.) that relied on libraries outside of Python.

Conda manages environments AND packages. Pip only manages packages.

To use venv and pip, the commands look something like this:

```
python3 -m venv environmentname
source environmentname/bin/activate
pip install numpy
```

Which to Choose

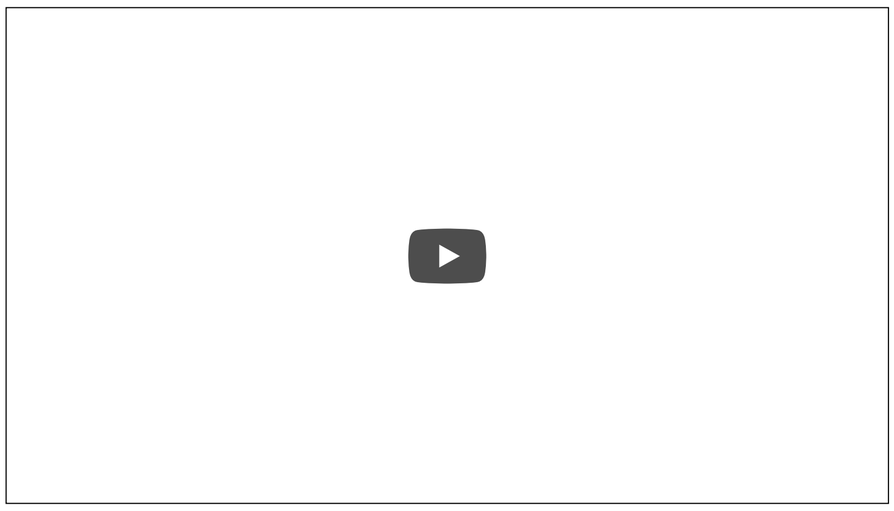
Whether you choose to create environments with venv or conda will depend on your use case. Conda is very helpful for data science projects, but conda can make generic Python software development a bit more confusing; that's the case for this project.

If you create a conda environment, activate the environment, and then pip install the distributions package, you'll find that the system installs your package globally rather than in your local conda environment. However, if you create the conda environment and install pip simultaneously, you'll find that pip behaves as expected installing packages into your local environment:

```
conda create --name environmentname pip
```

On the other hand, using pip with venv works as expected. Pip and venv tend to be used for generic software development projects including web development. For this lesson on creating packages, you can use conda or venv if you want to develop locally on your computer and install your package.

The video below shows how to use venv, which is what we recommend for this project.



Instructions for venv

Here are instructions about how to set up virtual environments on a macOS, Linux, or Windows machine using the terminal: instructions link.

These are a few notes for understanding the tutorial:

- If you are using Python 2.7.9 or later (including Python 3), the Python installation should already come with the Python package manager called pip. There is no need to install it.
- `env` is the name of the environment you want to create. You can call `env` anything you want.
- Python 3 comes with a virtual environment package pre-installed. So instead of typing `python3 -m virtualenv env`, you can type `python3 -m venv env` to create a virtual environment.

Once you've activated a virtual environment, you can then use terminal commands to go into the directory where your Python library is stored. And then you can run `pip install .`. In the next section, you can practice pip installing and/or creating virtual environments in the classroom workspace. You'll see that creating a virtual environment actually creates a new folder containing a Python installation. Deleting this folder will remove the virtual environment.

Note that if you install packages on the workspace and run into issues, you can always reset the workspace; however, you will lose all of your work. So be sure to download any files you want to keep before resetting a workspace.

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