Machine Learning for Imaging

Setting up Python environment for the programming tutorials

Getting started

For the lab tutorials, we are making use of Jupyter Notebook, a web application that allows you to run code directly in a web browser. For each tutorial, we provide a notebook file with example code and coding exercises. Here, we are explaining three different ways of doing the lab tutorials.

Option 1: Google Colab

This is the easiest option. You can directly run the provided notebooks on Google Colab with free (but limited) access to GPUs. You can start Google Colab here: https://colab.research.google.com.

Import the notebooks from the tutorial GitLab repository.

Option 2: Setup a local Python environment on your own machine

Step 1a: Using conda (recommended for Windows):

Create and activate a Python3 conda environment (we recommend installing miniconda).

```
$ conda create -n mli python=3
$ conda activate mli
```

Install PyTorch using conda:

```
$ conda install pytorch torchvision cpuonly -c pytorch
```

The above is for the CPU-only version.

Please see the PyTorch website for more details and different options for installing PyTorch.

Step 1b: Using virtualenv (recommended for Linux)

Create and activate a Python3 virtual environment:

```
$ bash
$ virtualenv -p python3 <path_to_env>/mli
$ source <path_to_env>/mli/bin/activate
```

Install PyTorch using pip:

```
$ pip install torch torchvision
```

Please see the PyTorch website for more details and different options for installing PyTorch.

Step 2: Install additional Python packages

Whether you used conda or virtualenv, you can install all additional packages using pip:

```
$ pip install pandas seaborn scikit-learn scikit-image lightning tensorboard
matplotlib jupyter
```

Step 3: Running Jupyter notebook

Make sure your Python environment is activated. Download (or clone) the Jupyter notebooks and run the following command from the same folder that contains the notebook files:

```
$ jupyter notebook --port=8888
```

Your default web browser should automatically open the page http://localhost:8888/.

Option 3: Remote use of lab machines with pre-configured Python

We provide a pre-configured virtualenv Python environment which contains all required dependencies and packages.

Use ssh to log into one of the lab machines (see this list of available workstations). Replace `<user>` with your DoC username, and `<machine_name>` with a suitable lab machine. Here, we jump via the host machine `shell3`. The following command will connect your local port 8888 to the remote machine.

```
$ ssh -L 8888:localhost:8888 -A -J <user>@shell3.doc.ic.ac.uk
<user>@<machine_name>.doc.ic.ac.uk
```

You will be prompted twice for your password. The Python environment can be then activated by running the following commands:

```
$ bash
$ source /vol/lab/course/416/mli/bin/activate
```

Download (or clone) the Jupyter notebooks to your home directory (if you do not have sufficient storage space you can also use `/vol/bitbucket/<user>/mli`).

Run the following command from the same folder that contains the notebook files:

```
$ jupyter notebook --port=8888 --no-browser
```

Open the page http://localhost:8888/ in your local web browser and navigate to the Jupyter notebook that you would like to run. Note that running the first cell may initially take a bit longer.

You may have to use different ports if 8888 is already in use on your own or the lab machine.