

Assignment 0

CS5304 - Environment Setup

Deadline: January 29, 2018; Points: 10

Complete the following exercises in a jupyter notebook. Save the notebook as a PDF and submit it to Blackboard before the deadline.

1. (4 points) *Docker Exercise*. This exercise will walk you through installing Docker, running a container, and starting a jupyter notebook.

First, install Docker: <https://docs.docker.com/engine/installation/>
Additionally, follow the steps here to run Docker without sudo:
<https://askubuntu.com/a/477554>

Second, we'll be creating a Dockerfile. Create a directory on your computer called `assignment0` and a file in this directory called `Dockerfile`. The Dockerfile specifies the base image for your Docker container and any additional setup. Feel free to use the sample Dockerfile that we've provided or design your own. Make sure to keep this file since we'll likely use it for future assignments.

Third, build a Docker image and run a container. Make sure Docker is running, then run the following commands:

```
$ cd /path/to/assignment0
$ docker build . -t cs5304:a0 # this may take a while
$ docker run -i -t --name cs5304 \
  -p 3003:3003 \
  -v `pwd`:/code \
  cs5304:a0 \
  /bin/bash
$ # At this point, you should be running commands \
  # from the Docker container's shell.
$ cd /code
$ jupyter notebook --ip=0.0.0.0 --port=3003
```

After running these commands, jupyter should be running within the container and accessible at this url: <http://localhost:3003>. Now create a new notebook and complete exercises 2 and 3. Additionally, provide the following information:

- The pytorch version (this should be 0.3.0).
- The python version (this should be 3.x, such as 3.6.2).
- (optional) Indicate whether you can run pytorch on GPU. This will require nvidia-docker and the correct pytorch installation. Note: This is only possible if you have access to a GPU (many computers don't). We'll rely on GPUs throughout the semester to speed up our models, and will talk more about this later.

To get a PDF, navigate to **File** → **Print** in your browser, and save as a PDF.

Hint: A sample Dockerfile is provided on the next page.

Sample Dockerfile

```
FROM continuumio/miniconda3

# Install a simple text editor
RUN apt-get update \
    && apt-get install -y vim

# Install jupyter notebook
RUN conda install jupyter

# Install pytoch (Requires CUDA 8.0)
# RUN conda install pytorch torchvision -c pytorch

# Install pytorch (cpu)
RUN conda install pytorch-cpu torchvision -c pytorch

# Install useful tools for interactive debugging
RUN pip install ipython ipdb

# Install additional datascience tools
RUN pip install matplotlib pandas scipy scikit-learn

RUN useradd -ms /bin/bash nyc
USER nyc
WORKDIR /code
```

2. (3 points) *Statistics Exercise.* We've collected 60 days worth of bitcoin prices. Download the file and calculate the running mean and variance of the closing price for each day (starting on the 10th day) using a window size of 10.

The data can be downloaded with the following command:

```
$ wget http://bit.ly/cs5304-assignment0-btc -O btc.csv
```

Hint: Use the pandas python package to read the csv file.

3. (3 points) *Tensor Exercise.* A is a $2 \times 2 \times 1$ tensor, B is a $2 \times 1 \times 2$ tensor. Perform a “batched matrix multiplication” between A and B using `torch.matmul`.

$$A = \begin{pmatrix} \begin{pmatrix} 7 \\ 3 \end{pmatrix} \\ \begin{pmatrix} 11 \\ 3.5 \end{pmatrix} \end{pmatrix}, B = \begin{pmatrix} (7 \ 9) \\ (4.5 \ 4.5) \end{pmatrix}$$

Hint: The answer will be a $2 \times 2 \times 2$ tensor.