ECE4880J: Computer Vision May 15, 2022

Homework 2: Python Programming

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Instruction

- This homework is due at 11:59:59 p.m. on ** May 30th, 2022.
- The write-up must be an electronic version edited by LATEX using **this template** and submitted in **pdf** format.
- Please DO NOT rename python files and their functions. Just fill it.
- The overall submission should be a .zip file named by xxx(student id)-xxx(name)-Assignment2.zip

Python Environment. We are using Python 3.7 for this course. We will use the following packages in this course: Numpy, SciPy, Matplotlib, Pytorch.

Q2. Numpy

```
/run/me/s/d/SJ/2022-05/ECE4880J/H/H2  master !1 ?8  pip show numpy
Name: numpy
Version: 1.21.2
Summary: NumPy is the fundamental package for array computing with Python.
Home-page: https://www.numpy.org
Author: Travis E. Oliphant et al.
Author-email:
License: BSD
Location: /home/setsunayyw/.local/lib/python3.10/site-packages
Requires:
Required-by: matplotlib, pandas, scikit-learn, scipy, seaborn, svgpath2mpl, svgp
athtools, torchvision
```

Figure 1: Numpy Version

Q3. SciPy

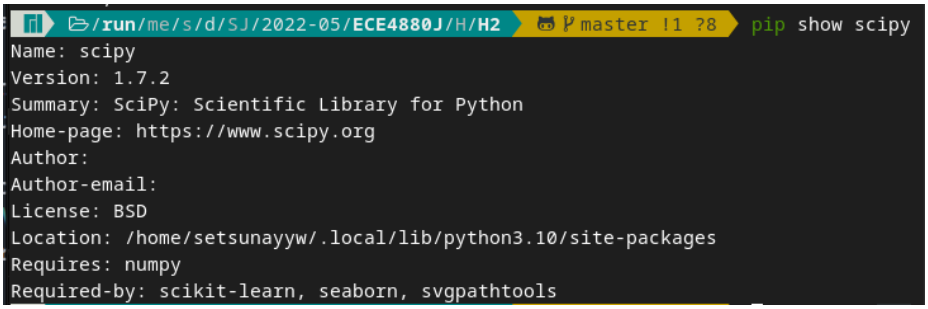


Figure 2: SciPy Version

Q4. Matplotlib

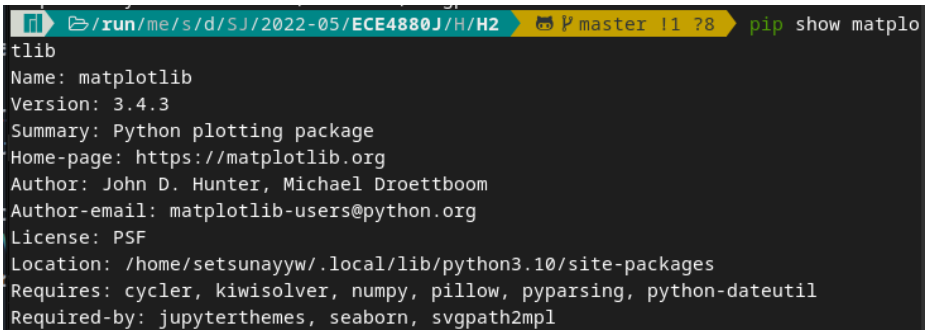


Figure 3: Matpltlib Version

Q5. Pytorch

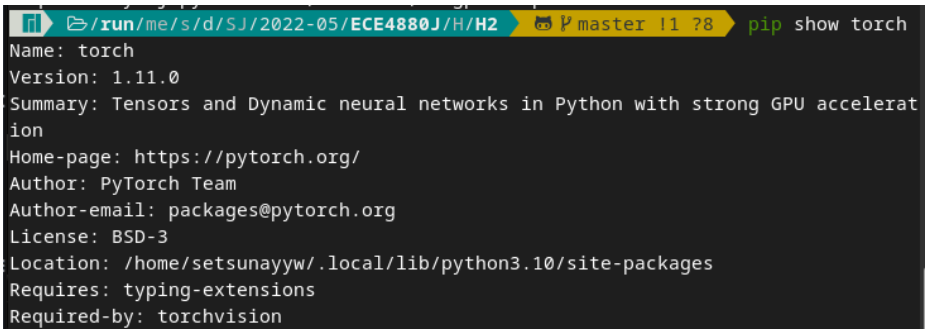
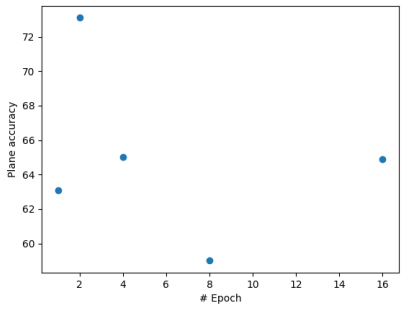


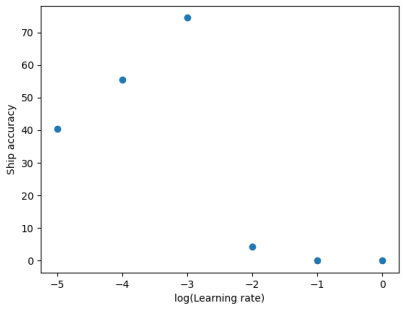
Figure 4: PyTorch Version

The accuracy of "plane" classification with a fixed learning rate $lr = 10^{-3}$ changes according to the training epoch, as shown in Figure 5a. The best epoch is estimated to be 2, with accuracy 73.1%.

The accuracy of "ship" classification with a fixed training epoch as 4 changes according to the learning rate, as shown in Figure 5b. The best learning rate is estimated to be 10^{-3}, with accuracy 74.5%.



(a) Accuracy of plane classification vs. traning epoch



(b) Accuracy of ship classification vs. learning rate

Figure 5: Accuracy Test

When changing the loss function from crossentropy to MSE and set learning rate at 10^{-3} with epoch of 2, the accuracy of "plane" classification is 66.6% and "ship" is 58.4%. The accuracy is lower comparing to crossentropy, but if epoch is set 4, the accuracy of "plane" is highest at 71.0% and "ship" is 68.4%, inferring that with MSE as the loss function one may have loop more to achieve higher accuracy.