

Applied Machine Learning - EDAN95

Lab Session 1 - Fall 2018

Introduction to Python Numpy and Linear Algebra

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1 Objectives

The objectives of this lab are to:

- Be sure that you can log on the computer system
- Have the right programming environment
- Have a hands-on introduction to Python
- Refresh your knowledge on linear algebra
- Know of the main functions of numpy

The student's presence in the computer room is compulsory for this initial session. Its goal is to be sure that all the students have the elementary mathematics and Python programming skills they need for the course. In this lab, we will review the Python syntax, linear algebra, and important numpy features.

2 Outline

1. We will use Python 3 and the Anaconda distribution in the labs: <https://www.anaconda.com/distribution>. Anaconda has most packages, including numpy, we need for the course.
2. Anaconda is available on the lab machines. You add it to your path by running: `$ initcs` If you use a personal machine, you will have to download and install it.
3. **Tensorflow** and **Keras**, the machine-learning engines we are going to use, are not part of Anaconda. You can find them on pypi: <https://pypi.python.org/pypi/keras/> <https://pypi.python.org/pypi/keras/>. They should already be installed on the LTH computer network. On your personal machine, install them with pip: `pip install --upgrade tensorflow keras`
4. To run the exercises, you will use Jupyter notebooks, where you will create cells that you can run interactively. You start jupyter with: `$ jupyter lab` or `$ jupyter notebook`
5. You may want also to use an interactive programming environment (IDE). We recommend **PyCharm**: <https://www.jetbrains.com/pycharm/>. The community edition is free. PyCharm should be available on the lab computers. If not, you will add the Python plugin to IntelliJ instead. Run: `$ intellij-idea-community` then Configure and add Python
6. You need first to configure your environment. To do so, in the File menu, select Settings..., then Project and Project Interpreter. In the Project Interpreter box, on the top of the right pane, add the new interpreter by pressing the cog icon, and Add... Then select Anaconda Python: `/usr/local/anaconda3/bin/python`

3 Course of the lab

In the lab session. You will:

1. Run all the code in the chapter: **A Tour of Python**. Pierre Nugues will send you a copy of it before the lab session. You may create a notebook for it or run it with PyCharm;
2. Run the Jupyter notebook on linear algebra from Machine Learning and Deep Learning in Python using Scikit-Learn, Keras and TensorFlow 2 by Géron available at <https://github.com/ageron/handson-ml2> and entitled `math_linear_algebra.ipynb`;
3. Run the Jupyter notebook on numpy from Machine Learning and Deep Learning in Python using Scikit-Learn, Keras and TensorFlow 2 by Géron available at <https://github.com/ageron/handson-ml2> and entitled `tools_numpy.ipynb`;
4. Optionally, you can also run the notebooks on **Pandas** and **Matplotlib**.

If you have questions on these topics, Python, Unix, numpy, and linear algebra, ask your instructors. They will help you.

4 Appendix

References

- [1] VanderPlas, A Whirlwind Tour of Python. O'Reilly 2016. Online reading: <https://jakevdp.github.io/WhirlwindTourOfPython/>
- [2] Geron, Jupyter notebook on linear algebra from Machine Learning and Deep Learning in Python using Scikit-Learn, Keras and TensorFlow: <https://github.com/ageron/handson-ml2>