How to prepare and setup a Python environment for the courses of the Faculty of Applied Mathematics and Data Mining

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1. Introduction

This document poses to be a guideline (or instruction set) to set up a minimal working *Python* environment for the courses for the faculty of *Applied Mathematics and Data Mining*, namely

- *Daten und Statistik* (ITSB4DUSIL)
- *Data Analysis with Python* (ITSB5DAPIL)
- *Data Science* (AISM1DSCIL, BINM1DSCIL, ITSM1DCEIL)
- *Machine Learning* (AISM2MLGIL, BINM2MLGIL, ITSM2MLGIL)
- *Natural Language Processing* and *Applied Natural Language Processing* (AISM3NLPIL, AISM3ANLIL, BINM3NLPIL, ITSM3NLPIL)
- *Reinforcement Learning* and *Applied Reinforcement Learning* (AISM3RILIL, AISM3ARLIL)

These instructions are supposed to be an incomplete list of resources to be installed and set up. Certainly, students are encouraged to use a much more sophisticated setup, using IDEs, etc. However, no specific tool support is provided.

The minimum requirements for the setup contain:

- a Python3.X interpreter (most recent stable version recommended),
- an environment manager (virtualenv or (ana)conda),
- a package manager (pip or (ana)conda), and
- Jupyter Notebook
- four additional libraries

2. Programming Environments

2.1. Python and Jupyter using Anaconda

The most convenient option to install the necessary components is using *Anaconda*. *Anaconda* allows to create and manage different isolated environments. By using environments, you can use different Python versions with different sets of packages installed.
Following, find a list of links to instructions for different platforms:

- Windows: https://www.geeksforgeeks.org/how-to-setup-conda-environment-with-jupyter-notebook/
- macOS: https://mas-dse.github.io/startup/anaconda-macosx-install/
- Linux: https://mas-dse.github.io/startup/anaconda-ubuntu-install/

2.2. JupyterLab Desktop

JupyterLab Desktop is a standalone application for JupyterLab and can be installed using these instructions. Be aware, that this tool may not support all functionalities needed for certain courses.

2.3. Integrated Development Environments

PyCharm is a highly-functional IDE that offers a wide range of tools for proper development, like debugger, remote code execution, environment management, etc. It is also possible to work with *Jupyter* Notebooks and more sophisticated *Scientific Mode*. For whether a course notebook can be used with PyCharm, please refer to the individual instructors. Students can apply for a free educational license using this link.

Visual Studio Code also supports development with Python. See this link for more information.

3. Libraries

The minimal set of libraries consists of *NumPy*, *pandas*, *matplotlib*, and *scikit-learn*. These libraries are used in most of the courses. Additional libraries may be needed for certain courses. Here, instructors will give instructions on requirements and installation.

4. Further Links

- This tutorial from Stanford offers a quick introduction to Python and Numpy.
- What are notebooks and how do I work with them? Be referred to this tutorial.
- Make yourself more comfortable with Anaconda/Conda for Python! This video poses a nice introduction.

- For most of the courses you are going to use Jupyter Notebooks. These are very convenient, but pose some drawbacks, especially when it comes to deployment and modularity. This video proposes a position on why notebooks shall not be used.

Remarks

In case you spot any errors, deadlinks or you have suggestions for improving these instructions, please drop us an e-mail to cornelia.ferner@fh-salzburg.ac.at and/or martin.uray@fh-salzburg.ac.at.