Python for Matlab Users

Computational Seminars @ GSE

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⇒ github.com/prisae/Python4MatlabUsers

Python for Matlab Users

- **What this workshop is**
  - A quick primer for Matlab users: What is the same, what is different?
- **What this workshop IS NOT**
  - An introduction to programming
  - An introduction to Python
  - Best practices and all the other stuff
- Ultimate objective of today
  - **YOU start to translate one of your scripts from Matlab to Python**

Rough comparison

Python

- Late 80's (Guido Rossum, then at CWI)
- Free and open-source
- General programming language; scientific computing came later (late 90's)
- Many ways to install / use

Matlab

- Late 70's
- Proprietary and very costly
- Matrix computation
- One way to install / use

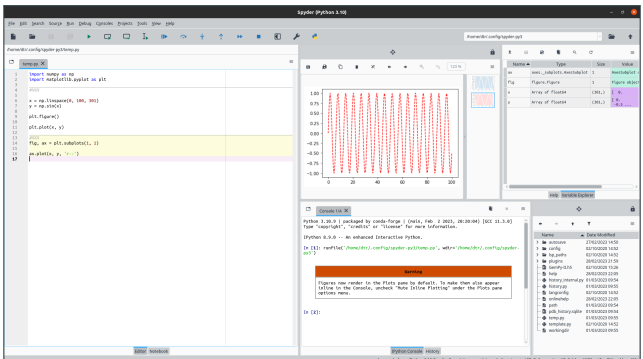
Both are multi-paradigm (e.g., *procedural*, *object-oriented*).

In Python, *everything* is an object.

Spyder: spyder-ide.org

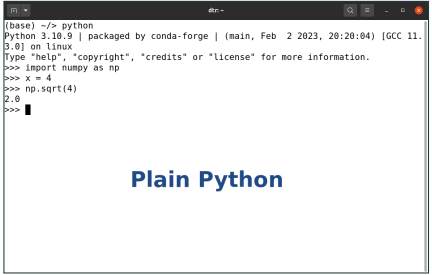
⇒ Easiest for transition, the most "*Matlab-ish*" experience.

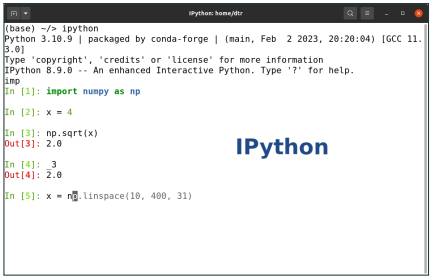
- Editor with
  - cells
  - linting
  - visual debugging
- Variable explorer
- Can run notebooks (`spyder-notebook`)
- Line profiler (`spyder-line-profiler`)



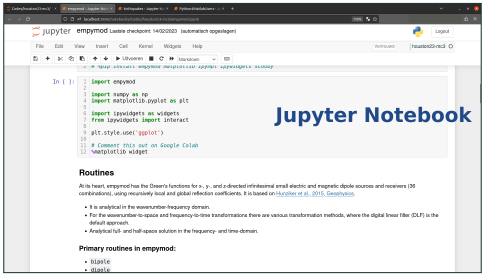
Terminal, Plain Python, IPython (Atom, VSCode, PyCharm, Sublime, . . .)

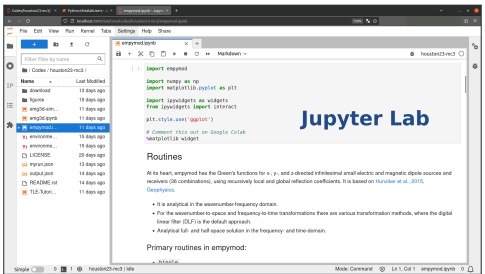
Terminal based solutions





Jupyter ecosystem (language agnostic!)





Distributions and Package Manager

Package Manager

- `pip` (`pip install package`)
- `conda` (`conda install package`)
- `mamba` (`mamba install package`)

- `conda`/`mamba` are language agnostic.
- `mamba` is the newer/faster `conda`.

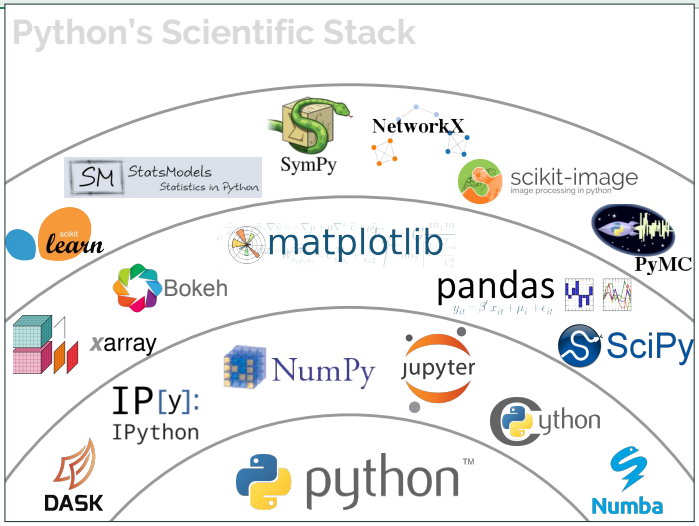
Distributions

- There are many (e.g., Anaconda, conda-forge, Python(x,y); PyPy, EDM, WinPython)
- I recommend mambaforge: github.com/conda-forge/miniforge#mambaforge

Make a note for the future: Once you translated your first scripts, get familiar with **environments**; crucial for **reproducibility**!
conda.io/projects/conda/en/latest/user-guide/tasks/manage-environments.html

Why use Python? It is SO SLOW! (I hear it every day)

- In scientific computing, Python is GLUE
- High-level syntax wraps low-level C/Fortran libraries, which is (mostly) where the computation happens.
- AOT & JIT: Cython, PyPy, Numba, Pythran, ...



Jake VanderPlas, PyCon2017, The Unexpected Effectiveness of Python in Science

Further information

- ⇒ Bookmark this: numpy.org/doc/stable/user/numpy-for-matlab-users.html
- More in depth: enthought.com/wp-content/uploads/2019/08/Enthought-MATLAB-to-Python-White-Paper_.pdf