PyQB

Monga

Third-party
libraries

NumPy

Homework

Programming in Python[1]

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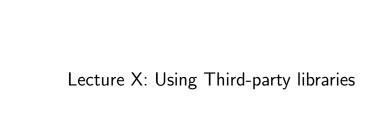`mattia.monga@unimi.it`

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Lecture X: Using Third-party libraries

Third-party libraries

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Python is "sold" *batteries included* (with many useful built-in
libraries). Moreover, like many modern programming
environments, it has standard **online package directories** that
list libraries produced by independent developers.
`https://pypi.org/`
The Python package index currently lists almost 300K libraries!

Installing a library

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The details are explained here: `https://packaging.python.`
`org/tutorials/installing-packages/`

- In most cases it is very easy, the `pip` program does all the
  magic
- It is **very** important to understand the difference between
  a system-wide and a project-specific installation.

System-wide vs. Project-specific

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If you don't take special precautions, a package is installed in a
way that makes it available to your Python system: every
Python interpreter you launch sees them.

- In many cases, this is **not** what you want
- **Different projects/programs might depend on
  different versions of the libraries**
- Libraries themselves depend on other libraries, you want to
  understand exactly which packages your program is using
  in order to **reproduce** the settings on other machines

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Virtual environments

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Python provides the idea of virtual development environments
(`venv`)

- You can create one with: `python -m venv
  CHOOSE_A_NAME`
- You must activate it (syntax depends on your OS):
  `CHOOSE_A_NAME\Scripts \activate`
- In an active virtual environment all the installation are
  confined to it
- You can get the list of installed packages with `pip freeze`

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Simplified venv administration

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**Virtual environments are key to avoid messing up your
system.** Many tools simplify their administration.

- `pipenv` (my preferred one, we will use this)
- `poetry` (similar to `pipenv`, currently less popular, but it
  has a better dependency control, a bit more complex)
- `conda` (uses its own package index, great flexibility and
  complexity, manage different python versions)

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Virtual environments caveats

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When you are working in a Python virtual environment,
remember to launch **all** your development tools "inside" the
virtual space.
For example, to use IDLE don't click on the main application
launcher, instead: `python -m idlelib`.

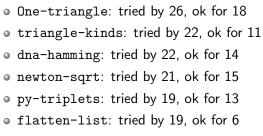83

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`NumPy` is a third-party library very popular for
scientific/numerical programming (`https://numpy.org/`).

- Features familiar to `matlab`, R, Julia programmers
- The key data structure is the array
  - 1-dimension arrays: vectors
  - 2-dimension arrays: matrices
  - n-dimension arrays

In some languages array is more or less synonym of list: Python
distinguishes: lists (mutable, arbitrary elements), arrays
(mutable, all elements have the same type), tuples (immutable,
fixed length, arbitrary elements).

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State of the homework

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- `One-triangle`: tried by 26, ok for 18
- `triangle-kinds`: tried by 22, ok for 11
- `dna-hamming`: tried by 22, ok for 14
- `newton-sqrt`: tried by 21, ok for 15
- `py-triplets`: tried by 19, ok for 13
- `flatten-list`: tried by 19, ok for 6
- `dna-files`: tried by 20, ok for 7
- `dna-forensics`: tried by 14, ok for 5

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