

Effective Programming Practices for Economists

Basic Python

Importing, Namespaces, Modules

Janoś Gabler and Hans-Martin von Gaudecker

Contents

- What are libraries?
- Different ways to import libraries or parts of libraries
- Namespaces
- Modules
- Typical errors when importing

Third party libraries

- Python is a general purpose programming language
- The base language you have seen so far is extended by libraries
 - Standard library (e.g. pathlib, functools)
 - Third party libraries (e.g. numpy, pandas, scipy)
- Libraries need to be imported to use them
- Third party libraries need to be installed

The example

- We will use the numpy library as example
- Numpy provides efficient data structures and functions for working with n-dimensional arrays
- Feel free to watch the numpy screencast for details but otherwise just ignore any numpy-specific details for now

Different ways to import

```
# Import one function / object  
from numpy import array
```

```
# Import an entire library  
import numpy
```

```
# Import entire library and rename it  
import numpy as np
```

```
# Import everything from a library  
from numpy import *
```

- Use single import if you need one-three specific things
- Use library import if you need many functions
- Use shorthand if there is a convention, e.g. numpy (np), pandas (pd), seaborn (sns)
- Never ever use `import *`

Namespaces (*why not to use "import *"*)

```
# bad option
>>> from math import log
>>> log(2.718281828459045)
1.0
```

```
# better option
>>> import math
>>> math.log(2.718281828459045)
1.0
```

```
>>> import numpy as np
>>> np.log(2.718281828459045)
1.0
```

- Multiple libraries could implement `log`
 - math library: The natural logarithm
 - web development library: Write a log file
- Importing an entire library makes it very explicit from which namespace you use a function
- Namespaces are one of the reasons why Python has succeeded in so many different areas!

Modules

- So far we imported from the standard library or from packages
- You can import from any module (a module is a `.py` file)
- In larger projects you will split code across multiple modules and import them
- Think of a package as a structured collection of modules

ModuleNotFoundError

```
>>> from numpai import array
```

```
-----  
ModuleNotFoundError                                Traceback (most recent call last)
```

```
Cell In[32], line 1
```

```
----> 1 from numpai import array
```

```
ModuleNotFoundError: No module named 'numpai'
```

- Meaning: The library you asked for is not found
- Do you have a typo in the library name?
- Is the library installed in your environment?
- **Is the correct environment activated?**

ImportError

```
from numpy import arrrrray
```

```
-----  
ImportError
```

```
Traceback (most recent call last)
```

```
Cell In[33], line 1
```

```
----> 1 from numpy import arrrrray
```

```
ImportError: cannot import name 'arrrrray' from 'numpy'  
(/home/user_1/mambaforge/envs/epp_topics/lib/python3.11/  
site-packages/numpy/__init__.py)
```

- Something went wrong during import
- Do you have typos in what you want to import?
- Is the correct version of the library installed?