Effective Programming Practices for Economists

Scientific Computing

Creating arrays

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Creating arrays from lists

Flat list

```
>>> np.array([1, 2, 3, 4])
array([1, 2, 3, 4])

Nested list

>>> np.array([[1, 2], [3, 4])
array([[1, 2], [3, 4]])

Mixed dtypes in list

>>> np.array([[1, 2], [3.1, 4])
array([[1, 2, 1, [3.1, 4]])
array([[1, 2, 1, [3.1, 4]])
```

- Can use flat or (deeply) nested lists
- Lists length cannot be rugged
- List might have mixed dtypes, arrays will not!

Constructors

- inp.ones_like
- np.zeros` and `np.zeros_like`
- np.empty`
- np.linspace
- `np.full`
- More in the (documentation)
- Learn them like vocabulary!

Reshaping

- Reshape can transform arrays from one shape to another
- Shapes are denoted as in matrices, i.e. (`n_rows`, `n_cols`)
- Number of elements must not change
- Elements aranged in row-major order

Repeating arrays

```
>>> a = np.array([1, 2, 3])
>>> a.repeat(2)
array([1, 1, 2, 2, 3, 3])
>> b = np.array([[1, 2], [3, 4]])
>>> b.repeat(2)
array([1, 1, 2, 2, 3, 3, 4, 4])
>>> b.repeat(2, axis=1)
array([[1, 1, 2, 2],
       [3, 3, 4, 4]])
>>> a.reshape(-1, 1).repeat(2, axis=1)
array([[1, 1],
       [2, 2],
       [3, 3]])
```

- repeat duplicates elements n times
- Without axis, result is flattened
- Versatile together with reshaping
- Tip for complex cases:
 - First introduce new dimensions via reshaping
 - Then repeat along these axes
- Always prefer broadcasting over repetition!