



PyQB

Monga

Programming in Python¹

Mattia Monga

Dip. di Informatica
Università degli Studi di Milano, Italia

`mattia.monga@unimi.it`

Academic year 2022/23, I semester



PyQB

Monga

Lecture XIII: NumPy

Indexing is powerful

PyQB

Monga

```
a = np.arange(1, 6)
```

1	2	3	4	5
0	1	2	3	4

`a[1]`

2

`a[2:4]`

3	4
---	---

`a[-2:]`

4	5
---	---

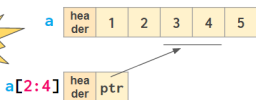
`a[::2]`

1	3	5
---	---	---

`a[[1,3,4]]`

2	4	5
---	---	---

"fancy indexing"



`a[2:4] = 0`

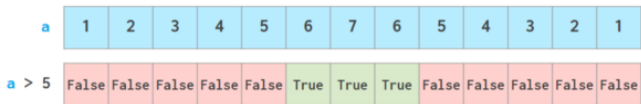


`a`

1	2	0	0	5
---	---	---	---	---

Picture from "NumPy Illustrated: The Visual Guide to NumPy", highly recommended

Indexing is powerful



np.any(a > 5)

True

a[a > 5]

6

7

6

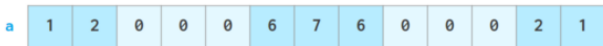
np.all(a > 5)

False

a[a > 5] = 0



a[(a >= 3) & (a <= 5)] = 0



& and
| or
^ xor
~ not

Picture from ["NumPy Illustrated: The Visual Guide to NumPy"](#), highly recommended



Warning! Assignment works differently from lists

```
>>> np = np.array([1,2,3,4,5])
>>> lst = [1,2,3,4,5]
>>> np[2:4] = 0
>>> np
array([1, 2, 0, 0, 5])
>>> lst[2:4] = 0 # Error!
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: can only assign an iterable
>>> lst[2:4] = [0,0]
>>> lst
[1, 2, 0, 0, 5]
>>> lst[2:4] = [0,0,0]
>>> lst
[1, 2, 0, 0, 0, 5]
>>> np[2:4] = [0,0]
>>> np[2:4] = [0,0,0] # Error!
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ValueError: could not broadcast input array from shape (3,) into
↪ shape (2,)
```

PyQB

Monga



<https://classroom.github.com/a/0Vc-7zYm>

- 1 Manage your virtual environment (see hints in the README.md)
- 2 Code your solution