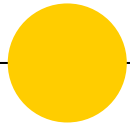


Numpy





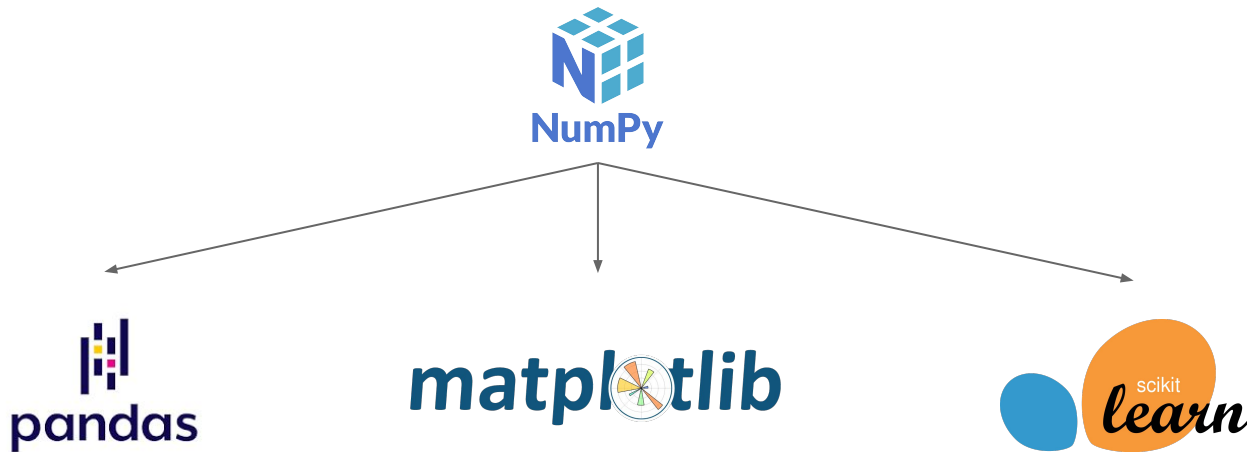
What is it?

- **Numpy** (short for Numerical Python) is a library used for numeric computing
- It includes support for multi-dimensional arrays and matrices along with a variety of mathematical functions to apply to them.
- You have to import the library :

```
>>> import numpy as np
```



Why Numpy is important





Numpy arrays

Numpy come with its own data types, different from python's built in data types.

The basic data structures in Numpy are **arrays**, which can be used to represent tabular data. You can think of arrays as lists of lists, where all the elements of a list are of the same type (typically numeric since the reason you use Numpy is to do numeric computing)

- A matrix is just a two-dimensional array
- The size of an array is the total number of elements in every list
- The shape of an array is the size of the array along each dimension (e.g. number of rows and number of columns for a two-dimensional array)

```
>>> a = np.random.random((10,4))
```

```
>>> print(a)
```

```
>>> print(a.shape)
```

```
>>> print(a.size)
```



Extracting data

- ◉ Reference the indices of the values to be extracted

```
# First group of array c
```

```
>>>print(c[0])
```

```
# Second subgroup of the first group
```

```
>>>print(c[0,1])
```

```
# Fourth column of the second subgroup
```

```
>>>print(c[0,1,:,3])
```

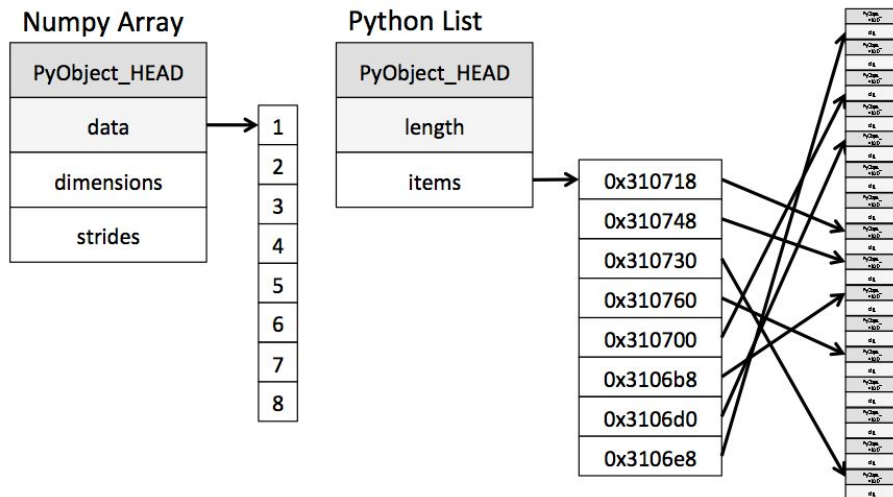
```
# Value in the third row and fourth column of the second subgroup
```

```
>>>print(c[0,1,2,3])
```



Arrays are more efficient than lists

Lists are super flexible: they can contain elements of different types. To allow this, each item in the list must contain its own type info, reference count, and other information. If all variables are of the same type, much of this information is redundant: it's more efficient to store data in a fixed-type array.





Convert data structures to arrays

```
>>> lst_lst = [[1,2,3],[4,5,6],[7,8,9]]
```

```
>>> d = np.array(lst_lst)
```

```
>>> print(d)
```

```
[[1 2 3] [4 5 6] [7 8 9]]
```



Math functions

```
# Sum of all elements in matrix a
```

```
>>> print(np.sum(a))
```

```
# Sum of each row in matrix a
```

```
>>> print(np.sum(a, axis=1))
```

```
# Subtract elements of x from elements of y
```

```
>>> print(np.subtract(y, x))
```




Numpy cheat sheet

This cheat sheet will give you an overview of the most common Numpy operations:

https://s3.amazonaws.com/assets.datacamp.com/blog_assets/Numpy_Python_Cheat_Sheet.pdf