



NUMPY BASICS

NUMERICAL PYTHON

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TOPIC OUTLINE

Numpy

N-D Array

Descriptive Statistics Functions

Axis Parameter



NUMPY



NUMPY

NumPy, short for Numerical Python, is a foundational library for numerical computing in Python, providing support for efficient arrays, matrices, and mathematical operations. It serves as the backbone for many other scientific libraries, including **pandas**, **scipy**, and **matplotlib**.



<https://numpy.org>



N-D ARRAY

An n-dimensional array is a versatile and powerful data structure that allows you to work with multi-dimensional data efficiently.

Multi-dimensional:

- 0D array: Scalar
- 1D array: Vector
- 2D array: Matrix
- 3D array: Tensor
- General n-dimensional arrays



1-D ARRAY

Examples:

```
array_a = np.array([1,2,3])
```

```
array_b = np.array([4,5,6])
```

Syntax to create 1-D array:

```
array_name = np.array([elements])
```



2-D ARRAY

Syntax to create 2-D array:

```
array_name = np.array([  
    [row1_elements],  
    [row2_elements],  
    ...,  
    [rown_elements]  
])
```

Example:

1	2	3
4	5	6

```
my_array = np.array([  
    [1,2,3], [4,5,6]])
```

Transpose array

```
my_array.T
```

1	4
2	5
3	6



DESCRIPTIVE STATISTICS

`np.mean(array)`

`np.median(array)`

`stats.mode(array)` #from scipy import stats

`np.min(array)`

`np.max(array)`

`np.percentile(array,25)` #1st quartile

`np.percentile(array,50)` #2nd quartile

`np.var(array)`

`np.std(array)`



AXIS

The **axis** parameter defines the direction in which an operation (e.g., **sum**, **mean**, **median**) is performed.

For a 2-D array:

- **axis = 0** refers to rows (vertical direction)
- **axis = 1** refers to columns (horizontal direction)

Example:

1	4
2	5
3	6

```
np.sum(array,axis=0)
```

```
# output: [6, 15]
```

```
np.sum(array,axis=1)
```

```
# output: [5, 7, 9]
```



LABORATORY

