NUMPY BASICS

NUMERICAL PYTHON

prepared by:

Gyro A. Madrona

Electronics Engineer

@gyromadrona @gyro-madrona @OrbitGNX @OrbitGNX @gyronics

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. It serves as the framework for many other scientific libraries, including pandas, scipy, and matplotlib.

https://numpy.org

NUMPY PACKAGE

loading NumPy package

```
import numpy as np
```

The community agreed alias for NumPy is **`np`**, so loading NumPy as np is assumed standard practice for all of the NumPy documentation.

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

syntax

```
import numpy as np

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

example

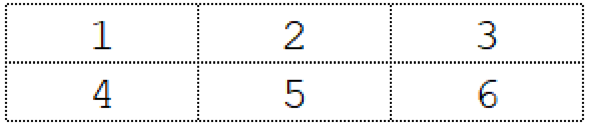
```
array_a = np.array([1,2,3)]

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

2-D ARRAY

syntax

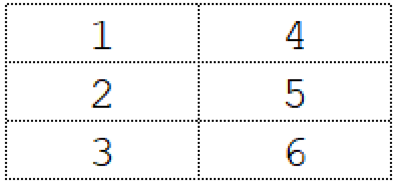
```
import numpy as np

array_name = np.array([

    [row_1 elements],

    [row_2 elements],

    ...,

    [row_n 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,75) #3rd quartile

np.var(array)

np.std(array)
```

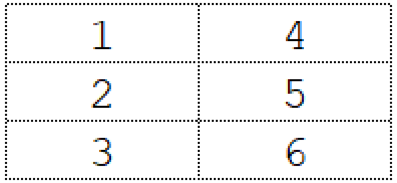
AXIS

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

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)

# returns [6, 15]
```

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

# returns [5, 7, 9]
```

LABORATORY