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# What is NumPy?

## INTRODUCTION TO DATA SCIENCE IN PYTHON

# Agenda

- Advantages of NumPy
- NumPy Basic Operations
- Creating a NumPy Array
- Reshaping NumPy Array
- Array Indexing in NumPy
- Statistics
- Arithmetic Operations with NumPy Arrays
- Linear Algebra Operations with NumPy Arrays
- Creating a machine learning model using NumPy (Linear Model)

The fundamental package for ***scientific*** computing in Python.

"Numeric Python" or "Numerical Python".

# Advantages of NumPy

NumPy has several advantages over using core Python mathematical functions, a few of which are outlined here:

1. NumPy is extremely fast when compared to core Python thanks to its heavy use of C extensions.
2. Many advanced Python libraries, such as Scikit-Learn, Scipy, and Keras, make extensive use of the NumPy library. Therefore, if you plan to pursue a career in data science or machine learning, NumPy is a very good tool to master.
3. NumPy comes with a variety of built-in functionalities, which in core Python would take a fair bit of custom code.
4. NumPy is an open source library available in Python that aids in mathematical, scientific, engineering, and data science programming.
5. It works perfectly well for multi-dimensional arrays and matrices multiplication
6. NumPy is memory efficiency, meaning it can handle the vast amount of data more accessible than any other library

# HOW TO INSTALL NUMPY

pip install numpy

conda install -c anaconda numpy

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# Import NumPy and Check Version

## # import numpy

- import numpy as np

## # check installed version

- print (np.__version__)

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# What is Python NumPy Array?

NumPy array is a central data structure of the numpy library

- Central data structure of the NumPy library
- Have a fixed size at creation.
- Facilitate advanced mathematical and operations on large numbers of data.
- Elements in a NumPy array are all required to be of the same data type, and thus will be the same size in memory.

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# Array Types

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# Common Array types

## Scalar

- 0-D arrays or scalars.
- Are immutable.

## Vector

- 1-D arrays or uni-dimensional arrays.
- Has 0-D arrays as its elements.

## Matrix

- 2-D arrays.
- Has 1-D arrays as its elements.
- Represent matrices.

## Tensor

- 3-D arrays.
- Has 2-arrays as its elements.
- Represent a 3rd order tensor.

# ndarray

## N-dimensional array

- N-dimensional array is simply an array with any number of dimensions.

# Additional Resources

# NumPy Documentation

- https://numpy.org/doc/stable/contents.html

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