## What is NumPy?

NumPy is a Python library used for working with arrays.

It also has functions for working in domain of linear algebra, fourier transform, and matrices.

In Python we have lists that serve the purpose of arrays, but they are slow to process.

NumPy aims to provide an array object that is up to 50x faster than traditional Python lists.

The array object in NumPy is called ndarray, it provides a lot of supporting functions that make working with ndarray very easy.

## Access Array Elements

Array indexing is the same as accessing an array element.

You can access an array element by referring to its index number.

The indexes in NumPy arrays start with 0, meaning that the first element has index 0, and the second has index 1

## Access 2-D Arrays

To access elements from 2-D arrays we can use comma separated integers representing the dimension and the index of the element.

Think of 2-D arrays like a table with rows and columns, where the dimension represents the row and the index represents the column.

## Access 3-D Arrays

To access elements from 3-D arrays we can use comma separated integers representing the dimensions and the index of the element.

## Slicing arrays

Slicing in python means taking elements from one given index to another given index.

We pass slice instead of index like this: [*start*:*end*].

We can also define the step, like this: [*start*:*end*:*step*].

## Negative Slicing

Use the minus operator to refer to an index from the end:

## Data Types in NumPy

NumPy has some extra data types, and refer to data types with one character, like i for integers, u for unsigned integers.

- i - integer
- b - boolean
- u - unsigned integer
- f - float
- c - complex float
- m - timedelta
- M - datetime
- O - object
- S - string
- U - unicode string
- V - fixed chunk of memory for other type ( void )

## shape

NumPy arrays have an attribute called shape that returns a tuple with each index having the number of corresponding elements.

Reshaping means changing the shape of an array.

The shape of an array is the number of elements in each dimension.

## Generate Random Number

NumPy offers the random module to work with random numbers.

The random module's rand() method returns a random float between 0 and 1.

The randint() method takes a size parameter where you can specify the shape of an array.

The rand() method also allows you to specify the shape of the array.

he choice() method allows you to generate a random value based on an array of values.

## Element wise operation & statistics functions

Compute the element-wise summation, subtraction, division, multiplication:-

**numpy.add()** **numpy.subtract()** **numpy.divide()** **numpy.multiply()**

| | |
|---|---|
| **median**(a) | Compute the median along the specified axis. |
| **average**(a) | Compute the weighted average along the specified axis. |
| **mean**(a) | Compute the arithmetic mean along the specified axis. |
| **std**(a) | Compute the standard deviation along the specified axis. |
| **var**(a) | Compute the variance along the specified axis. |