Python Libraries : Numpy

INTERNSHIPSTUDIO

Agenda

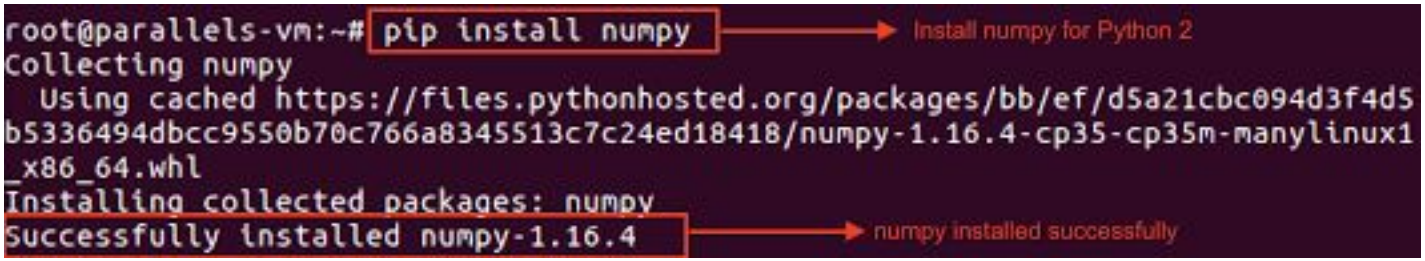
INTERNSHIPSTUDIO

- Basics of NumPy
- Creating NumPy arrays and Matrices
- NumPy Functions

What is NumPy?

- It's a Python package that stands for 'Numerical Python'.
- It is the core library for scientific computing
- NumPy arrays provide tools for integrating C, C++, etc.
- Also useful in linear algebra, random number capability etc.
- NumPy array can also be used as an efficient multi-dimensional container for generic data.

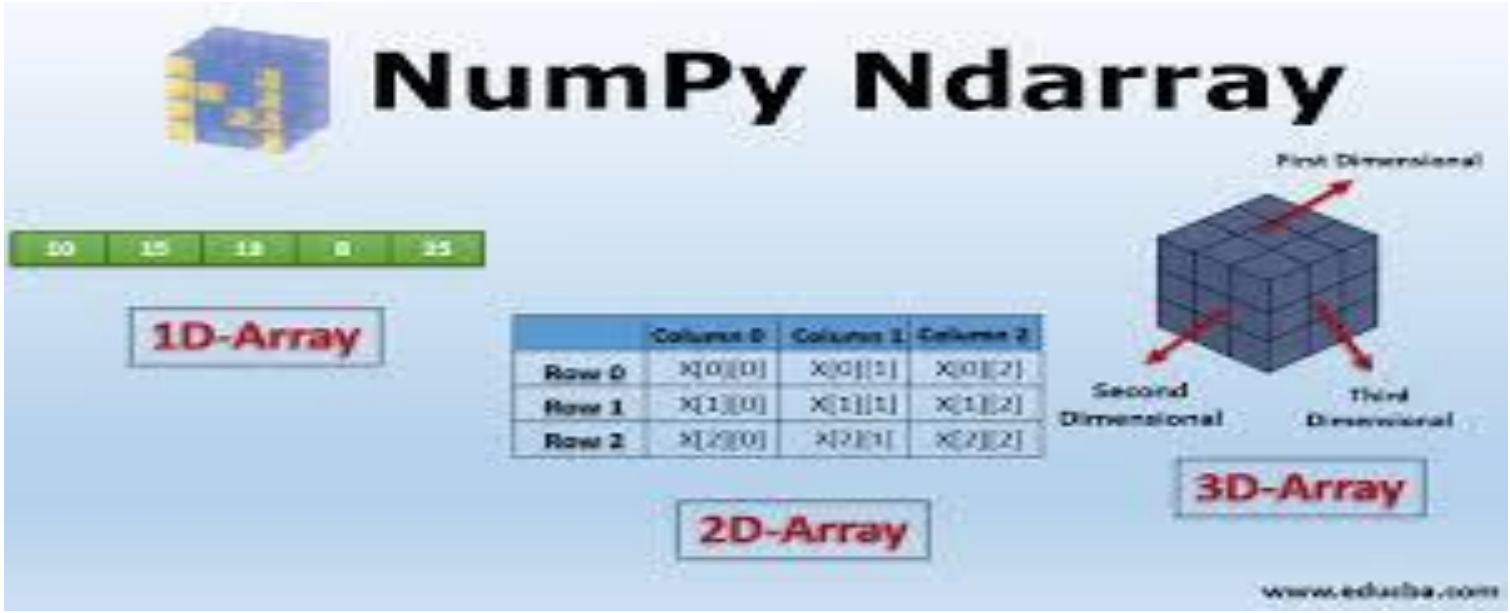
How do I install NumPy?



- From command prompt and type “pip install numpy”.
- Once the installation is completed, and simply import it by typing:

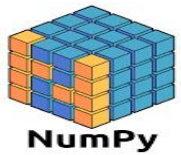
  “import numpy as np”

Python NumPy



- Numpy array is a powerful N-dimensional array object which is in the form of rows and columns.
- Array is a table of elements (usually numbers), all of the same type, indexed by a tuple of positive integers.
- Number of dimensions of the array is called rank of the array.
- A tuple of integers giving the size of the array along each dimension is known as shape of the array.

Creating NumPy Array



INTERNSHIPSTUDIO

How do I start NumPy?

Let us see how it is implemented in PyCharm:

Single-dimensional Numpy Array:

```
1  import numpy as np
2  a=np.array([1,2,3])
3  print(a)
```

Output – [1 2 3]

Multi-dimensional Array:

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

O/P – [[1 2 3]

[4 5 6]]

Transforming List into Numpy Arrav

Element0	Element1	Element2	Element3	Element4

Element0
Element1
Element2
Element3
Element4

```
[ ] l = list(range(1,11)) #create a list
    l
```

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

```
[ ] my_array = np.array(l) #transform list into a numpy array (ndarray)
    my_array
```

```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10])
```

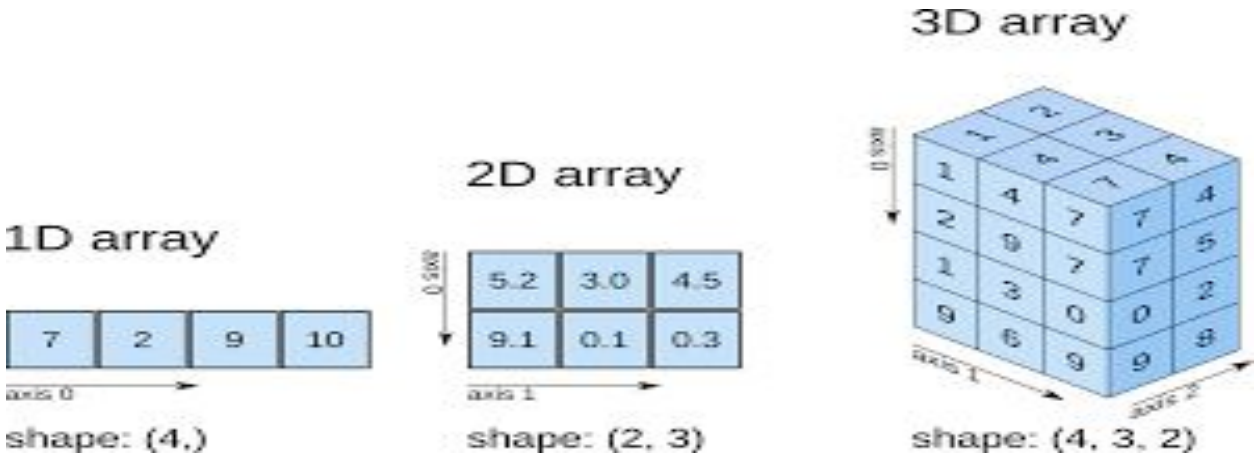
```
[ ] type(my_array)
```

```
numpy.ndarray
```

INTERNSHIPSTUDIO

One- Dimensional Numpy Array:

We can think of a one-dimensional array as a column or a row of a table with one or more elements.




```
[ ]  a = np.arange(1,13) #creating array from 1 to 12
     a
```

```
array([ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12])
```

```
[ ]  type(a)
```

```
numpy.ndarray
```

```
[ ]  a.dtype
```

```
dtype('int32')
```

```
[ ]  a.shape #one-dimensional array, 12 elements in one dimension (vector)
```

```
(12,)
```

Two-Dimensional NumPy Array

INTERNSHIPSTUDIO

A multidimensional array has more than one column. *We can consider a multi-dimensional array to be an Excel Spreadsheet — it has columns and rows. Each column can be considered as a dimension.*

```
[ ] a = a.reshape(2,6) #reshaping a: 2 rows / 6 columns
```

```
[ ] a
```

```
array([[ 1,  2,  3,  4,  5,  6],
       [ 7,  8,  9, 10, 11, 12]])
```

```
[ ] a.shape # two-dimensional array: 2 rows / 6 columns (matrix)
```

```
(2, 6)
```

Three- Dimensional Array

- This will create 3 arrays with 4 rows and 5 columns each with random integers.

```
3DArray = np.random.randint(10, size=(3, 4, 5))
```

- **There are also other types available such as:**
- Boolean
- Integer (signed and unsigned)
- Float
- Complex

```
a = a.reshape(2,2,3) #creating a three-dimensional array
a
```

```
array([[[ 1,  2,  3],
        [ 4,  5,  6]],

       [[ 7,  8,  9],
        [10, 11, 12]]])
```

```
a.shape
```

```
(2, 2, 3)
```

NumPy

INTERNSHIPSTUDIO

Question 1- What is NumPy?

Question 2- How do I install NumPy?

Question 3- What is NumPy array?

Question 4- How many types of Numpy Array we can create?

Question 5- How to create a Two - Dimensional Array?