

1.What makes NumPy.shape() different form NumPy.Size()?

Ans: NumPy can be used to perform a wide variety of mathematical operations on arrays. It adds powerful data structures to Python that guarantee efficient calculations with arrays and matrices and it supplies an enormous library of high-level mathematical functions that operate on these arrays and matrices.

Shape relates to the size of the dimensions of an N-dimensional array.

Size regarding arrays, relates to the amount (or count) of elements that are contained in the array (or sometimes, at the top dimension of the array – when used as length).

For example, let a be a matrix

```
1  2 3 4
2  5 6 7 8
9 10 11 12
```

The shape of a is (3, 4), the size of a is 12 and the size of a[1] is 4.

2. In NumPy.describe the idea of broadcasting.?

Ans: The term broadcasting refers to the ability of NumPy to treat arrays of different shapes during arithmetic operations. Arithmetic operations on arrays are usually done on corresponding elements. If two arrays are of exactly the same shape, then these operations are smoothly performed

If the dimensions of two arrays are dissimilar, element-to-element operations are not possible. However, operations on arrays of non-similar shapes is still possible in NumPy, because of the broadcasting capability. The smaller array is broadcast to the size of the larger array so that they have compatible shapes.

Broadcasting is possible if the following rules are satisfied

Array with smaller ndim than the other is prepended with '1' in its shape.

Size in each dimension of the output shape is maximum of the input sizes in that dimension.

An input can be used in calculation, if its size in a particular dimension matches the output size or its value is exactly 1.

If an input has a dimension size of 1, the first data entry in that dimension is used for all calculations along that dimension.

A set of arrays is said to be broadcastable if the above rules produce a valid result and one of the following is true

Arrays have exactly the same shape.

Arrays have the same number of dimensions and the length of each dimension is either a common length or 1.

Array having too few dimensions can have its shape prepended with a dimension of length 1, so that the above stated property is true.

The following program shows an example of broadcasting.

Import numpy as np

```
A = np.array([1,2,3,4])
```

```
B = np.array([10,20,30,40])
```

```
C = a * b
```

Print c

```
Output:[10 40 90 160]
```

3. What makes python better than other libraries for numerical computation.?

Ans:1| SciPy (Scientific Numeric Library) Officially released in 2000-01, SciPy is free and open source library used for scientific computing and technical computing. The library consists of modules for optimisation, image processing, FFT, special functions and signal processing. The SciPy package includes algorithms and functions which are the crux of Python scientific computing capabilities.

2| Pandas (Data Analytics Library)

Pandas is the most important data analysis library of Python. Being open source, it is used for analysing data with Python. It can take data formats of CSV or TSV files, or a SQL database and convert it into Python data frames with rows and columns which is similar to tables in statistical formats. The package makes comparisons with dictionaries with the aid of 'for' loops which are very easy to understand and operate.

3| IPython (Command Shell)

Developed by Fernando Perez in the year 2001, IPython is a command shell which is designed for interactive calculation in various programming languages. It offers self-examination, rich media, shell syntax, tab completion, and history.

4| Numeric Python (Fundamental Numeric Package) Better known as Numpy, numeric Python has developed a module for Python, mostly written in C. Numpy guarantees swift execution as it is accumulated with mathematical and numerical functions. Robust Python with its dynamic data structures, efficient implementation of multi-dimensional arrays and matrices.

5| Natural Language Toolkit (Library For Mathematical And Text Analysis) Simply known as NLP, Natural Language Processing library is used to build applications and services that can understand and analyse human languages and data. One of the sub-libraries which are widely used in NLP is NLTK (Natural Language Toolkit). It has an active discussion forum through which they give hands-on guidance on programming basic topics such as computational linguistics, comprehensive API documentation, linguistics to engineers, students, industries and researchers.

4. How does NumPy deal with files.?

Ans:. Numpy.save()

The numpy.save() file stores the input array in a disk file with npy extension.

Import numpy as np

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

```
Np.save('outfile',a)
```

To reconstruct array from outfile.npy, use load() function.

Import numpy as np

```
B = np.load('outfile.npy')
```

Print b

It will produce the following output –

```
Array([1, 2, 3, 4, 5])
```

The save() and load() functions accept an additional Boolean parameter allow\_pickle. A pickle in Python is used to serialize and de-serialize objects before saving to or reading from a disk file.

Savetxt()

The storage and retrieval of array data in simple text file format is done with savetxt() and loadtxt() functions.

Example:

Import numpy as np

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

```
Np.savetxt('out.txt',a)
```

```
B = np.loadtxt('out.txt')
```

Print b

It will produce the following output –

```
[ 1.  2.  3.  4.  5.]
```

NumPy introduces a simple file format for ndarray objects. This . npy file stores data, shape, dtype and other information required to reconstruct the ndarray in a disk file such that the array is correctly retrieved even if the file is on another machine with different architecture.

5. Mention the importance of NumPy.empty().?

Ans: The tutorial assumes that you have somewhat limited experience with NumPy. As such, it starts with a quick review of NumPy, then proceeds to an explanation of the NumPy empty function. Later, the tutorial shows examples of the np.empty function and answers a few common questions. If you just need something quick, you can click on any of the following links and it will take you to the appropriate section of the tutorial.

Specifically speaking, it is seldom used in any scripts, As specified, it returns a numpy array object initialized with garbage, you would manually need to set the data in each cell of the matrix.

However there is a slight optimization up side of using this method, Since it returns an array of garbage values, therefore it is slightly faster as compared to other initialization of array to zeros or ones.