**Python Numpy**

**Numpy** is a general-purpose array-processing package. It provides a high-performance multidimensional array object, and tools for working with these arrays. It is the fundamental package for scientific computing with Python.  
Besides its obvious scientific uses, Numpy can also be used as an efficient multi-dimensional container of generic data.

**Creating a Numpy Array**

Arrays in Numpy can be created by multiple ways, with various number of Ranks, defining the size of the Array. Arrays can also be created with the use of various data types such as lists, tuples, etc. The type of the resultant array is deduced from the type of the elements in the sequences.

# Python program for Creation of Arrays

import numpy as np

# Creating a rank 1 Array

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

print("Array with Rank 1: \n",arr)

# Creating a rank 2 Array

arr = np.array([[1, 2, 3],

                [4, 5, 6]])

print("Array with Rank 2: \n", arr)

# Creating an array from tuple

arr = np.array((1, 3, 2))

print("\nArray created using "

      "passed tuple:\n", arr)

**Accessing the array Index**

In a numpy array, indexing or accessing the array index can be done in multiple ways. To print a range of an array, slicing is done. Slicing of an array is defining a range in a new array which is used to print a range of elements from the original array. Since, sliced array holds a range of elements of the original array, modifying content with the help of sliced array modifies the original array content.

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| # Python program to demonstrate indexing in numpy array  import numpy as np    # Initial Array  arr = np.array([[-1, 2, 0, 4],                  [4, -0.5, 6, 0],                  [2.6, 0, 7, 8],                  [3, -7, 4, 2.0]])  print("Initial Array: ")  print(arr)    # Printing a range of Array  # with the use of slicing method  sliced\_arr = arr[:2, ::2]  print ("Array with first 2 rows and"      " alternate columns(0 and 2):\n", sliced\_arr)    # Printing elements at  # specific Indices  Index\_arr = arr[[1, 1, 0, 3],                  [3, 2, 1, 0]]  print ("\nElements at indices (1, 3), "      "(1, 2), (0, 1), (3, 0):\n", Index\_arr) |

**Basic Array Operations**

In numpy, arrays allow a wide range of operations which can be performed on a particular array or a combination of Arrays. These operation include some basic Mathematical operation as well as Unary and Binary operations.

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| # Python program to demonstrate  # basic operations on single array  import numpy as np    # Defining Array 1  a = np.array([[1, 2],                [3, 4]])    # Defining Array 2  b = np.array([[4, 3],                [2, 1]])    # Adding 1 to every element  print ("Adding 1 to every element:", a + 1)    # Subtracting 2 from each element  print ("\nSubtracting 2 from each element:", b - 2)    # sum of array elements  # Performing Unary operations  print ("\nSum of all array "         "elements: ", a.sum())    # Adding two arrays  # Performing Binary operations  print ("\nArray sum:\n", a + b) |