



Vidyavardhini's College of Engineering & Technology

Department of Computer Engineering

Experiment No. 9
Program to manipulate arrays using NumPy
Date of Performance:
Date of Submission:



Experiment No. 11

Title: Program to manipulate arrays using NumPy

Aim: To study and implement arrays manipulation using NumPy

Objective: To introduce NumPy package

Theory:

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.

Arrays in Numpy

Array in Numpy is a table of elements (usually numbers), all of the same type, indexed by a tuple of positive integers. In Numpy, 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. An array class in Numpy is called as **ndarray**. Elements in Numpy arrays are accessed by using square brackets and can be initialized by using nested Python Lists.

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.

Note: Type of array can be explicitly defined while creating the array.

Code:

```
import numpy as np

A = np.array([[1,2,3],[4,5,6]])

# Print the array A

print("Array A:")
```



```
print(A)

# Finding the indices of elements

indices = np.indices(A.shape)

# Sum of all elements

sum_of_elements = np.sum(A)

# Print the indices of elements

print("\nIndices of elements:")

print(indices)

# Print the sum of all elements

print("\nSum of all elements:", sum_of_elements)
```

Output:

A screenshot of a Jupyter Notebook's 'Output' window. The window has a dark background with light-colored text. It displays the output of the code: 'Array A:' followed by a 2x3 array [[1 2 3], [4 5 6]]. Then 'Indices of elements:' followed by two 2x3 arrays of indices. Finally, 'Sum of all elements: 21'. At the bottom, it says '=== Code Execution Successful ==='. There is a 'Clear' button in the top right corner of the output window.

```
Output
Clear

Array A:
[[1 2 3]
 [4 5 6]]

Indices of elements:
[[[0 0 0]
  [1 1 1]]

 [[0 1 2]
  [0 1 2]]]

Sum of all elements: 21

=== Code Execution Successful ===
```

Conclusion: NumPy package has been studied and arrays have been implemented and manipulated.