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

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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:

```python
import numpy as np

user_input = input("Enter the array elements separated by spaces: ")
array_elements = [int(x) for x in user_input.split()]
np_array = np.array(array_elements)

element_to_search = int(input("Enter the element to search: "))

index_number = np.where(np_array == element_to_search)[0]
if len(index_number) > 0:
    print("Index number of element", element_to_search, "is:", index_number[0])
else:
    print("Element", element_to_search, "not found in the array.")

array_sum = np.sum(np_array)
print("Sum of all elements in the array:", array_sum)
```

OUTPUT:

```
============== RESTART: C:/Vedanti_Degree/SEM_4/SBL_PYTHON/pr9.py ==============
Enter the array elements separated by spaces: 2 4 6 8 10
Enter the element to search: 10
Index number of element 10 is: 4
Sum of all elements in the array: 30
```

CONCLUSION:

In this experiment, we explored the capabilities of NumPy, a powerful library for numerical computing in Python, to manipulate arrays efficiently. By leveraging NumPy's functions and methods, we performed various operations on arrays, including creation, manipulation. NumPy's extensive functionality, combined with its high-performance computing capabilities, makes it a fundamental tool for scientific computing, data analysis, and machine learning applications.