Training Day-10 Report:

NumPy

NumPy is a Python library used for working with arrays.It also has functions for working in domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open source project and you can use it freely.NumPy stands for Numerical Python.

Why Use NumPy?

In Python we have lists that serve the purpose of arrays, but they are slow to process.NumPy aims to provide an array object that is up to 50x faster than traditional Python lists.The array object in NumPy is called `ndarray`, it provides a lot of supporting functions that make working with `ndarray` very easy.Arrays are very frequently used in data science, where speed and resources are very important.

Create a NumPy ndarray Object

NumPy is used to work with arrays. The array object in NumPy called `ndarray`. We can create a NumPy `ndarray` object by using the `array()` function.

```
import numpy as np
arr = np.array([1, 2, 3, 4, 5])
print(arr)
print(type(arr))
```

Access Array Elements

Array indexing is the same as accessing an array element.You can access an array element by referring to its index number.The indexes in NumPy arrays start with 0, meaning that the first element has index 0, and the second has index 1 etc.

```
import numpy as np
arr = np.array([1, 2, 3, 4])
print(arr[0])
```

Slicing arrays Slicing in python means taking elements from one given index to another given index.We pass slice instead of index like this: `[start:end]`.We can also define the step, like this: `[start:end:step]`.If we don't pass start its considered 0If we don't pass end its considered length of array in that dimensionIf we don't pass step its considered 1

```
import numpy as np
arr = np.array([1, 2, 3, 4, 5, 6, 7])
print(arr[1:5])
```

Data Types in Python By default Python have these data types:

- `strings` - used to represent text data, the text is given under quote marks. e.g. "ABCD"
- `integer` - used to represent integer numbers. e.g. -1, -2, -3
- `float` - used to represent real numbers. e.g. 1.2, 42.42
- `boolean` - used to represent True or False.
- `complex` - used to represent complex numbers. e.g. 1.0 + 2.0j, 1.5 + 2.5j

The Difference Between Copy and View

The main difference between a copy and a view of an array is that the copy is a new array, and the view is just a view of the original array.The copy *owns* the data and any changes made to the copy will not affect original array, and any changes made to the original array will not affect the copy.

Copy

```
import numpy as np
arr = np.array([1, 2, 3, 4, 5])
x = arr.copy()
arr[0] = 42
print(arr)
print(x)
```

view

```
import numpy as np
arr = np.array([1, 2, 3, 4, 5])
x = arr.view()
x[0] = 31
print(arr)
print(x)
```

Shape of an Array

The shape of an array is the number of elements in each dimension.

```
import numpy as np
arr = np.array([[1, 2, 3, 4], [5, 6, 7, 8]])
print(arr.shape)
```

Reshaping arrays

Reshaping means changing the shape of an array.The shape of an array is the number of elements in each dimension.By reshaping we can add or remove dimensions or change number of elements in each dimension.

```
import numpy as np
arr = np.array([1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12])
newarr = arr.reshape(4, 3)
print(newarr)
```