DSS Lab Experiment Number: 1

AIM: Setting up the Python environment and use of NumPy Library

Anaconda is an open-source software that contains Jupyter, spyder, etc that are used for large data processing, data analytics, heavy scientific computing. Anaconda works for R and python programming language. Spyder(sub-application of Anaconda) is used for python. Opencv for python will work in spyder. Package versions are managed by the package management system called conda.
To begin working with Anaconda, one must get it installed first. Follow the below instructions to Download and install Anaconda on your system:

Steps for installation of Anaconda on System:

1. Click on the link below to open the download page https://www.anaconda.com/download/#windows
2. Click on the Download button and check for the compatibility of your system. Then, it will start downloading.
3. Double click the installer to launch.
4. Click on Next
5. Read the license agreement and click on "I Agree".
6. Select installation type "Just Me" unless you're installing it for all users (which require Windows Administrator privileges) and click on Next.
7. Select a destination folder to install Anaconda and click the Next button
8. Choose whether to add Anaconda to your PATH environment variable. We recommend NOT adding Anaconda to the PATH environment variable, since this can interfere with other softwares. Instead, use Anaconda software by opening Anaconda Navigator or the Anaconda Prompt from the Start Menu Choose whether to register Anaconda as your default Python. Unless you plan to install and run multiple versions of Anaconda or multiple versions of Python, accept the default version and leave this box checked.
9. Click the Install button.
10. Click on the Next button.
11. And then click the Finish button.

Numpy:

NumPy (**Numerical Python**) is an open source Python library that's used in almost every field of science and engineering. It's the universal standard for working with numerical data in Python, and it's at the core of the scientific Python and PyData ecosystems. NumPy users include everyone from beginning coders to experienced researchers doing state-of-the-art scientific and industrial research and development. The NumPy API is used extensively in Pandas, SciPy, Matplotlib, scikit-learn, scikit-image and most other data science and scientific Python packages.

The NumPy library contains multidimensional array and matrix data structures (you'll find more information about this in later sections). It provides **ndarray**, a homogeneous n-dimensional array object, with methods to efficiently operate on it. 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.

Installing Numpy:

It get installed by using command :

```
pip install numpy
```

How to import NumPy

To access NumPy and its functions import it in your Python code like this:

```
import numpy as np
```

We shorten the imported name to np for better readability of code using NumPy. This is a widely adopted convention that you should follow so that anyone working with your code can easily understand it.

Creating NumPy Arrays:

NumPy is used to work with arrays. The array object in NumPy is 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)
```

Checking Dimensions of np array:

Eg:

```
import numpy as np
a = np.array(42)
b = np.array([1, 2, 3, 4, 5])
c = np.array([[1, 2, 3], [4, 5, 6]])
d = np.array([[[1, 2, 3], [4, 5, 6]], [[1, 2, 3], [4, 5, 6]]])
print(a.ndim)
print(b.ndim)
print(c.ndim)
print(d.ndim)
```

Methods for Creating Numpy arrays:

1. By using np.array()
2. By using np.zeros()/np.ones()/np.empty()/np.random()
3. By using np.arrange()
4. By using np.linspace()

Write example of each:

Conclusion:

In above manner we have studied to install anaconda and work on Numpy array creation