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Assignment -2

Q1 What Benefits Do (nested) Python Lists have over numpy arrays?

Ans. A Python list and a Numpy array having the same elements will be declared and an integer will be added to increment each element of the container by that integer value without statements. Numpy arrays takes less time for execution.

Advantages of using Numpy arrays over Python Lists:

- Consumes less memory.
- Fast as compared to the python list.
- Convenient to use.

Q2 Why are Numeric, Numarray and Numpy important?

Ans. Numpy has a syntax which is simultaneously compact, powerful and expressive. It allows users to manage data in vectors, matrices and higher dimensional arrays. Within these data structures, it allows users to:

- Access
- Manipulate
- Compute

The effort to obtain the first representation of a

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black hole was made possible, not only by the hard work and dedication of a team researchers but by the support of Numpy.
In the mid-90s two main packages were present in the scientific world:
- Numarray was an array processing package designed to efficiently manipulate large multi-dimensional arrays.
- Numeric was efficient for small-array handling and had a rich C API.

Q3 How can I use Numpy / Scipy to create 3D plots and visulizations?

Ans: To Create a 3D plot from a 3D numpy array, we can create 3D array using numpy and extract the x, y and z points.

- Create a new figure or activate an existing figure using figure() method.
- Add an '~.axes.Axes' to the figure as part of a subplot arrangement using add_subplot() method.
- Create a random data of size = (3, 3, 3).
- Extract x, y and z data from the 3D array.
- Plot 3D scattered points on the created axis.
- To display the figure, use show() method.

Q4 Can we Create a DataFrame with more than one facts kinds in Python? If yes, how will you do it?

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Ans. Pandas is a data analysis and manipulation library for Python. It provides numerous functions and methods for efficient data analysis. The core pandas object for storing data is called dataframe which consists of labelled rows and columns.

There are 4 different ways that can be used for creating a dataframe.

1. Csv or excel file

Csv is one of most frequently used file formats. The read_csv function is highly versatile. It has several parameters that allows for modifying the csv file while reading.

2. Numpy arrays

Since a dataframe can be considered as two-dimensional data structure, we can use a two-dimensional numpy array to create a data frame.

3. Dictionary

Python Dictionaries are also commonly used for creating dataframes. The keys represent the column names and the rows are filled with the values.

4. List

List is a built-in data structure in Python. It is

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represented as a collection of data points in square brackets. Lists can be used to store any data type or a mixture of different data types.

Q5 Write the difference Between Python Matplotlib and MATLAB.

As MATLAB

A high-level language and interactive environment for numerical computation, visualization and programming. Using MATLAB, you can analyze data, develop algorithms and create models and applications. The language, tools and built-in math functions enable you to explore multiple approaches and reach a solution faster than with spreadsheets or traditional programming languages such as C/C++ or Java.

Matplotlib

A plotting library for the Python Programming. It is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. It can be used in Python scripts, the Python and IPython shells, the Jupyter notebook, web application servers and four graphical user interface toolkits.

Q6 How we create 1D, 2D and 3D arrays in NumPy?

As 1D array creation:

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```
import numpy as np
one_d_list = [1,2,4]
one_d_arr = np.array(one_d_list)
print("1D array is :", one_d_arr)
```

2D array creation:

```
import numpy as np
two_d_list = [[1,3,3], [4,5,6]]
two_d_arr = np.array(two_d_list)
print("2D array is :", two_d_arr)
```

3D array creation:

```
import numpy as np
three_d_list = [[[1,2,3],[4,5,6], [7,8,9]]]
three_d_arr = np.array(three_d_list)
print("3D array is :", three_d_arr)
```


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