ARTIFICAL INTELLIGENCE CLASS -5

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Tuple

- A tuple is an ordered collection of values.
- **Tuples are a lot like lists:**
  - Tuples are ordered – Tuples maintains a left-to-right positional ordering among the items they contain.
  - Accessed by index – Items in a tuple can be accessed using an index.
  - Tuples can contain any sort of object – It can be numbers, strings, lists and even other tuples.
- **except:**
  - Tuples are immutable – we can't add, delete, or change items after the tuple is defined.
- To distinguish tuples from lists, tuples are denoted by parenthesis instead of square bracket as given below,

```
nums= (10, 20, 30) # A tuple of integers
T = ('red', 'green', 'blue') # A tuple of strings
vals=(1,34.6,True,[4,5],'apple',(12.6,78)) # A tuple with mixed datatypes
```

Tuple Cont'd

- Another difference between tuples and lists is that *tuples of one element* (Singleton Tuple) *must include a comma following the element.*
- Otherwise, the parenthesized element will not be made into a tuple, as shown below,

CORRECT	WRONG
>>> (234,)	>>> (234)
(234,)	234

```
>>> t=(123)
>>> print(type(t))
<class 'int'>
```

```
>>> t=(123,)
>>> print(type(t))
<class 'tuple'>
```

- **Syntactically, a tuple is just a comma-separated list of values**.
- We don't need the parentheses to create a tuple.
- It's the trailing commas that really define a tuple. But using parentheses doesn't hurt; also they help make the tuple more visible.

```
>>> t=123,
>>> print(type(t))
<class 'tuple'>
```

```
>>> T = 1, 'abc', 1.23, True  # A tuple without parentheses
>>> T
(1, 'abc', 1.23, True)
```

LIBRARIES IN PYTHON

A Python library is simply a collection of codes or modules of codes that we can use in a program for specific operations. We use libraries so that we don't need to write the code again in our program that is already available.

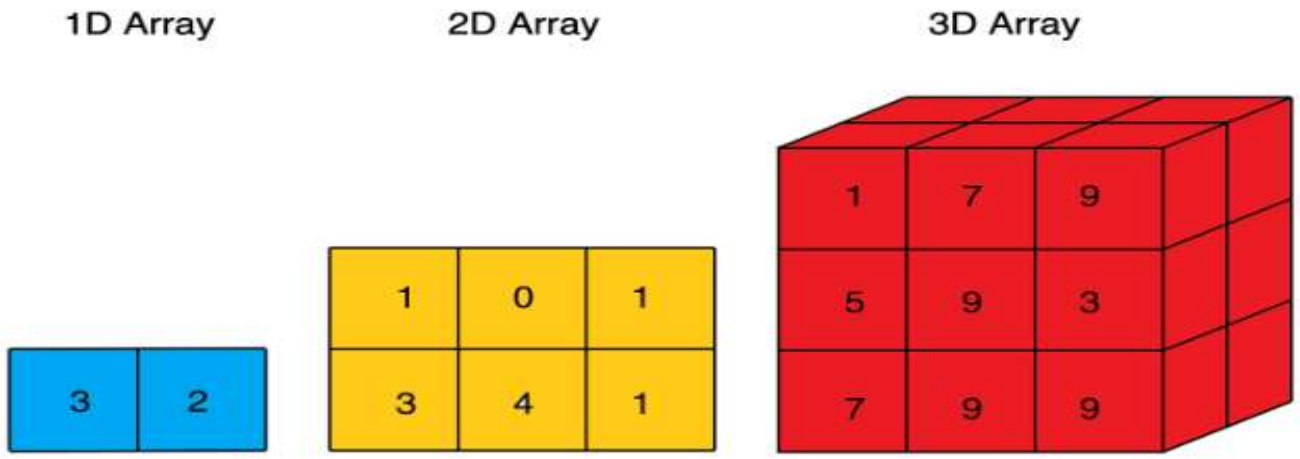
TYPES

- **Numpy:** The name “Numpy” stands for “Numerical Python”. It is the commonly used library. It is a popular machine learning library that supports large matrices and multi-dimensional data. It consists of in-built mathematical functions for easy computations.
- **Matplotlib**: This library is responsible for plotting numerical data. And that’s why it is used in data analysis. It is also an open-source library and plots high-defined figures like pie charts, histograms, scatterplots, graphs, etc.

- **Pandas**: Pandas are an important library for data scientists. It is an open-source machine learning library that provides flexible high-level data structures and a variety of analysis tools. It eases data analysis, data manipulation, and cleaning of data. Pandas support operations like Sorting, Re-indexing, Iteration, Concatenation, Conversion of data, Visualizations, Aggregations, etc.

NUMPY

- The main data structure of NumPy is the ndarray or n-dimensional array.
- The ndarray is a multidimensional container of elements of the **same type** as depicted below. It can easily deal with **matrix and vector operations**



Importing Numpy

Numpy library needs to be imported in the environment before it can be used as shown below. 'np' is the standard alias used for Numpy.

import numpy as np

- **Syntax: np.array(object, dtype)**
- object – A python object(for example, a list)
- dtype – data type of object (for example, integer)

Topics in numpy

1) CREATING
2) DATA TYPE
3) DIMENSION
4) SHAPE
5) RESHAPE
6) COMBINING
7) SLICING
8) MAXIMUM AND MINIMUM
9) WHERE
10) SORT

GOOGLE COLAB

https://colab.research.google.com/drive/1rBIiFASlN-8t4Qv2oipfnd-1OnVBb-Yt?usp=sharing

LIST

```
%%time
#Used to calculate total operation time
list1 = list(range(1,1000000))

list2 = list(range(2,1000001))

list3 = []

for i in range(len(list1)):
    list3.append(list1[i]+list2[i])


```

```
Wall time: 395 ms
```

NUMPY ARRAY

```
1. %%time
2. #Used to calculate total operation time
3. #Importing Numpy
4. import numpy as np
5. #Creating a numpy array of 1 million numbers
6. a = np.arange(1,1000000)
7. b = np.arange(2,1000001)
8. c = a+b
9.
```

```
Wall time: 12 ms
```