



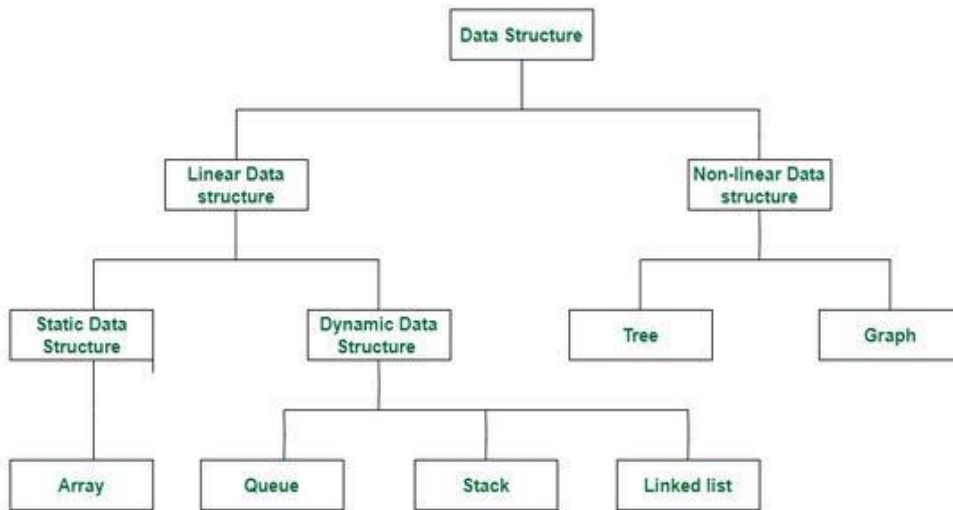
**Artificial Intelligence (Machine Learning & Deep Learning)
[Course]
Week 1 - Day 3**

**It is not about Theory, it is 20% Theory and 80% Practical –
Technical/Development/Programming [Mostly Python based]**

Data Structure

Data structures are the fundamental building blocks of computer programming. They define how data is organized, stored, and manipulated within a program. Understanding data structures is very important for developing efficient and effective algorithms.

Classification of Data Structure



References:

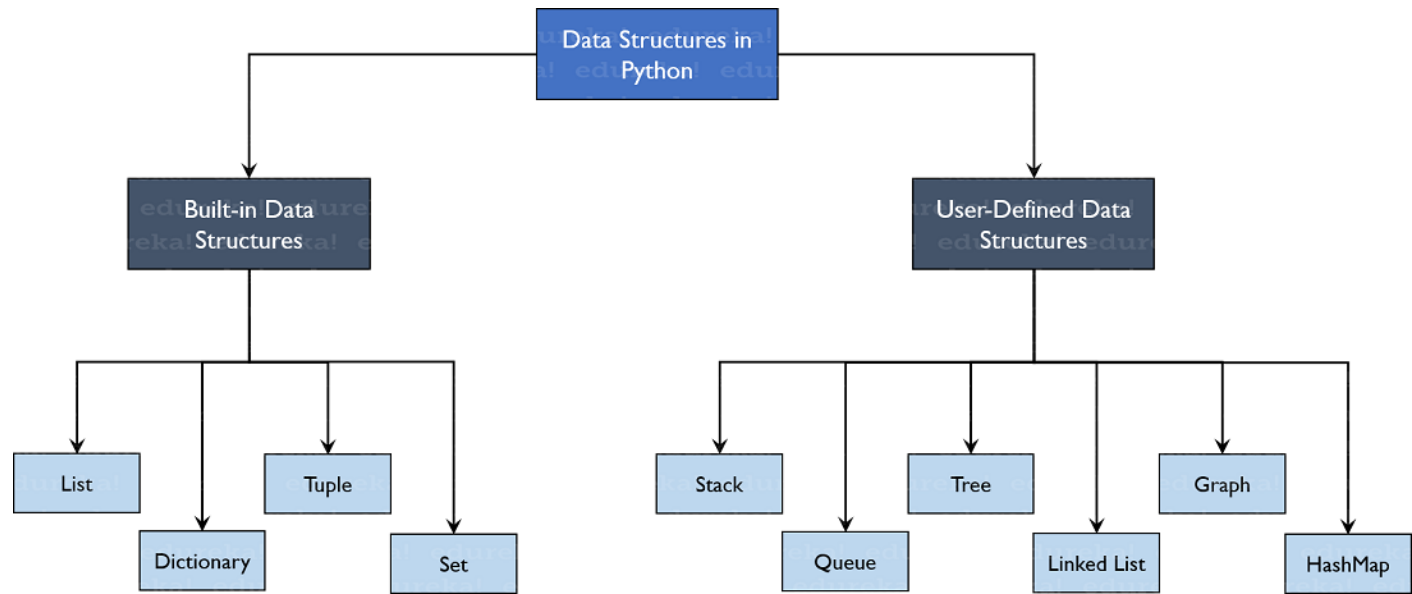
<https://www.geeksforgeeks.org/data-structures/>

<https://www.simplilearn.com/tutorials/data-structure-tutorial/what-is-data-structure>



python

Data Structure in Python



References:

<https://www.geeksforgeeks.org/python-data-structures/>

<https://docs.python.org/3/tutorial/datastructures.html>

<https://corporatefinanceinstitute.com/resources/data-science/python-data-structures/>

<https://www.edureka.co/blog/data-structures-in-python/>



Difference between mutable and immutable

VS	
MUTABLE DATA TYPES	IMMUTABLE DATA TYPES
1. Value assigned to a variable is modifiable	1. Value assigned to a variable is not modifiable
2. They are not quicker to access	2. They are quicker to access
3. Mutable Data types in Python <ol style="list-style-type: none">1. List2. Dictionary3. Set4. Bytearray Exception: Dictionary key	3. Immutable Data types in Python <ol style="list-style-type: none">1. Numeric2. String3. Tuple4. Boolean5. Frozenset6. Range7. Bytes

References:

<https://www.geeksforgeeks.org/mutable-vs-immutable-objects-in-python/>

<https://realpython.com/python-mutable-vs-immutable-types/>

<https://www.shiksha.com/online-courses/articles/difference-between-mutable-and-immutable-in-python/>



Python Lists

PYnative.com

List in Python

```
L = [ 20, 'Jessa', 35.75, [30, 60, 90] ]
```

\uparrow \uparrow \uparrow \uparrow

L[0] L[1] L[2] L[3]

- ✓ **Ordered:** Maintain the order of the data insertion.
- ✓ **Changeable:** List is mutable and we can modify items.
- ✓ **Heterogeneous:** List can contain data of different types
- ✓ **Contains duplicate:** Allows duplicates data

References:

https://www.w3schools.com/python/python_lists.asp

<https://www.programiz.com/python-programming/list>

<https://www.geeksforgeeks.org/python-lists/>

25

Exercises



python

Python Tuples

PYnative.com

Tuples in Python

```
T = ( 20, 'Jessa', 35.75, [30, 60, 90] )
```

↑
T[0]

↑
T[1]

↑
T[2]

↑
T[3]

- ✓ **Ordered:** Maintain the order of the data insertion.
- ✓ **Unchangeable:** Tuples are immutable and we can't modify items.
- ✓ **Heterogeneous:** Tuples can contains data of types
- ✓ **Contains duplicate:** Allows duplicates data

References:

https://www.w3schools.com/python/python_tuples.asp

<https://www.geeksforgeeks.org/tuples-in-python/>

<https://www.programiz.com/python-programming/tuple>

Exercises



python

Python Sets

Set in Python

PYnative.com

```
S = { 20, 'Jessa', 35.75 }
```

- ✓ **Unordered:** Set doesn't maintain the order of the data insertion.
- ✓ **Unchangeable:** Set are immutable and we can't modify items.
- ✓ **Heterogeneous:** Set can contains data of all types
- ✓ **Unique:** Set doesn't allows duplicates items

References:

https://www.w3schools.com/python/python_sets.asp

<https://www.programiz.com/python-programming/set>

<https://www.geeksforgeeks.org/sets-in-python/>

Exercises



python

Python Dictionaries

Dictionary in Python PYnative.com

Unordered collections of unique values stored in (Key-Value) pairs.

```
d = {'a': 10, 'b': 20, 'c': 30}
```

↑
d['a']

↑
d['b']

↑
d['c']

- ✓ **Unordered:** The items in dict are stored without any index value
- ✓ **Unique:** Keys in dictionaries should be Unique
- ✓ **Mutable:** We can add/Modify/Remove key-value after the creation

References:

https://www.w3schools.com/python/python_dictionaries.asp

<https://www.programiz.com/python-programming/dictionary>

<https://www.geeksforgeeks.org/python-dictionary/>

Exercises





Thank you - for listening and participating

- ☐ Questions / Queries
- ☐ Suggestions/Recommendation
- ☐ Ideas.....?

Shahzad Sarwar
Cognitive Convergence

<https://cognitiveconvergence.com>
shahzad@cognitiveconvergence.com

voice: +1 4242530744 (USA) +92-3004762901 (Pak)