Data Types and Data Structure

There many classification of these topics in internet;

Single list

Data types

Two list

Data types - Data Structure

Primitive – Non primitive (datacamp)

Some works take the array as data type, some of them take as data structure



Generally, data structures can be divided into two categories in computer science: primitive and non-primitive data structures. The former are the simplest forms of representing data, whereas the latter are more advanced: they contain the primitive data structures within more complex data structures for special purposes.

**1. Data Types** (Basic data types / Primitive data types)

These are the most primitive or the basic data structures. They are the building blocks for data manipulation and contain pure, simple values of a data. Python has four primitive variable types:

* Integers
* Float
* Strings
* Boolean

**Integers**

You can use an integer represent numeric data, and more specifically, whole numbers from negative infinity to infinity, like 4, 5, or -1.

**Float**

"Float" stands for 'floating point number'. You can use it for rational numbers, usually ending with a decimal figure, such as 1.11 or 3.14.

**String**

Strings are collections of alphabets, words or other characters. In Python, you can create strings by enclosing a sequence of characters within a pair of single or double quotes. For example: 'cake', "cookie", etc.

**Boolean**

This built-in data type that can take up the values: True and False, which often makes them interchangeable with the integers 1 and 0. Booleans are useful in conditional and comparison expressions

**2. Data Structures (Non-primitive data structure)**

* Arrays
* Lists
* Tuples
* Dictionary
* Sets
* Files

**Array**

This module defines an object type which can compactly represent an array of basic values: characters, integers, floating point numbers. Arrays are sequence types and behave very much like lists, except that the type of objects stored in them is constrained.[[1]](#footnote-1)

**List**

Lists in Python are used to store collection of heterogeneous items. These are mutable, which means that you can change their content without changing their identity. You can recognize lists by their square brackets [ and ] that hold elements, separated by a comma ,.

**Stacks**

A stack is a container of objects that are inserted and removed according to the Last-In-First-Out (LIFO) concept. Think of a scenario where at a dinner party where there is a stack of plates, plates are always added or removed from the top of the pile. In computer science, this concept is used for evaluating expressions and syntax parsing, scheduling algortihms/routines, etc.

**Queue**

A queue is a container of objects that are inserted and removed according to the First-In-First-Out (FIFO) principle. An excellent example of a queue in the real world is the line at a ticket counter where people are catered according to their arrival sequence and hence the person who arrives first is also the first to leave. Queues can be of many different kinds.

**Graphs**

A graph in mathematics and computer science are networks consisting of nodes, also called vertices which may or may not be connected to each other. The lines or the path that connects two nodes is called an edge. If the edge has a particular direction of flow, then it is a directed graph, with the direction edge being called an arc. Else if no directions are specified, the graph is called an undirected graph.

This may sound all very theoretical and can get rather complex when you dig deeper. However, graphs are an important concept specially in Data Science and are often used to model real life problems. Social networks, molecular studies in chemistry and biology, maps, recommender system all rely on graph and graph theory principles.

**Tree**

In computer science, trees are used to describe how data is sometimes organized, except that the root is on the top and the branches, leaves follow, spreading towards the bottom and the tree is drawn inverted compared to the real tree.

What is the difference between list and array?

**Tuples**

Tuples are another standard sequence data type. The difference between tuples and list is that tuples are immutable, which means once defined you cannot delete, add or edit any values inside it. This might be useful in situations where you might to pass the control to someone else but you do not want them to manipulate data in your collection, but rather maybe just see them or perform operations separately in a copy of the data.

**Dictionary**

Dictionaries are made up of key-value pairs. key is used to identify the item and the value holds as the name suggests, the value of the item.

**Sets**

Sets are a collection of distinct (unique) objects. These are useful to create lists that only hold unique values in the dataset. It is an unordered collection but a mutable one, this is very helpful when going through a huge dataset.

**Files**

Files are traditionally a part of data structures.

1. https://docs.python.org/3.4/library/array.html [↑](#footnote-ref-1)