Department of Computer Science and Engineering
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Lecture Notes
Python for Computational Problem Solving
UE23CS151A

Lecture #27
General introduction to Data Structures in Python

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Introduction to Data Structures in python

Data structure is a storage that is used to **store and organize data**. It is **a way of arranging data on a computer so that it can be accessed and updated efficiently**.

A specialized format for organizing and retrieval of data in an efficient way is known as Data Structure. There are several **basic and advanced data structures** that are used to arrange data to make it useful for a specific purpose. At their core, data structures are intended to frame information in a way that makes that information clear and easily accessible to both humans and machines.

Applications of Data Structures:

- In geology, used for making seismic surveys.
- Used for plotting graphs, and statistics and also to do scientific studies and research in almost different fields.
- Representing real-world data like the population of people, infant mortality rate, etc.
- For refraction and reflection in science optics.
- Electronic circuit and quantum physics.
- Media player.
- Mailing list.
- Symbol table creation.
- …

Broad Classification of Data Structures:

Generic Data Structures - This can be used to develop any Collections. There is no particular way to access elements. Example: List, Tuple

Specific Data Structures – Collections – There is some particular way in which element can be accessed. Example: Stack, Queue

Depending on how the data is depicted in memory, there are two types of Data structures.

Sequence – type Data Structures: Data is stored in a contiguous manner in the form of **list, tuple, str, unicode, buffer, xrange**. It can be accessed through index or subscript. This enables random access of elements

Non-Sequence type Data Structures: The elements in non-linear data structures are not in any sequence (no order). They are arranged in a **hierarchical manner** where one element will be connected to one or more elements. Data is stored in the form of **set, frozenset, dict.** This cannot be indexed and doesn't allow random access.

Common Operations on Sequence Type Data Structures:

- Homogenous and Heterogeneous data is allowed

- Supports membership operators such as in, not in

- Index operator [] is used have random access to elements

- Positive and negative indices allowed

- Relational Operators are supported

- Supports len(), max(), min(), count(), index()

- …