

Data Structures and Its Limitations

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Abstract

In this growing age of technology, computers play one of the most important roles. Be it medical surgeries to handling of huge power grids and power generation stations, all are controlled by computers. The most basic requirement of a computer to carry out its task is data. The data that is provided is initially in the raw form, but in order for it to work with other machinery that is required to carry out the task and produce an output the data needs to be structured. This structuring of data is done by some simple commands and algorithms termed as data structure. [1] This review paper aims at introducing different types of data structures as well as addressing the shortcomings of certain data structure. I will also try to point out certain improvements that can be carried out in certain data structures.

1 Introduction

DATA STRUCTURES: Data structure is a method of structuring of data for easy usage and retrieval. The basic aim of data structure is to collect data values at a single place, establish relationship between the data and the different functions and operations that can be carried out on the collected data. [2] The various types of data structures are mentioned below along with a brief introduction to each:-

LINEAR DATA STRUCTURE:

1. **Array:** - An array is the most basic data structure. It stores values adjacent to each other ie. Contiguous memory locations. The address of the data value next to the selected Data value can be easily retrieved by incrementing the address of the selected Data value by one. The data types of all elements in array are same. Real life example: - Array can be understood similar to a staircase where the first Stair is the base value of

the array and each and every subsequent data value is Similar to following stairs. Fig1. Basic structure of array 2. **Stack:** - Stack is a type of linear data structure ie. All the operations that are to be performed on the data values are done In a particular order. The order that may be Followed LIFO (Last in First Out) or FILO (First in Last Out). [5] In stack the data values are added on top of each other and so there is a top value that keeps a track on the number of elements present in the stack. Real life example: - Books vertically

placed on top of each other.

Mathematical expressions are introduced in standard way as in $\$x^2\$$ that appears as x^2 . Unnumbered expressions like

$$ax^2 + bx + c = 0$$

Numbered equations

$$E = mc^2 \quad (1)$$

2 Figures, Tables



FIGURE 2. NSTU view from LAL BUS

Tables are introduced as in the following example

TABLE I. True-false Table

p	q	$p \wedge q$
0	0	0
0	1	0
1	0	0
1	1	1

As usual, tables can be crossreferenced in the text I.