

Data Structures

Assignment 4

In and Out Place Sort

Submitted By : Sahil Sharma (SID:21104019)

Q 1) What is the difference between in place and out place sorting algorithm ?

Answer :

An "In-Place" sorting algorithm is algorithm whose space complexity lies between $O(1)$ and $O(\log n)$ both included.

We can say an in-place algorithm is an algorithm that does need a small extra space and produces an output in the same memory that contains the data by transforming the input 'in-place'. Where as an "Out-Place" sorting algorithm is algorithm whose space complexity is greater than $O(\log n)$.

Q 2)Implement Insertion sort in both (in-place and out-place) manner.?

Answer :

The insertion sort can be implemented in a various kind of ways .

The code has been Uploaded in the github repository

(https://github.com/Sahil-Sharma03/PEC_Data_Structures_Assignments)

Q 3) Suggest some practical examples of using in-place and out-place techniques.

Answer :

In-place techniques have lesser space complexity but are difficult to apply in algorithm whereas out-place techniques are easy to apply but increases the space complexity of algorithm.

For example if we want to reverse an array then its in-place algorithm will be swapping the first and last element of array until we reach the middle of array, If we want to solve the same problem using out-place algorithm we have to create one extra array of same size and copy elements of original array from back to the front of new array, this algorithm increases the space complexity to $O(n)$ as we have created an extra array.

IN-PLACE algorithm are used in Bubble sort, Selection Sort, Insertion Sort, Heapsort.

NOT IN-PLACE algorithm is used in Merge Sort, Because merge sort requires $O(n)$ extra space.