

\* Comparative study between Bubble sort and Insertion sort.

Insertion sort →

Insertion sort is the sorting mechanism where the sorted array is built having one item at a time. The array elements are compared with each other sequentially and then arranged simultaneously in some particular order. This sort works on the principle of inserting an element at a particular position, hence the name insertion sort.

Workn :-

1. The first step involves the comparison of the element in question with its adjacent element.
2. And if at every comparison reveal that the element in question can be inserted at a particular position, then space is created for it by shifting the other elements one position to the right and inserting the element at the suitable position.

3. The above procedure is repeated until all the elements in the array is at their apt position.

Example:-

25, 17, 31, 13, 2

0 → 1 2 3 4 ← from added  
25 17 31 13 2

17 25 31 13 2 ← from added

17 25 13 31 2 ← from added

17 13 25 31 2 ← from added

13 17 25 31 2 ← from added

13 17 25 2 31 ← from added

13 17 2 25 31 ← from added

13 2 17 25 31 ← from added

2 13 17 25 31 ← from added

2 13 17 25 31 ← from added

2 13 17 25 31 ← from added

Worst complexity  $\rightarrow n^2$

Average complexity  $\rightarrow n^2$

Best complexity  $\rightarrow n$

Bubble sort  $\rightarrow$

Bubble sort, sometimes referred to as sinking sort, is a simple sorting algorithm that repeatedly steps through the list, compares adjacent elements and swaps them if they are in the wrong order. The pass through the list is repeated until the list is sorted.

Worst complexity  $\rightarrow n^2$

Average complexity  $\rightarrow n^2$

Best complexity  $\rightarrow n$

An example of bubble sort. Starting from the beginning of the list, compare every adjacent pair, swap their position if they are not in the right order (the latter one is smaller than the former one). After each iteration, one less

lement (the last one) is needed to be compared until there are no more elements left to be compared.

5 3 1 8 7 6 4

3 5 1 8 7 6

3 1 5 8 7 6

3 1 5 7 8 6

3 1 5 7 6 8 4

3 1 5 7 6 4 8

1 3 5 7 6 4 8

1 3 5 6 7 4 8

1 3 5 6 4 7 8

1 3 5 4 6 7 8

1 3 5 4 6 7 8

1 3 4 5 6 7 8

Even other  $O(n^2)$  sorting algorithms, such as insertion sort, generally run faster than bubble sort and are no more complex. Therefore, bubble sort is not a practical sorting algorithm.

The only significant advantage that bubble sort has over most other algorithms, even quicksort but not insertion sort, is that the ability to detect that the list is sorted efficiently is built into the algorithm. Insertion sort performs better on a list that is substantially sorted (having a small number of inversions.)

Bubble sort should be avoided in the case of large collections. It will not be efficient in the case of a reverse-ordered ordered collection.