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Insertion sort

Insertion sort is a sorting algorithm that places an unsorted element at its suitable place in each iteration. Insertion sort is based on the idea that one element from the input elements is consumed in each iteration to find its correct position thus the position to which it belongs in a sorted array. This sort works on the principle of inserting an element at a particular position, hence the name Insertion Sort.

It iterates the input elements by growing the sorted array at each iteration. It compares the current element with the largest value in the sorted array. If the current element is greater, then it leaves the element in its place and moves on to the next element else it finds its correct position in the sorted array and moves it to that position. This is done by shifting all the elements, which are larger than the current element, in the sorted array to one position ahead

Characteristics of Insertion Sort

1. It is efficient for smaller data sets, but very inefficient for larger lists.
2. Insertion Sort is adaptive, that means it reduces its total number of steps if a partially sorted array is provided as input, making it efficient.
3. It is better than Selection Sort and Bubble Sort algorithms.
4. Its space complexity is less. Like bubble Sort, insertion sort also requires a single additional memory space.
5. It is a **stable** sorting technique, as it does not change the relative order of elements which are equal.

How insertion sort works

The first element in the array is assumed to be sorted.

Take the second element and store it separately in a key.

Compare key with the first element. If the first element is greater than key, then key is placed in front of the first element. Now, the first two elements are sorted.

Take the third element and compare it with the elements on the left of it. Placed it just behind the element smaller than it. If there is no element smaller than it, then place it at the beginning of the array. place every unsorted element at its correct position