

Criteria for Analysis of Sorting Algorithm:

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→ Time Complexity:

→ We observe the time complexity of an algorithm to see which algorithm works efficiently for larger data sets and which algorithm works faster with smaller data sets.

→ In general, $O(N \log N)$ is considered a better algorithm time complexity than $O(N^2)$, and most of our algorithms' time complexity revolves around these two.

NOTE: Lesser the time complexity, the better is the algorithm.

→ Space Complexity:

→ The space complexity criteria helps us compare the space the algorithm uses to sort any data set. If an algorithm consumes a lot of space for larger inputs, it is considered a poor algorithm for sorting large data sets.

In some cases, we might prefer a higher space complexity algorithm if it proposes exceptionally low time complexity, but not in general.

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→ And when we talk about space complexity, the term in-place sorting algorithm arises. The algorithm which results in constant space complexity is called an in-place sorting algorithm. Inplace sorting algorithm mostly use swapping and rearranging techniques to sort a data set. One example is Bubble Sort.

→ Stability :

The stability of an algorithm is judged by the fact whether the order of the elements having equal status when sorted on some basis is preserved or not.

→ Suppose you have a set of numbers, 6, 1, 2, 7, 6 and we want to sort them in \uparrow ing order by using an algorithm. Then the result would be 1, 2, 6, 6, 7.

But the key thing to look at is whether the 6s follow the same order as the given in the input or they have changed.

That is, whether the first 6 still comes before the second 6 or not. If they do, then the algorithm we followed is called stable, otherwise unstable.

→ Internal & External Sorting Algorithms :

→ When the algorithm loads the data set into the memory (RAM), we say the algorithm follows internal sorting methods. In contrast, we say it follows the external sorting methods when the data doesn't get loaded into the memory.

→ Adaptivity:

→ Algorithms that adapt to the fact that if the data are already sorted and it must take less time are called adaptive algorithms. And algorithms which do not adapt to this situation are not adaptive.

→ Recursiveness:

→ If the algorithm uses recursion to sort a data set, then it is called a recursive algorithm. Otherwise, non-recursive.