

Linear Vs Binary Search

Linear Search

Searches for an element by visiting all the elements sequentially until the element is found.

$\begin{array}{c} 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \\ \boxed{7} \quad \boxed{10} \quad \boxed{2} \quad \boxed{9} \quad \boxed{11} \quad \boxed{21} \quad \boxed{3} \end{array} \Rightarrow \text{can be sorted or unsorted}$

Search '2' \rightarrow Element found WC Complexity: $O(n)$

Binary Search

Searches for an element by breaking the search space into half in a sorted array.

$\begin{array}{c} 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \\ \boxed{8} \quad \boxed{9} \quad \boxed{11} \quad \boxed{18} \quad \boxed{22} \quad \boxed{31} \quad \boxed{88} \end{array}$

$\begin{array}{c} \uparrow \quad \quad \quad \uparrow \quad \quad \quad \uparrow \\ \text{Low} \quad \quad \text{Mid} \quad \quad \text{High} \end{array} \quad \text{WC Complexity } O(\log n)$

Search 18

The search continues towards either side of mid based on whether the element to be searched is lesser or greater than mid.

Linear Search

Binary Search

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|----|--|-----------------------------|
| 1. | Works on both sorted and unsorted arrays | Works only on sorted arrays |
| 2. | Equality operations | inequality operations |
| 3. | $O(n)$ WC complexity | $O(\log n)$ WC complexity |