**SEARCHING ALGORITHMS**

**Searching algorithms** are essential tools in computer science used to locate specific items within a collection of data. These algorithms are designed to efficiently navigate through data structures to find the desired information, making them fundamental in various applications such as **databases, web search engines**, and more.

**Basics :**

* [Linear Search](https://www.geeksforgeeks.org/linear-search/)
* [Binary Search](https://www.geeksforgeeks.org/binary-search/)
* [Two Pointers Technique](https://www.geeksforgeeks.org/two-pointers-technique/)

**Library Implementations of Binary Search**

* [binary\_search, lower\_bound and upper\_bound in C++](https://www.geeksforgeeks.org/binary-search-functions-in-c-stl-binary_search-lower_bound-and-upper_bound/)
* [Arrays.binarySearch() in Java](https://www.geeksforgeeks.org/arrays-binarysearch-java-examples-set-1/)
* [Arrays.binarySearch() in Java for Search in subarray](https://www.geeksforgeeks.org/arrays-binarysearch-in-java-with-examples-set-2-search-in-subarray/)
* [Collections.binarySearch() in Java](https://www.geeksforgeeks.org/collections-binarysearch-java-examples/)
* [Bisect in Python](https://www.geeksforgeeks.org/bisect-algorithm-functions-in-python/)
* [List.BinarySearch in C#](https://www.geeksforgeeks.org/list-binarysearch-method-in-c-sharp/)

**Easy Problems**

* [Largest in an Array](https://www.geeksforgeeks.org/program-to-find-largest-element-in-an-array/)
* [Second Largest in an array](https://www.geeksforgeeks.org/find-second-largest-element-array/)
* [Largest three in an array](https://www.geeksforgeeks.org/find-the-largest-three-elements-in-an-array/)
* [Missing Number](https://www.geeksforgeeks.org/find-the-missing-number/)
* [First Repeating](https://www.geeksforgeeks.org/find-first-repeating-element-array-integers/)
* [Missing and Repeating](https://www.geeksforgeeks.org/find-a-repeating-and-a-missing-number/)
* [Count 1’s in a sorted binary array](https://www.geeksforgeeks.org/count-1s-sorted-binary-array/)
* [Closest to 0 Sum Pair](https://www.geeksforgeeks.org/two-elements-whose-sum-is-closest-to-zero/)
* [Pair with the given difference](https://www.geeksforgeeks.org/find-a-pair-with-the-given-difference/)
* [k largest(or smallest) Elements](https://www.geeksforgeeks.org/k-largestor-smallest-elements-in-an-array/)
* [Kth smallest in row and column-wise sorted](https://www.geeksforgeeks.org/kth-smallest-element-in-a-row-wise-and-column-wise-sorted-2d-array/)
* [Common elements in 3 sorted](https://www.geeksforgeeks.org/find-common-elements-three-sorted-arrays/)
* [Ceiling in a sorted](https://www.geeksforgeeks.org/ceiling-in-a-sorted-array/)
* [Floor in a Sorted](https://www.geeksforgeeks.org/floor-in-a-sorted-array/)
* [Maximum in a Bitonic](https://www.geeksforgeeks.org/find-the-maximum-element-in-an-array-which-is-first-increasing-and-then-decreasing/)
* [Elements that appear more than n/k times](https://www.geeksforgeeks.org/given-an-array-of-of-size-n-finds-all-the-elements-that-appear-more-than-nk-times/)

**Medium Problems**

* [Triplets with zero sum](https://www.geeksforgeeks.org/find-triplets-array-whose-sum-equal-zero/)
* [Partition Point](https://www.geeksforgeeks.org/find-the-element-before-which-all-the-elements-are-smaller-than-it-and-after-which-all-are-greater-than-it/)
* [Largest pair sum](https://www.geeksforgeeks.org/find-the-largest-pair-sum-in-an-unsorted-array/)
* [K’th Smallest in Unsorted Array](https://www.geeksforgeeks.org/kth-smallest-largest-element-in-unsorted-array/)
* [Search an in a sorted and rotated](https://www.geeksforgeeks.org/search-an-element-in-a-sorted-and-pivoted-array/)
* [Min in a sorted and rotated](https://www.geeksforgeeks.org/find-minimum-element-in-a-sorted-and-rotated-array/)
* [Max in a sorted and rotated](https://www.geeksforgeeks.org/maximum-element-in-a-sorted-and-rotated-array/)
* [Peak element](https://www.geeksforgeeks.org/find-a-peak-in-a-given-array/)
* [Max and min using minimum comparisons](https://www.geeksforgeeks.org/maximum-and-minimum-in-an-array/)
* [Find a Fixed Point in a given array](https://www.geeksforgeeks.org/find-a-fixed-point-in-a-given-array/)
* [K most frequent words from a file](https://www.geeksforgeeks.org/find-the-k-most-frequent-words-from-a-file/)
* [K closest elements](https://www.geeksforgeeks.org/find-k-closest-elements-given-value/)
* [2 Sum – Pair Sum Closest to Target in Sorted Array](https://www.geeksforgeeks.org/given-sorted-array-number-x-find-pair-array-whose-sum-closest-x/)
* [Closest pair from two sorted arrays](https://www.geeksforgeeks.org/given-two-sorted-arrays-number-x-find-pair-whose-sum-closest-x/)
* [Three closest from three sorted arrays](https://www.geeksforgeeks.org/find-three-closest-elements-from-given-three-sorted-arrays/)
* [Binary Search for Rationals](https://www.geeksforgeeks.org/binary-search-for-rational-numbers-without-using-floating-point-arithmetic/)
* [Missing Element in AP](https://www.geeksforgeeks.org/find-missing-number-arithmetic-progression/)

**Hard Problems**

* [Median of two sorted arrays](https://www.geeksforgeeks.org/median-of-two-sorted-arrays/)
* [Median of two sorted of different sizes](https://www.geeksforgeeks.org/median-of-two-sorted-arrays-of-different-sizes/)
* [Search in an almost sorted array](https://www.geeksforgeeks.org/search-almost-sorted-array/)
* [Search in a sorted infinite array](https://www.geeksforgeeks.org/find-position-element-sorted-array-infinite-numbers/)
* [Pair sum in a sorted and rotated array](https://www.geeksforgeeks.org/given-a-sorted-and-rotated-array-find-if-there-is-a-pair-with-a-given-sum/)
* [K’th Smallest/Largest Element in Unsorted Array](https://www.geeksforgeeks.org/kth-smallest-largest-element-in-unsorted-array-worst-case-linear-time/)
* [K’th largest element in a stream](https://www.geeksforgeeks.org/kth-largest-element-in-a-stream/)
* [Best First Search (Informed Search)](https://www.geeksforgeeks.org/best-first-search-informed-search/)

**More Searching Algorithms**

* [Sentinel Linear Search](https://www.geeksforgeeks.org/sentinel-linear-search/)
* [Meta Binary Search | One-Sided Binary Search](https://www.geeksforgeeks.org/meta-binary-search-one-sided-binary-search/)
* [Ternary Search](https://www.geeksforgeeks.org/ternary-search/)
* [Jump Search](https://www.geeksforgeeks.org/jump-search/)
* [Interpolation Search](https://www.geeksforgeeks.org/interpolation-search/)
* [Exponential Search](https://www.geeksforgeeks.org/exponential-search/)
* [Fibonacci Search](https://www.geeksforgeeks.org/fibonacci-search/)
* [The Ubiquitous Binary Search](https://www.geeksforgeeks.org/the-ubiquitous-binary-search-set-1/)

**Comparisons Between Different Searching Algorithms**

* [Linear Search vs Binary Search](https://www.geeksforgeeks.org/linear-search-vs-binary-search/)
* [Interpolation search vs Binary search](https://www.geeksforgeeks.org/g-fact-84/)
* [Why is Binary Search preferred over Ternary Search?](https://www.geeksforgeeks.org/binary-search-preferred-ternary-search/)
* [Is Sentinel Linear Search better than normal Linear Search?](https://www.geeksforgeeks.org/is-sentinel-linear-search-better-than-normal-linear-search/)

SORTING ALGORITHMS

A **Sorting Algorithm** is used to rearrange a given array or list of elements in an order. Sorting is provided in library implementation of most of the programming languages.

**Basics of Sorting Algorithms:**

* [Introduction to Sorting](https://www.geeksforgeeks.org/introduction-to-sorting-algorithm/)
* [Applications of Sorting](https://www.geeksforgeeks.org/applications-advantages-and-disadvantages-of-sorting-algorithm/)

**Sorting Algorithms:**

Comparison Based : [Selection Sort](https://www.geeksforgeeks.org/selection-sort/), [Bubble Sort](https://www.geeksforgeeks.org/bubble-sort/), [Insertion Sort](https://www.geeksforgeeks.org/insertion-sort/), [Merge Sort](https://www.geeksforgeeks.org/merge-sort/), [Quick Sort](https://www.geeksforgeeks.org/quick-sort/), [Heap Sort](https://www.geeksforgeeks.org/heap-sort/), [Cycle Sort](https://www.geeksforgeeks.org/cycle-sort/), [3-way Merge Sort](https://www.geeksforgeeks.org/3-way-merge-sort/)  
Non Comparison Based : [Counting Sort](https://www.geeksforgeeks.org/counting-sort/), [Radix Sort](https://www.geeksforgeeks.org/radix-sort/), [Bucket Sort](https://www.geeksforgeeks.org/bucket-sort-2/), [TimSort](https://www.geeksforgeeks.org/timsort/" \t "_blank), [Comb Sort](https://www.geeksforgeeks.org/comb-sort/), [Pigeonhole Sort](https://www.geeksforgeeks.org/pigeonhole-sort/)  
Hybrid Sorting Algorithms : [IntroSort](https://www.geeksforgeeks.org/introsort-cs-sorting-weapon/" \t "_blank), [Tim Sort](https://www.geeksforgeeks.org/timsort/)

**Library Implementations:**

* [qsort() in C](https://www.geeksforgeeks.org/comparator-function-of-qsort-in-c/)
* [sort() in C++ STL](https://www.geeksforgeeks.org/sort-c-stl/)
* [Arrays.sort() in Java with examples](https://www.geeksforgeeks.org/arrays-sort-in-java-with-examples/)
* [Collections.sort() in Java with Examples](https://www.geeksforgeeks.org/collections-sort-java-examples/)
* [Sort a List in Python](https://www.geeksforgeeks.org/sort-a-list-in-python/)
* [Sorting in JavaScript](https://www.geeksforgeeks.org/javascript-array-sort-method/)

**Easy Problems on Sorting:**

* [Check if an array is Sorted](https://www.geeksforgeeks.org/program-check-array-sorted-not-iterative-recursive/)
* [Sort an array of two types](https://www.geeksforgeeks.org/sort-array-containing-two-types-elements/)
* [Sort a String](https://www.geeksforgeeks.org/sort-string-characters/)
* [Sort Each Row of a Matrix](https://www.geeksforgeeks.org/row-wise-sorting-2d-array/)
* [Sort a Matrix](https://www.geeksforgeeks.org/sort-given-matrix/)
* [Sort a Linked List](https://www.geeksforgeeks.org/sorting-a-singly-linked-list/)
* [Sort in Wave Form](https://www.geeksforgeeks.org/sort-array-wave-form-2/)
* [Sort by Frequency](https://www.geeksforgeeks.org/sort-elements-by-frequency/)
* [Sort from Different Machines](https://www.geeksforgeeks.org/sort-numbers-stored-on-different-machines/)
* [Check if any two intervals overlap](https://www.geeksforgeeks.org/check-if-any-two-intervals-overlap-among-a-given-set-of-intervals/)
* [Missing elements of a range](https://www.geeksforgeeks.org/find-missing-elements-of-a-range/)
* [Sort by set bits counts](https://www.geeksforgeeks.org/sort-array-according-count-set-bits/)
* [Sort even and odd placed in different orders](https://www.geeksforgeeks.org/sort-even-placed-elements-increasing-odd-placed-decreasing-order/)
* [Sorting Big Integers](https://www.geeksforgeeks.org/sorting-big-integers/)
* [Sort strings by lengths](https://www.geeksforgeeks.org/sort-array-strings-according-string-lengths/)
* [Merge Two Sorted Arrays](https://www.geeksforgeeks.org/merge-two-sorted-arrays/)
* [Sort when two halves are sorted](https://www.geeksforgeeks.org/sort-array-two-halves-sorted/)
* [2 Sum - Pair in a Sorted Array](https://www.geeksforgeeks.org/pair-with-given-sum-in-sorted-array-two-sum-ii/)
* [Intersection of two sorted arrays](https://www.geeksforgeeks.org/intersection-of-two-sorted-arrays/)
* [Union of two sorted arrays](https://www.geeksforgeeks.org/union-of-two-sorted-arrays/)
* [Meeting Rooms](https://www.geeksforgeeks.org/meeting-rooms-check-if-a-person-can-attend-all-meetings/)

**Medium Problems on Sorting:**

* [Minimum Increments to Make Unique](https://www.geeksforgeeks.org/minimum-increment-operations-to-make-array-unique/)
* [Merge Overlapping Intervals](https://www.geeksforgeeks.org/merging-intervals/)
* [Minimum Platforms](https://www.geeksforgeeks.org/minimum-number-platforms-required-railwaybus-station/)
* [Closest Pair of Elements](https://www.geeksforgeeks.org/closest-pair-of-points-using-divide-and-conquer-algorithm/)
* [Closest Pair of Points](https://www.geeksforgeeks.org/closest-pair-of-points-using-divide-and-conquer-algorithm/)
* [Chocolate Distribution Problem](https://www.geeksforgeeks.org/chocolate-distribution-problem/)
* [Min and Max Amount to Buy All](https://www.geeksforgeeks.org/find-minimum-maximum-amount-buy-n-candies/)
* [Three Way Partitioning](https://www.geeksforgeeks.org/three-way-partitioning-of-an-array-around-a-given-range/)
* [Sort an array of 0s, 1s and 2s](https://www.geeksforgeeks.org/sort-an-array-of-0s-1s-and-2s/)
* [Sort a linked list of 0s, 1s and 2s](https://www.geeksforgeeks.org/sort-a-linked-list-of-0s-1s-or-2s/)
* [Inversion count](https://www.geeksforgeeks.org/inversion-count-in-array-using-merge-sort/)
* [K-th Smallest Element](https://www.geeksforgeeks.org/k-largestor-smallest-elements-in-an-array/)
* [K Smallest Elements](https://www.geeksforgeeks.org/k-largestor-smallest-elements-in-an-array/)
* [3 Sum - Find Any](https://www.geeksforgeeks.org/find-a-triplet-that-sum-to-a-given-value/)
* [3 Sum - Closest Triplet](https://www.geeksforgeeks.org/find-a-triplet-in-an-array-whose-sum-is-closest-to-a-given-number/)
* [Smallest Difference Triplet from Three arrays](https://www.geeksforgeeks.org/smallest-difference-triplet-from-three-arrays/)
* [Merge K Sorted Arrays](https://www.geeksforgeeks.org/merge-k-sorted-linked-lists/)
* [Merge K Sorted Linked Lists](https://www.geeksforgeeks.org/merge-k-sorted-linked-lists/)
* [Min Unsorted Subarray to make array sorted](https://www.geeksforgeeks.org/minimum-length-unsorted-subarray-sorting-which-makes-the-complete-array-sorted/)
* [Sort a nearly sorted array](https://www.geeksforgeeks.org/nearly-sorted-algorithm/)
* [Sort n numbers in range from 0 to n^2 – 1](https://www.geeksforgeeks.org/sort-n-numbers-range-0-n2-1-linear-time/)
* [Sort an array of 1 to n](https://www.geeksforgeeks.org/sort-array-contain-1-n-values/)
* [Sort according to order defined by another](https://www.geeksforgeeks.org/sort-array-according-order-defined-another-array/)
* [Maximum intervals overlap](https://www.geeksforgeeks.org/find-the-point-where-maximum-intervals-overlap/)
* [Permutation with worst Case of Merge Sort](https://www.geeksforgeeks.org/find-a-permutation-that-causes-worst-case-of-merge-sort/)
* [Minimum swaps to make two arrays identical](https://www.geeksforgeeks.org/minimum-swaps-to-make-two-array-identical/)
* [Permute two arrays such that all pair suns are greater than K](https://www.geeksforgeeks.org/permute-two-arrays-sum-every-pair-greater-equal-k/)
* [Bucket Sort To Sort an Array with Negative Numbers](https://www.geeksforgeeks.org/bucket-sort-to-sort-an-array-with-negative-numbers/)
* [Convert an Array to reduced form using Vector of pairs](https://www.geeksforgeeks.org/convert-an-array-to-reduced-form-using-vector-of-pairs/)
* [Check if array can be sorted with conditional swapping of adjacent](https://www.geeksforgeeks.org/check-possible-sort-array-conditional-swapping-adjacent-allowed/)
* [4 Sum - Find Any](https://www.geeksforgeeks.org/4-sum-find-any-quadruplet-having-given-sum/) [More problems an 4 Sum are in Hard Section]

**Hard Problems on Sorting:**

* [Merge Without Extra Space](https://www.geeksforgeeks.org/merge-two-sorted-arrays-o1-extra-space/)
* [Top K Frequent Elements](https://www.geeksforgeeks.org/find-k-numbers-occurrences-given-array/)
* [3 Sum - Distinct Triplets](https://www.geeksforgeeks.org/unique-triplets-sum-given-value/)
* [4 Sum - Distinct Quadruples](https://www.geeksforgeeks.org/find-four-elements-that-sum-to-a-given-value-set-2/)
* [4 Sum - All Quadruples](https://www.geeksforgeeks.org/4-sum-find-a-quadruplet-with-closest-sum/)
* [4 Sum - Closest Quadruple](https://www.geeksforgeeks.org/4-sum-find-a-quadruplet-with-closest-sum/)
* [Surpasser Counts in an Array](https://www.geeksforgeeks.org/find-surpasser-count-of-each-element-in-array/)
* [Count distinct occurrences as a subsequence](https://www.geeksforgeeks.org/count-distinct-occurrences-as-a-subsequence/)
* [Minimum consecutive number subsets](https://www.geeksforgeeks.org/count-minimum-number-subsets-subsequences-consecutive-numbers/)
* [Minimum swaps for Binary Tree to BST](https://www.geeksforgeeks.org/minimum-swap-required-convert-binary-tree-binary-search-tree/)
* [K-th smallest element after removing some integers from natural numbers](https://www.geeksforgeeks.org/k-th-smallest-element-removing-integers-natural-numbers/)
* [Max frequency diff such greater freq item is also is also greater](https://www.geeksforgeeks.org/maximum-difference-between-frequency-of-two-elements-such-that-element-having-greater-frequency-is-also-greater/)
* [Min swaps to reach permuted array with at most 2 positions left swaps allowed](https://www.geeksforgeeks.org/minimum-swaps-reach-permuted-array-2-positions-left-swaps-allowed/)
* [Making Array Elements Same](https://www.geeksforgeeks.org/find-whether-possible-make-array-elements-using-one-external-number/)
* [Sort an array after applying an equation](https://www.geeksforgeeks.org/sort-array-applying-given-equation/)
* [Array of strings in sorted order without copying strings](https://www.geeksforgeeks.org/print-array-strings-sorted-order-without-copying-one-string-another/)