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AD 325

Bubble Sort

Time Complexity

Bubble sort has a time complexity of O(n^2) in the average and worst case scenarios. The reason for this complexity is the nested loops. The outer loop iterates through all elements of the array and the inner loop iterates from 0 to n - i - 1, where i is the current iteration of the outer loop. Within the inner loop comparisons and swaps are performed. Worst case scenario is the array being in reversed order.

Space Complexity

Bubble sort has a complexity of O(1) because it sorts the array in place without requiring additional memory proportional to the size of the input array. It uses a constant amount of additional memory for variables such as “swapped” and “in”.

Stability

Bubble sort is a stable algorithm because it only swaps adjacent elements of they are out of order. It does not changes the relative order of equal elements. If there are two equal elements in the array it will not swap their positions unless one is greater than the other.

Optimization

The optimized version of bubble sort can reduce the number of passes through the array by detecting if the array is already sorted earlier in the process.