Selection Sort Algorithm

Code and Analysis

Selection Sort Algorithm

Definition:

Selection Sort is a comparison-based sorting algorithm that repeatedly selects the smallest (or largest) element from the unsorted portion of the array and swaps it with the first unsorted element. This process continues until the entire array is sorted.

Algorithm Steps:

1- Start from the first element and assume it as the minimum.

2- Iterate through the unsorted part of the array to find the actual minimum.

3- Swap the minimum element with the first unsorted element.

4- Move to the next unsorted element and repeat the process.

5- Continue until the array is completely sorted.

Time Complexity:

Best Case (Already Sorted): O(n^2)

Worst Case (Reverse Sorted): O(n^2)

Average Case: O(n^2)

Space Complexity:

Auxiliary Space: O(1) (in-place sorting algorithm, requiring no extra space)

Code Implementation (Python):

```python
def selection_sort(arr):
    for i in range(0, len(arr)):
        min_index = i
        for j in range(i + 1, len(arr)):
            if arr[j] < arr[min_index]:
                min_index = j
        arr[i], arr[min_index] = arr[min_index], arr[i]
    return arr
```