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Bubble Sort Algorithm

Bubble sort algorithm is one of the simplest sorting algorithms that works by repeatedly sorting the adjacent elements if they are not in the correct order.

For example, we take an array of integers {5, 1, 4, 2, 8} and try to sort it in ascending order using bubble sort algorithm. It will be completed in three passes as shown below:

**First Pass**

( **5** **1** 4 2 8 ) → ( **1** **5** 4 2 8 )

( 1 **5** **4** 2 8 ) → ( 1 **4** **5** 2 8 )

( 1 4 **5** **2** 8 ) → ( 1 4 **2** **5** 8 )

( 1 4 2 **5** **8** ) → ( 1 4 2 **5** **8** )

**Second Pass**

( **1** **4** 2 5 8 ) → ( **1** **4** 2 5 8 )

( 1 **4** **2** 5 8 ) → ( 1 **2** **4** 5 8 )

( 1 2 **4** **5** 8 ) → ( 1 2 **4** **5** 8 )

( 1 2 4 **5** **8** ) → ( 1 2 4 **5** **8** )

**Third Pass**

( **1** **2** 4 5 8 ) → ( **1** **2** 4 5 8 )

( 1 **2** **4** 5 8 ) → ( 1 **2** **4** 5 8 )

( 1 2 **4** **5** 8 ) → ( 1 2 **4** **5** 8 )

( 1 2 4 **5** **8** ) → ( 1 2 4 **5** **8** )

Bubble Sort (Pseudocode)

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| public static void sort (double[] a) { while (array a is not sorted) { for (each adajacent pair of items) { if (the pair of items are out of order) { swap the pair of items  }  }  }  } |

Bubble Sort (Implementation in C++)

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| #include<iostream> using namespace std;  void swapping(int &a, int &b) { *// swap the content of a and b* int temp; temp = a; a = b; b = temp;  } void display(int \*array, int size) { for(int i = 0; i<size; i++) { cout << array[i] << " ";  } cout << endl;  } void bubbleSort(int \*array, int size) { for(int i = 0; i<size; i++) { int swaps = 0; *//flag to detect any swap is there or not* for(int j = 0; j<size-i-1; j++) { if(array[j] > array[j+1]) { *//when the current item is bigger than next* swapping(array[j], array[j+1]); swaps = 1; *//set swap flag*  } } if(!swaps) break; *// No swap in this pass, so array is sorted* }  } int main() { int n;  cout << "Enter the number of elements: "; cin >> n;  int arr[n]; *//create an array with given number of elements*  cout << "Enter elements:" << endl; for(int i = 0; i<n; i++) { |
| cin >> arr[i];  } cout << "Array before Sorting: "; display(arr, n); bubbleSort(arr, n);  cout << "Array after Sorting: "; display(arr, n);  } |