

### 3. Bubble Sort:-

- Bubble Sort is a simple Sorting Algorithm.
- It works by comparing each pair of adjacent items and swapping them if they are in the wrong order.
- This algorithm is not suitable for large data sets as its average and worst case complexity are of  $O(n^2)$  where  $n$  is the number of items.

#### How it works:-

1. Starting with the first element (index = 0), compare the current element with the next element of the array.
2. If the current element is greater than the next element of the array, swap them.
3. If the current element is less than the next element, move to the next element.  
Repeat Step 1.

## \* Algorithm

Suppose arr is an array of  $n$  elements -  
The assumed swap function in the algorithm will swap the values of given array elements

```
* BubbleSort (arr)
  for all array elements
    if arr[i] > arr[i+1]
      swap(arr[i], arr[i+1])
    end if
  end for
  return arr
end BubbleSort
```

## \* Complexity

Time Complexity	Space Complexity
Best Case $O(n)$	$O(1)$
Average Case $O(n^2)$	
Worst Case $O(n^2)$	

Array  $a[] = 25 \ 30 \ 15 \ 5 \ 20 \ 10$

25	25	25	25	25
30	30	15	15	15
15	15	30	5	5
5	5	5	30	20
20	20	20	20	30
10	10	10	10	10

Iteration 1

25	15	15	15	15	5	5
15	25	5	5	5	15	15
5	5	25	20	20	20	20
20	20	20	25	10	10	10
10	10	10	10	25	25	25
30	30	30	30	30	30	30

Iteration 2

Iteration 3

5	5	5
15	15	10
10	10	15
20	20	20
25	25	25
30	30	30

Iteration 4

BUBBLE SORT Iteration Result  
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