

Algorithm for Bubble Sort

- The element of an array List [N] are to be sorted into an ascending order
- Variable flag is being used to indicate the occurrence of an exchange during a pass over the list.
- Temp is a variable used to interchange the pair pair of elements not in order in the unsorted part of the list.

- Steps:
1. Flag = false, i = 0;
 2. While (i < N) and (flag = false)
repeat steps 3 to 5.
 3. Flag = true; i = i + 1
 4. for (j = 1) to N - 1 repeat step 5
 5. If (List[j] > List[j + 1])
then [Temp = List[j];
List[j] = List[j + 1];
List[j + 1] = Temp;
Flag = false]
} end of j loop }
} end of while loop }

6. End.

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Explanation

- ① Two loops the outer while loop and inner j loop.
- ② j loop makes the pass on the array list i.e. 1 to N-1, for any exchanges to be made and if yes, set flag to false.
- ③ Outer loop keeps a check on the termination of the sorting process with the help of two variables i and flag.
- ④ where i conveys the end of all the passes and flag indicates whether to proceed with the rest of the pass or not.

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Algorithm Explanation

List

1	2	3	4	5	6	7	8
5	1	2	6	4	11	8	9

- Step 1. Flag = false and $i = 0$
Step 2. while $(i < N)$ and flag = false
 repeat step 3 to 5
Step 3. Flag = true and $i = i + 1$
Step 4. for $(j = 1$ to $N - 1)$ repeat step 5
Step 5. if $(List[j] > List[j + 1])$ as $j = 1$
 $5 > 1$ true

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Then temp = List[j] = 5

List[j] = List[j+1] = 1

List[j+1] = temp; = 5

Flag = false.

1	2	3	4
1	5	2	6

→

Now $j = 2$

if $(List[2] > List[3])$

$5 > 2$

True Then

temp = List[2] = 5

List[2] = List[j+1] = 2

List[j+1] = temp = 5

1	2	3	4	5
1	2	5	6	4

Now $j = 3$

if $(List[3] > List[4])$

$5 > 6$ false

1	2	5	6	4
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Now $j = 4$ if $(List[4] > List[5])$

$6 > 4$

True so again

$\rightarrow \text{temp} = 6 \Rightarrow \text{List}[4]$
 $\rightarrow \text{List}[j] = \text{List}[j+1]$
 $\text{List}[4] = \text{List}[5]$
 $\text{List}[4] = 4$
 $\rightarrow \text{List}[5] = \text{temp} = 6$

1	2	3	4	5
1	2	5	4	6

Now $j = 5$
 these step will continue until
 $(j < n-1)$

After that one pass completes

1	2	3	4	5	6	7	8
1	2	5	4	6	8	9	11

Sorted

Now while loop of i checks

$(i < n-1) \&\& (!\text{Flag})$

which is true and j loops start for
Second pass.

So after list is sorted

flag variable is checked

if $\text{Flag} = \text{True}$

Means No more pass requires.



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