Discussion 4

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CSEN 5303 Foundations of Computer Science

September 16, 2022

Problem statement. Feel free to answer one of the following questions:

1. Discuss bubble sort algorithm. Give an illustrative example.
2. Discuss selection sort algorithm. Give an illustrative example.
3. Discuss insertion sort algorithm. Give an illustrative example.

Problem 3. Insertion sort works by starting from the 2nd element in the array, and comparing it with the 1st, swapping with the 1st if the 2nd is smaller. Then, it checks the 3rd element, and compares with the previous elements in descending order, swapping with each if 3rd is smaller than it. If we found an element smaller than the 3rd, we stop because now we know we have inserted the 3rd element into the correct position. Thus we can move on to the 4th element and repeat this process and so on. We are done when we have checked the last element and inserted it in the correct position.

An illustrative example is shown below:
Using an input array a = [3, 2, 5, 1, 4].

Iteration 1

instruction	a[0]	a[1]	a[2]	a[3]	a[4]
a[1] < a[0]?	3	2	5	1	4
yes, so swap	2	3	5	1	4
next iteration	2	3	5	1	4

Iteration 2

instruction	a[0]	a[1]	a[2]	a[3]	a[4]
a[2] < a[1] ?	2	3	5	1	4
no, next iteration	2	3	5	1	4

Iteration 3

instruction	a[0]	a[1]	a[2]	a[3]	a[4]
a[3] < a[2] ?	2	3	5	1	4
yes, so swap	2	3	1	5	4
a[2] < a[1] ?	2	3	1	5	4
yes, so swap	2	1	3	5	4
a[1] < a[0] ?	2	1	3	5	4
yes, so swap	1	2	3	5	4
next iteration	1	2	3	5	4

Iteration 4

instruction	a[0]	a[1]	a[2]	a[3]	a[4]
a[4] < a[3] ?	1	2	3	5	4
yes, so swap	1	2	3	4	5
a[3] < a[2] ?	1	2	3	4	5
no, we're done	1	2	3	4	5