Algo - Tutorial (5) (9) Sorting Algorithms

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(1) Explain how main sorting Algorithms can be performed using an appropriate array example.

There are 4 main sorting algorithms. They are bubble sort, selection sort, insertion sort and Merge sort.

> Bubble sort.

Ex:- [5, 2, 8, 12, 3]

Consider the indexs

- Select two by two bubble and exchange the minimum and sort out.

positions too

5, 2, 8, 12, 3

swap

2, 5, 8, 12, 3

- consider the next pair and go on.
- Finally you'll get the sorted array.

2, 5, 8, 3, 12 — 1st Iteration

2, 5, 3, 8, 12 — 2nd Iteration

2, 3, 5, 8, 12

> Selection sort.

Ex:- [5, 2, 8, 12, 3]

- Consider the first element and compare and search for an element lesser than that. if found, then swap.

swap

5, 2, 8, 12, 3

2, 5, 8, 12, 3

sorted unsorted.

2, 3 8, 12, 5

2, 3, 5 8, 12

2, 3, 5, 8, 12

sorted //.

3) Merge sort.

Ex:- [5, 4, 6, 9, 3]

- divide the array into two halves and sort them separately. later add them together to make the final sorted array.

[5, 4, 6,] [9, 3]

[4, 5, 6] [3, 9]

[3, 4, 5, 6, 9]

4) Insertion sort.

eg:- [9, 8, 14, 5, 6]

Consider the first element and sort and insert the relevent values in the relevant order.

[9, 8, 14, 5, 6]

[8, 9] [14, 5, 6]

[5, 8, 9] [6, 14]

[5, 6, 8, 9, 14]//

(2) Compare and contrast bubble sort and selection sort algorithms.

Bubble sort	vs	Selection sort
• Less efficient		• More efficient.
• Uses item exchanging		• Uses item selection.
• slower		• faster.
• Compares the adjacent elements and swap accordingly		• selects the minimum from the un-sorted sub-array and place them in the sorted array.
• Compares the adjacent pair to sort.		• takes the smallest value in the list and move it to the proper position in the array.

(3) What are the real world examples of sorting?

- Traffic lights
- Bus schedules
- Google search
- Facial recognition.
- Sorting the contact lists
- Sorting from max to min prices in online shopping pages.

(A) Write a function using pseudo or source code to sort an integer array using bubble sort and selection sort

```
#include <stdio.h>
void bubbleSort(int array[], int size)
{
    for (int step = 0; step < size-1; ++step)
    {
        for (int i = 0; i < size-step-1; i++)
        {
            if (array[i] > array[i+1])
            {
                int temp = array[i];
                array[i] = array[i+1];
                array[i+1] = temp;
            }
        }
    }
}

void printArray(int array[], int size)
{
    for (int i = 0; i < size; ++i)
    {
        printf("%d", array[i]);
    }
    printf("\n");
}

int main() {
    int data[] = {2, 45, 0, 11, 9};
    int size = 5;
    bubbleSort(data, size)
    Printf("Sorted in ascending \n"); printArray(data, size)
```

```
void selectionSort (int array[], int size)
{
  for (int step = 0; step < size - 1; step++)
  {
    int min_idx = step;

    for (int i = step + 1; i < size; i++)

    { if (array[i] < array [min_idx]

      min_idx = i;

    }
      swap (&array[min_idx], &array [step]);
    }
}

Void printArray (int Array[], int size)

{
    for (int i = 0; i < size ; ++i)

    { printf ("%d ", array[i]); }


        print ("\n");
    }
```