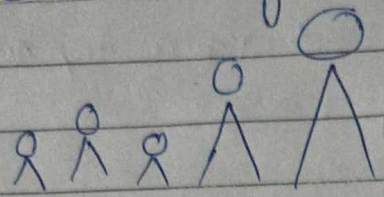
ANKIT

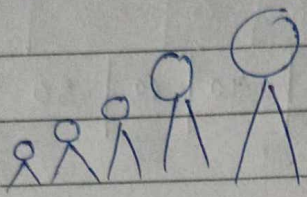
Page No.
Date 15-03-2022

*** (Sorting)

By definition sorting refers to arranging data in a particular format : either ascending or descending



[not arranged data]



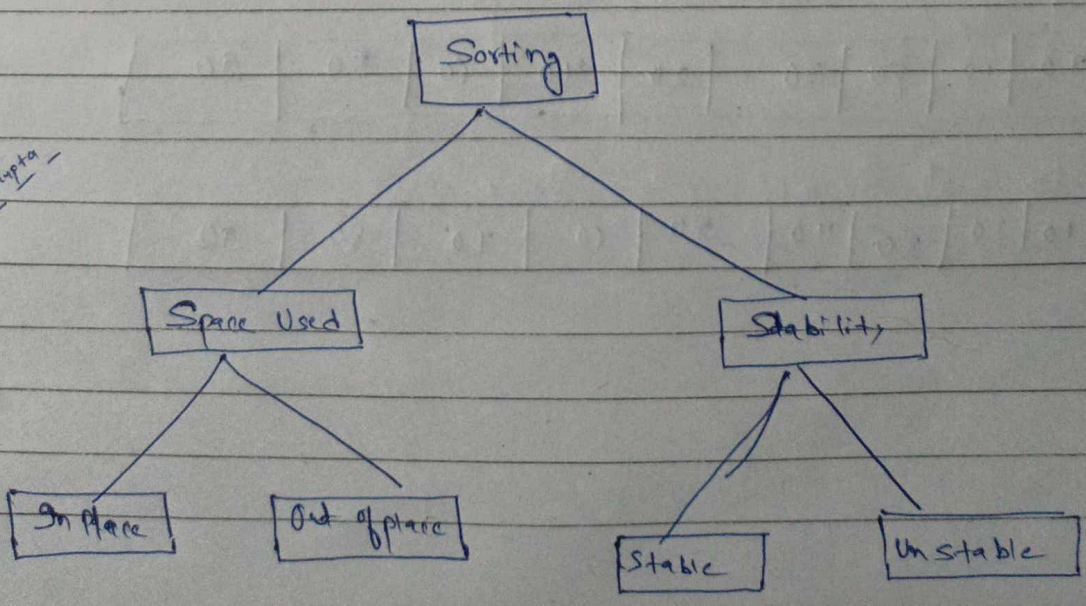
[arranged data]

Ex→ In MS Excel there is Button or function for sorting → here sorting algorithm is used.

Ex→ In E-commerce website we have the sorting option like sort price High to Low, Low to High. So in these website we are using the sorting algorithms.

*** [Types of Sorting]

Sorting can be subdivided in two categories depending on the space being used and stability of algorithm.



Vivek Kr. Gupta

Page No.
Date 15-03-2022

① Space Used

(1) In place Sorting → Sorting algorithm which does not require any extra space for sorting.

Ex →

70	10	80	30	20	40	60	50	90

To short the above we don't need any extra space.

10	20	30	40	50	60	70	80	90

Main Example → Bubble Sort (we learn after some pages)

(2) Out Place Sorting : → Sorting algorithm which requires an extra space for sorting

Ex → Merge Sort

In merge sort we need some extra space for sorting.

70	10	80	30	20	40	60	50	90

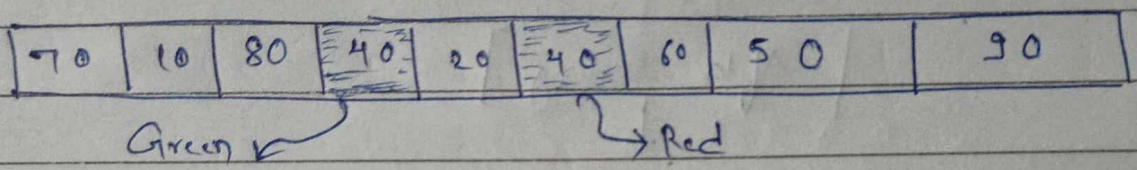
10	20	30	40	50	60	70	80	90

Page No.
Date 15-03-2022

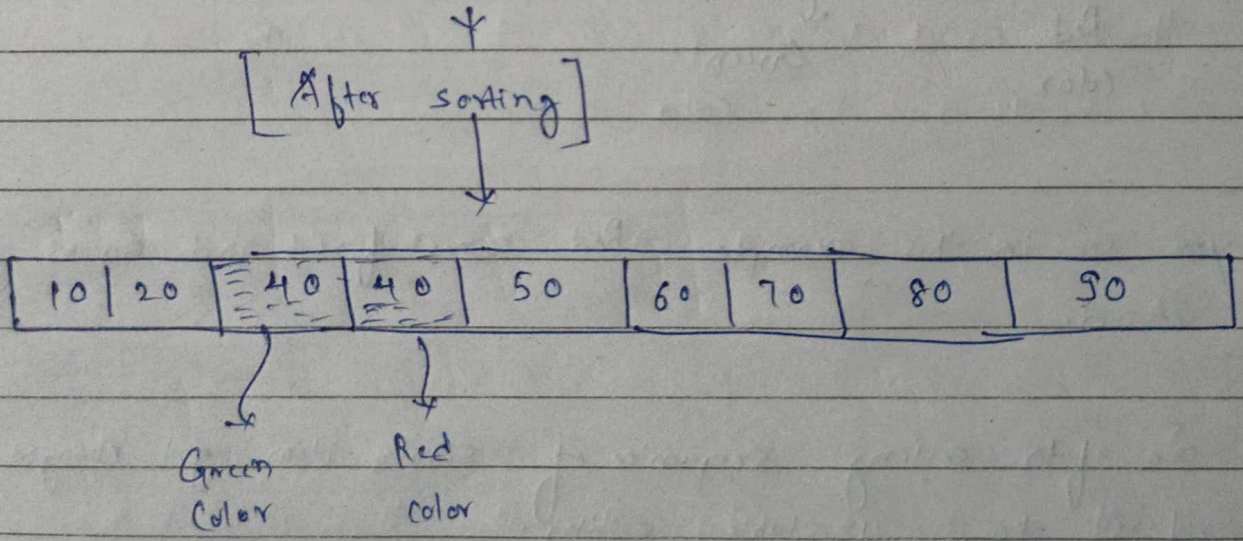
Based on stability

(1) Stable → If a sorting algorithm after sorting the contents does not change the sequence of similar content in which they appear, then this sorting is called stable sorting

Universal Example → Insertion Sort



As you see in the above example there are 2 entries of 40 let suppose first will be in Green color and second 40 will be in Red colour.

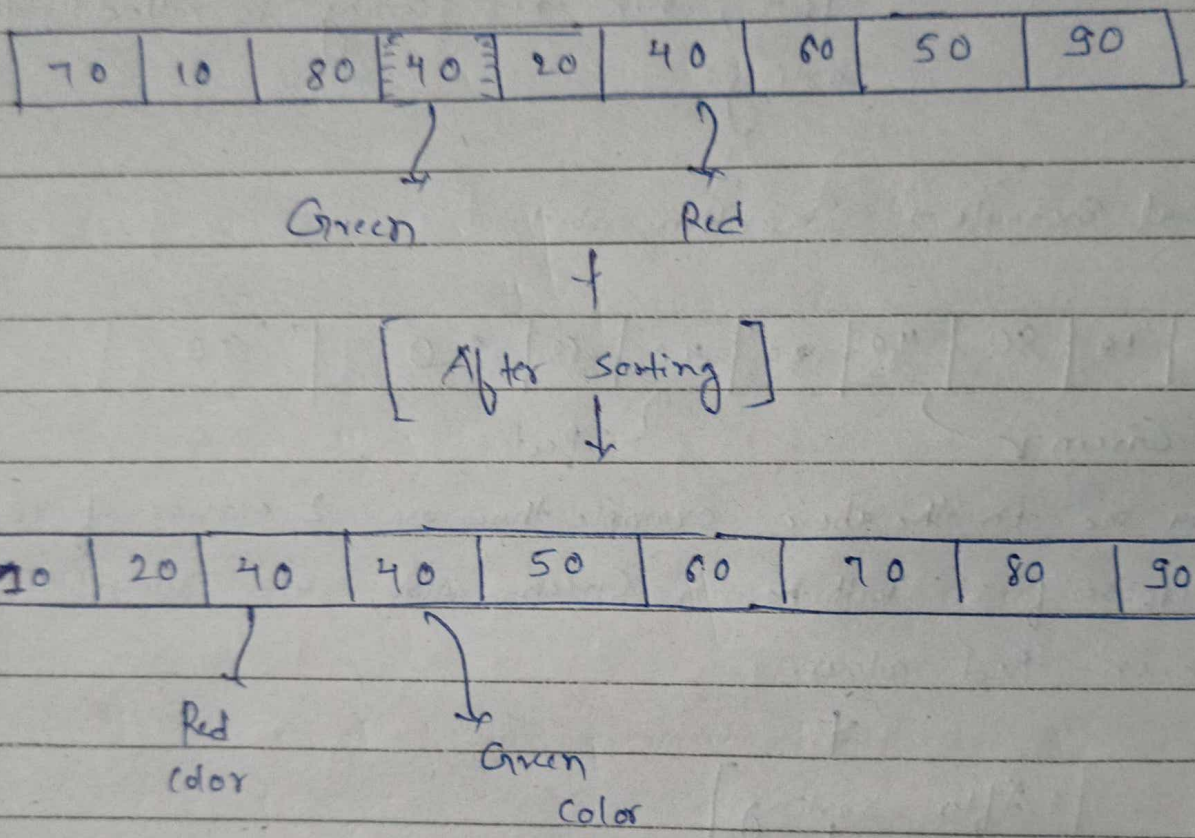


So as you see after sorting the Green color is first as per previous (unsorted) also the Red color is second so Both 40 is in the proper sequence after sorted.

[Means Sequence of similar elements not changed]

Page No.
Date 15-03-2022

(2) Unstable Sorting → If a sorting algorithm after sorting the content changes the sequence of similar content in which they appear, then it is called unstable sort.



As you see in this example Red comes first and Green is second.

So after sorting sequence of similar item got changed refers to unstable sorting.

Best Universal Example → Quick Sort

Page No.
Date 15-03-2022

Unstable Sorting Example (2) →

Unsorted Data	
Name	Age
Vivek	7
Rakesh	6
Vinay	6
Pushpa	7
Sofia	7

Sorted By Name	
Name	Age
Pushpa	7
Rakesh	6
Sofia	7
Vinay	6
Vivek	7

Sorted by age (stable)	
Name	Age
Rakesh	6
Vinay	6
Vivek	7
Pushpa	7
Sofia	7

Sorted by age (Unstable)	
Name	Age
Rakesh	6
Vinay	6
Vivek	7
Sofia	7
Pushpa	7

Sequence change

Page No.
Date 15-03-2022

*** [Sorting Terminology]

1) Increasing Order → If successive element is greater than the previous one.

Example → 1, 3, 5, 7, 9, 11

2) Decreasing Order → If successive element is less than the previous one.

Example → 11, 9, 7, 5, 3, 1

3) Non-Increasing Order → If successive element is less than or equal to its previous element in the sequence.

Ex → 11, 9, 7, 5, 5, 3, 1

9 is less than 11, 7 is less than 9, 5 is less than 7, 5 is equal to 5! so on...

So If you have the duplicate value than it will be the case of Non-Increasing order.

ANKIT
Page No.
Date 15-03-2022

4) Non - Decreasing order → If successive element is greater than or equal to its previous element in the sequence.

Ex → 1, 3, 5, 7, 7, 9, 11

Remember → If you will see non keyword means duplicate value will be there