

Bubble, Insertion, Selection

Selection sort

→ $i=0$ to $<n$ kisko min index maan lo

phir $j=i+1$ to $<n$ dekho ki min index se
chota element hai kya
 $\text{min-index} = j$

$\text{swap}(\text{arr}[i], \text{arr}[\text{min-index}])$

$O(n^2)$ Simple loop deno n ko chhota karna hai
dikhati nhi

Bubble, Insertion, Sort

i ke loop $n-1$ times chlega jo ke array
ki kisi bhi element ke saath compare karke
Iske saath use nhi karna dena

$i=0$ to $<\underline{n-1}$ or $i=1$ to $<\underline{n-1}$

j loop Bubble mai chota hai

0 to $<\underline{n-1-i}$ → Iske saath use use
 $i=1$ to $<\underline{n-1}$ ke
loop

Example $n=6$

0	1	2	3	4	5
1	1	1	1	1	1

$i=1$ $6-1-1=4$ 4th sort chlega as 5th ke
saath right element seega

i=2

6-1-2 = 3

3th sort cholegy 24th mai
shi element aege

Bubble Sort

```
for (int i = 1; i <= n-1; i++)
```

```
{ bool Swapped = false;
```

```
  for (j = 0; j <= n-1-i; j++)
```

```
    { if (arr[j] > arr[j+1])
```

```
      { swap(arr[j], arr[j+1]);  
        Swapped = true;  
      }
```

```
    if (Swapped == false) break;
```

Here we iterate over whole j array & if whole j
array is sorted then j+1 to n is already
sorted hai then we break from i loop

Insertion Sort

```
i = 1 to <= n-1
```

```
{ (j = i-1; j >= 0; j--)
```

```
  { if (arr[j] > arr[j+1])
```

```
    swap(arr[j], arr[j+1])
```

```
  } else break;
```

Sorted

3	2	1	4	5
0	1	2	3	4

$i=0$ vaha kaha ahi position
the hai don left part ko
Sorted hai

$i=1$

$j=0$

$3 > 2$ so Swap

2	3	1	4	5
0	1	2	3	4

Sorted

$i=2$

$j=1$

$3 > 1$ so swap

2	1	3	4	5
---	---	---	---	---

$j=0$

$2 > 1$ so swap

1	2	3	4	5
---	---	---	---	---

$i=3$

$j=2$

$3 \leq 4$ so no swap & break as far

if $3 < 4$ & waha left mai sb sorted
hai \Rightarrow vaha jaha sb se chote hai
so break

$i=4$

$j=3$

$4 < 5$ so break

We can do this type of break in bubble sort &
make it like

for (int $j=0$; $j < n-i-1$; $j++$)

{ if ($arr[j] > arr[j+1]$) swap($arr[j]$,
 $arr[j+1]$);

else break;
}

As See

18, 20, 4, -1, -2, -8, 10, 11

See $i=1$ $j=0$ $18 < 20$ so here we will break

But see age vale sat chahi hai Isliye
he hm choose j ke loop mai check krte
ge sb j ke loop mai sat chahi hain
break from 1 loop

Remember In insertion sort we break from j loop
after checking only one swap

In Bubble sort we check whole j loop
I break from i loop!!

To find Max in Array

Run Bubble sort one iteration or Run
Selection sort 1 iteration by using max-index here
To find min in Array

Run Selection sort [Not insertion] sort one
iteration

