

Sorting

① Bubble sort

$O(N^2)$
worst
case
scenario

①
first
iteration

0 $n-1$
10 2 5 3 6

2 10 5

2 5 10 3

2 5 3 10 6

2 5 3 6 10

bubble

second iteration 2 3 5 6 10

third iteration 2 3 5 6 10

fourth iteration 2 3 5 6 10

fifth iteration 2 3 5 6 10

Complexity
for $i < 10$
for $j < 10$

$O(N^2)$

$N = 10$ elements
 $N^2 = 100$ orders

PseudoCode

For $i = 0$ to $n-1$ i++

For $j = 0$ to $n-i-1$ j++

if $a[j] > a[j+1]$

Temp = $a[j]$

$a[j] = a[j+1]$

$a[j+1] = \text{Temp}$

Trace

$i = 0, j = 0$

$a[0] > a[1]$

swap



Selection Sort

$O(N^2)$

For $start = 0$ to $n-1$

For $i = start+1$ to n i++

if $a[i] < a[min]$

$min = i$

Swap ($a[min]$, $a[start]$)

Simple implementation
un efficient for large lists

min value

start = 0

$i = start + 1$

$i < n$

$i++$

sorted array

like bubble



Merge Sort

Complexity

$n \log n$

Complex space

n

bubble sort

selection

$O(N^2)$

1

