Algoritmos de Ordenação

- Dado um vetor **v** com **N** elementos, a ordenação consiste em organizar todos esses **N** elementos em uma ordem (não-crescente, não-decrescente etc)
- Exemplo:
  - v = {1, 9, 8, 5, 3, 7, 4}
    - Depois de ordenado de forma não-decrescente, v fica:
    - v = {1, 3, 4, 5, 7, 8, 9}

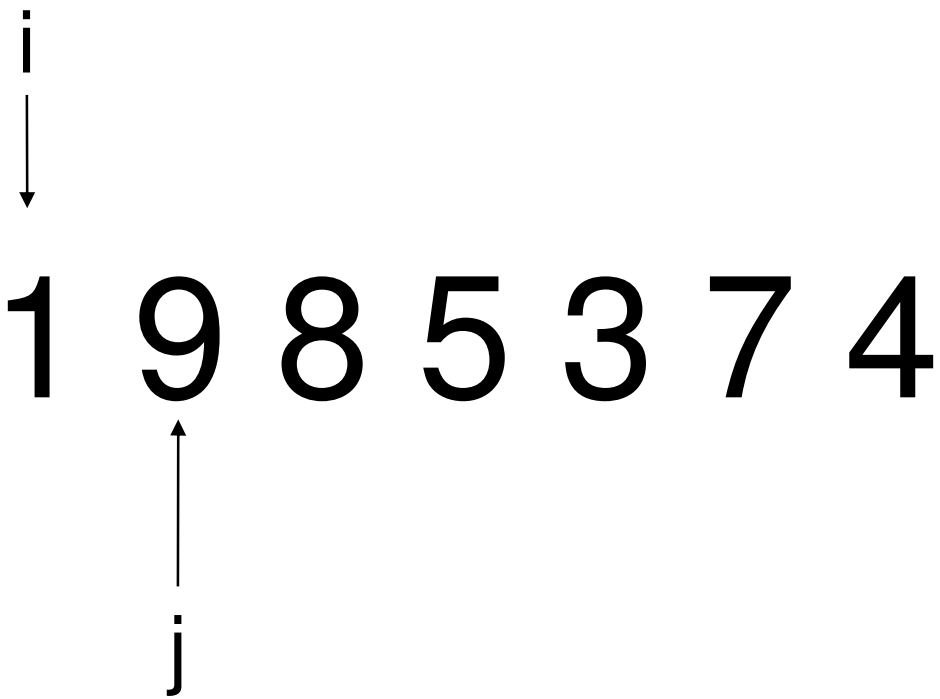
Insert Sort

- Outros nomes:
  - Bubble sort
  - Selection sort
- Consite em posicionar o menor ou o maior elemento em seu lugar correto **N** vezes consecutivas

Insert Sort

```
for i=1,N do
    for j=i+1,N do
        if v[i]>v[j] then
            v[i],v[j] = v[j],v[i]
        end
    end
end
```

Insert Sort



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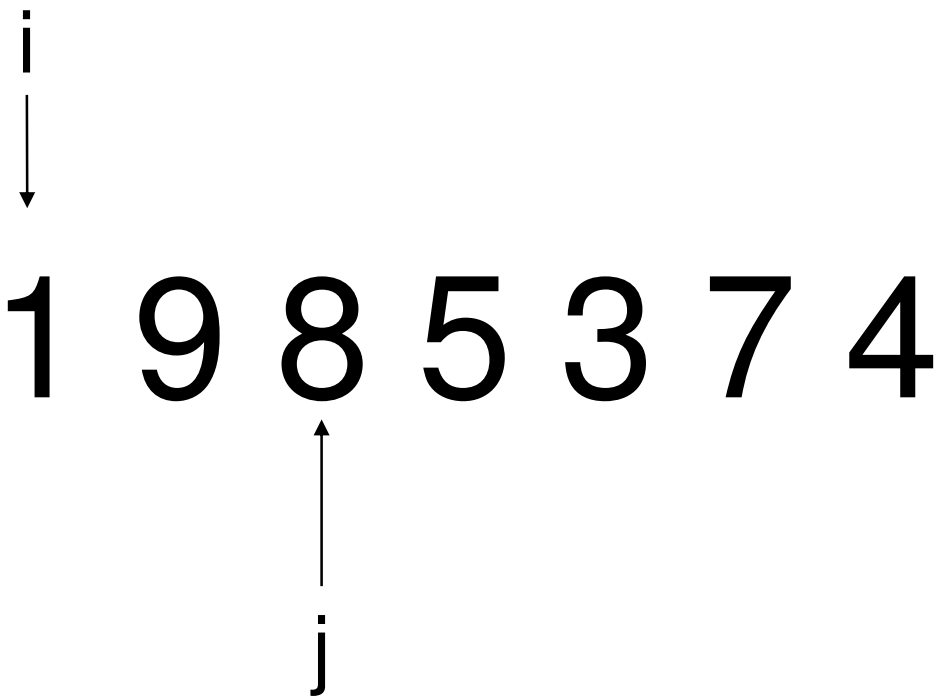

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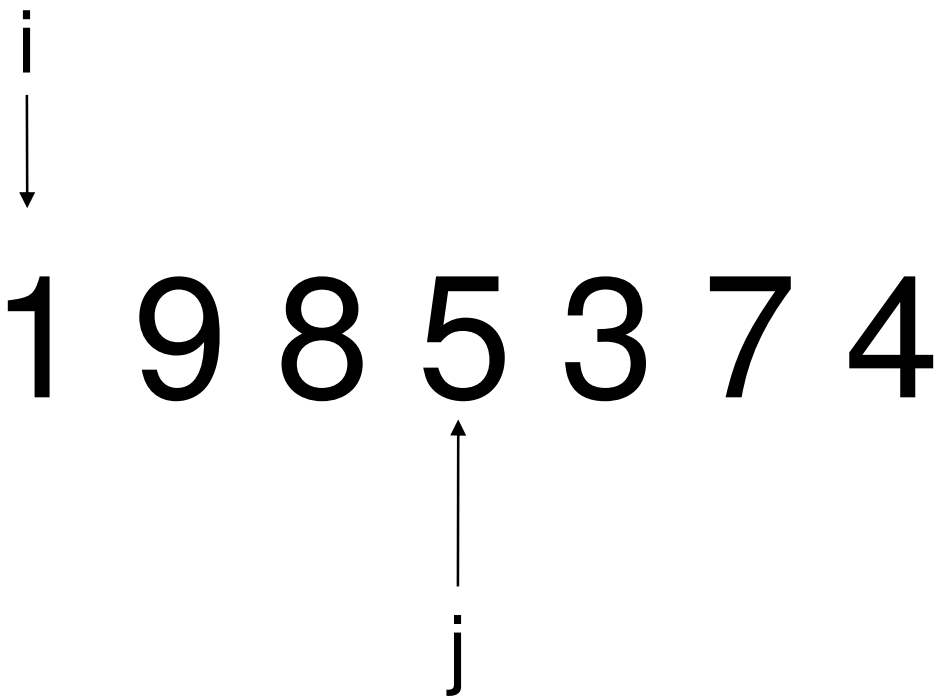

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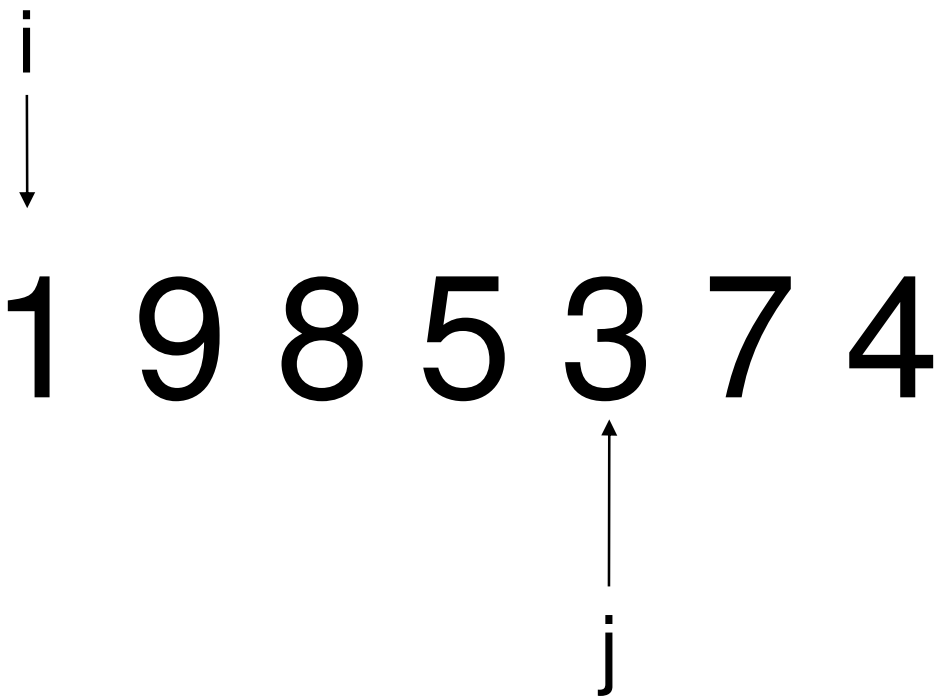

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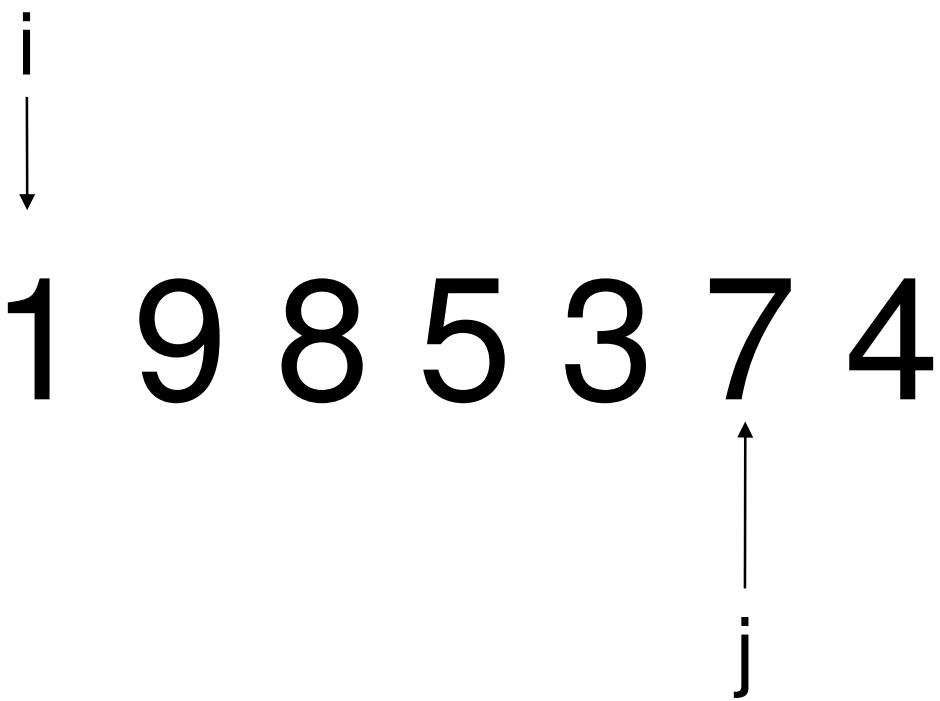

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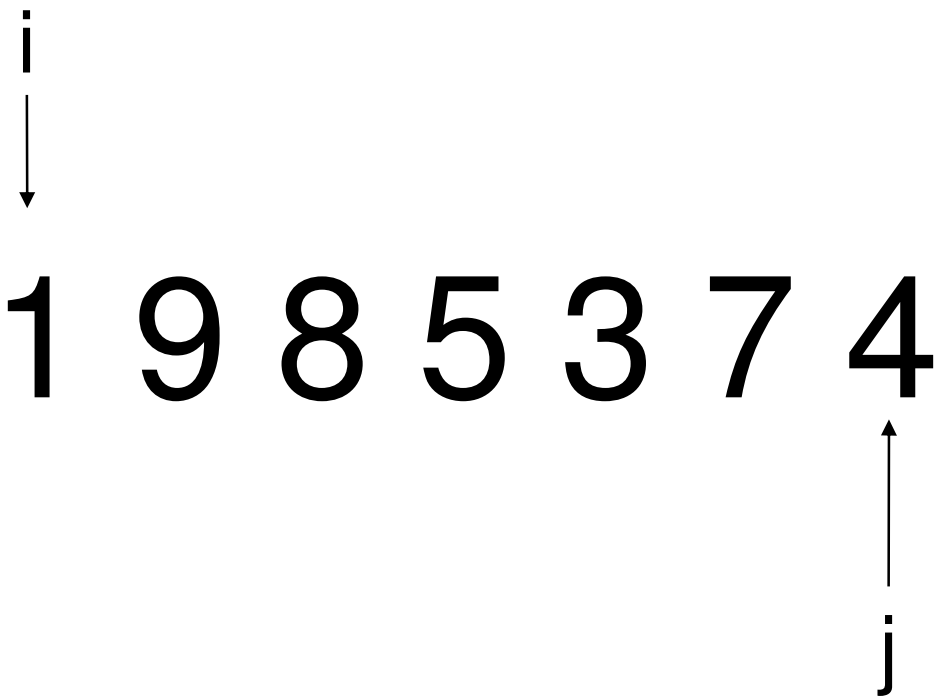

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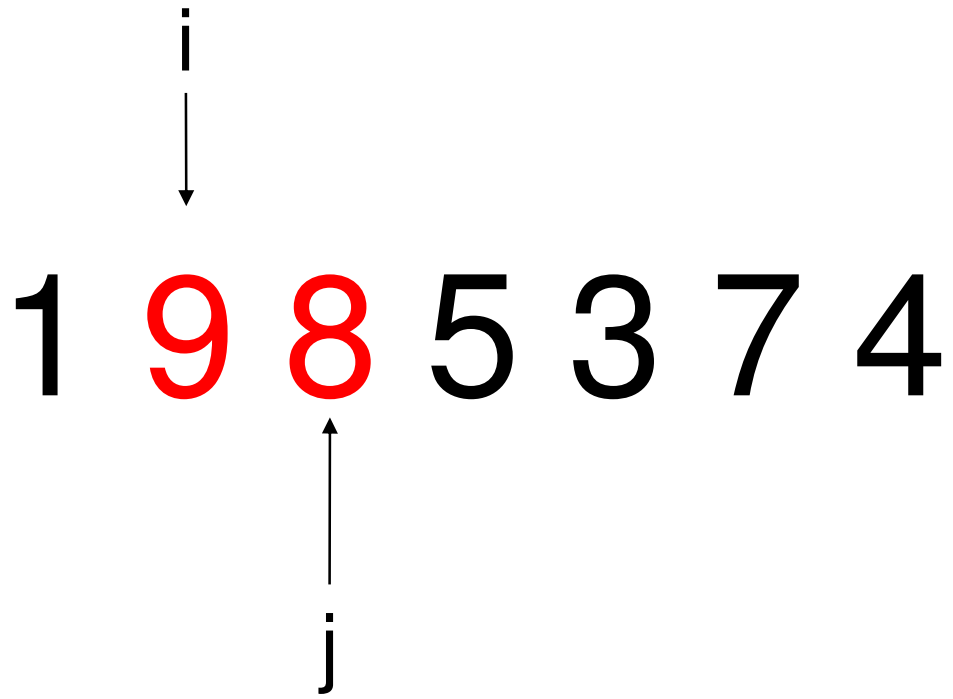

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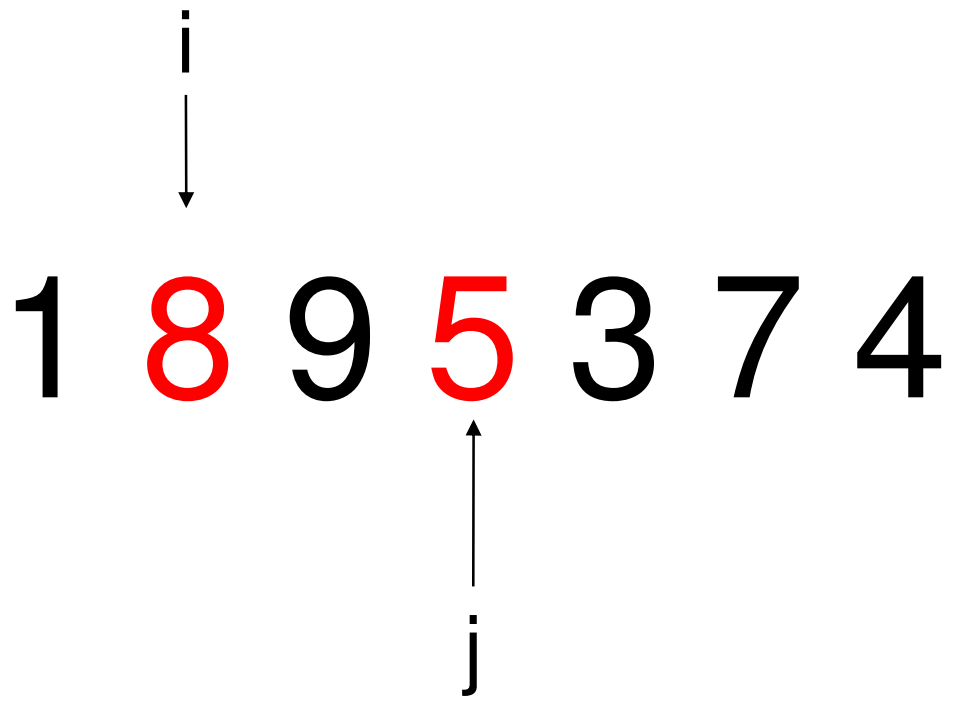

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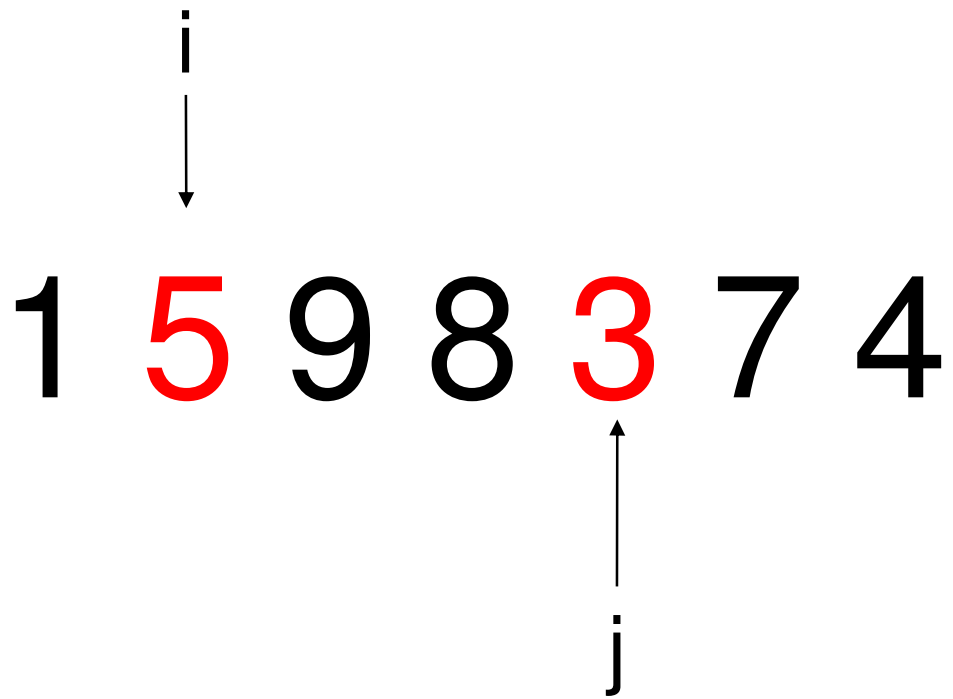

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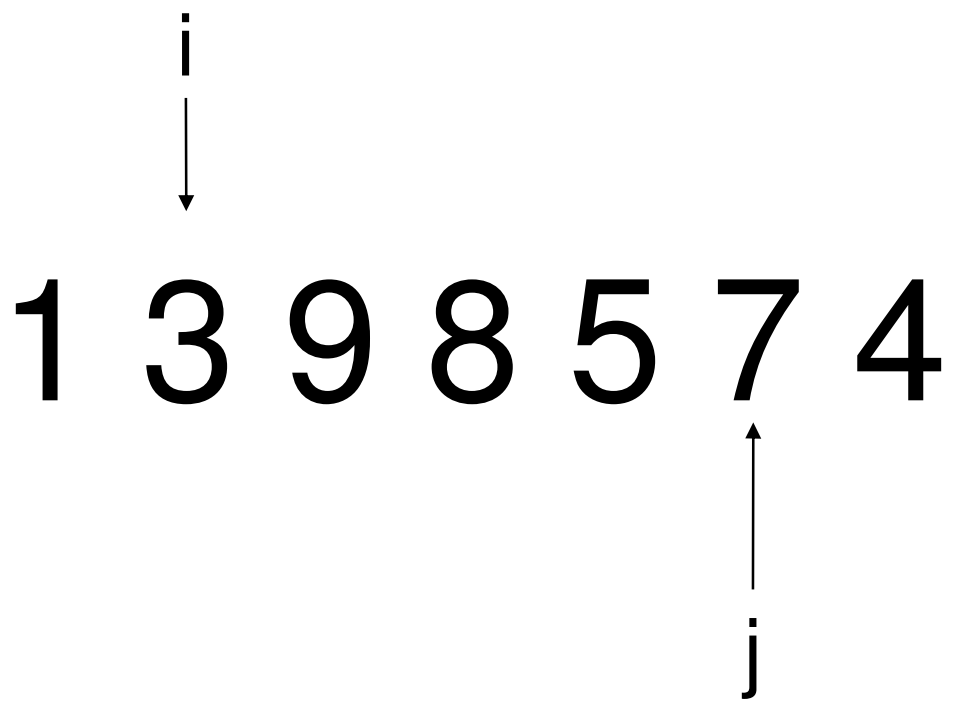

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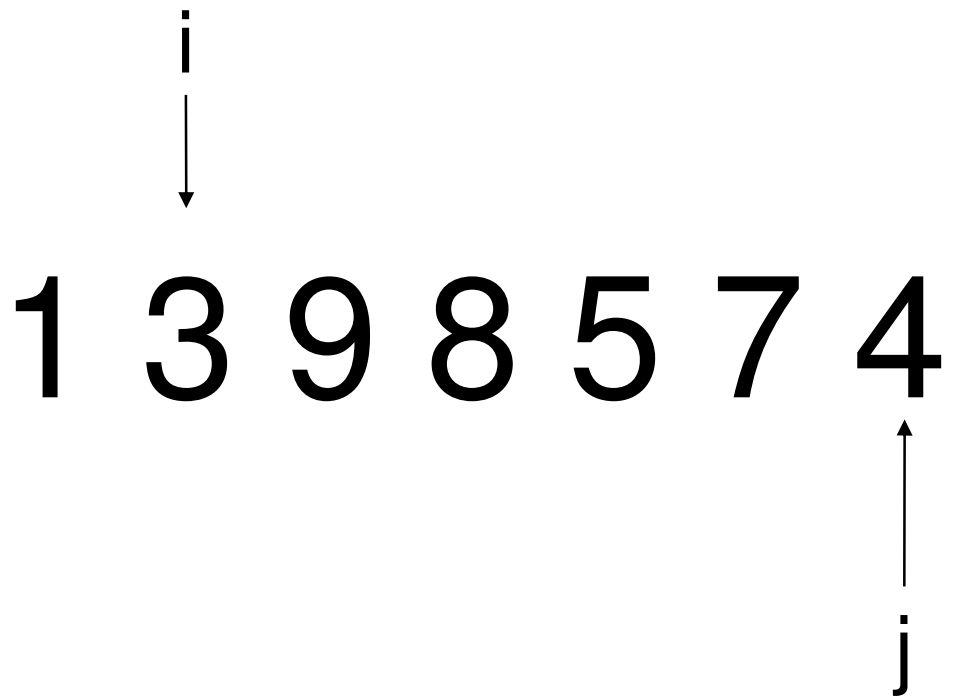

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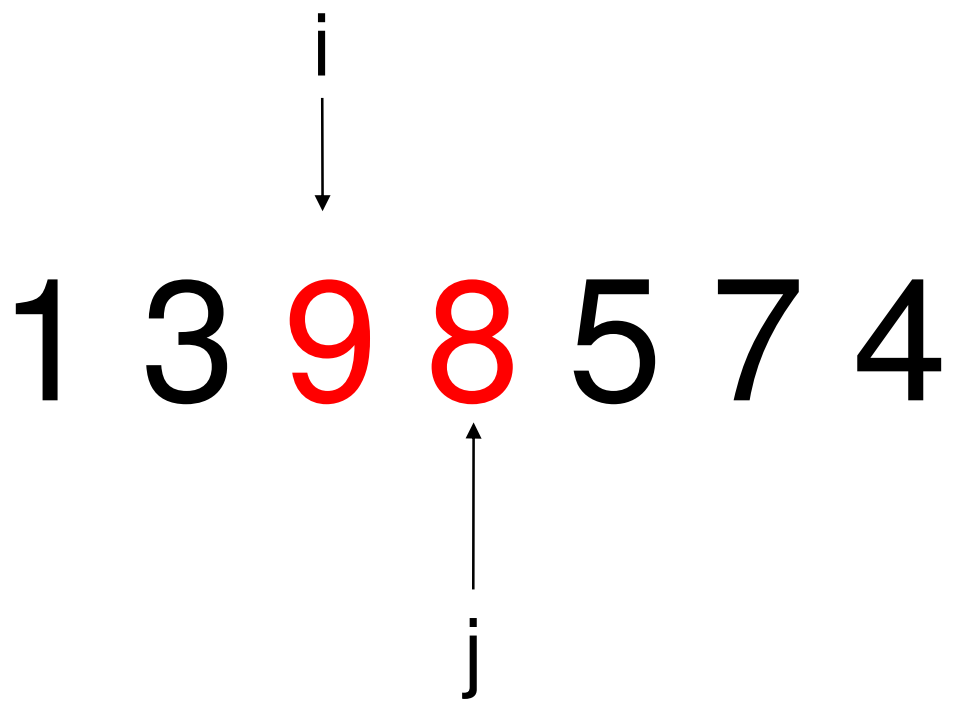

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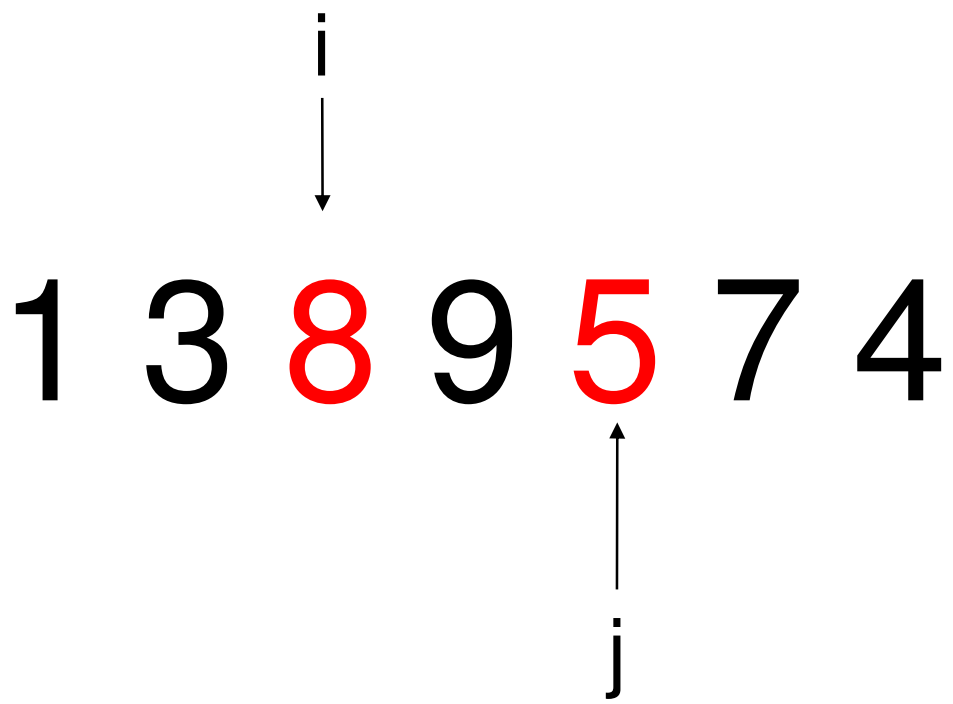

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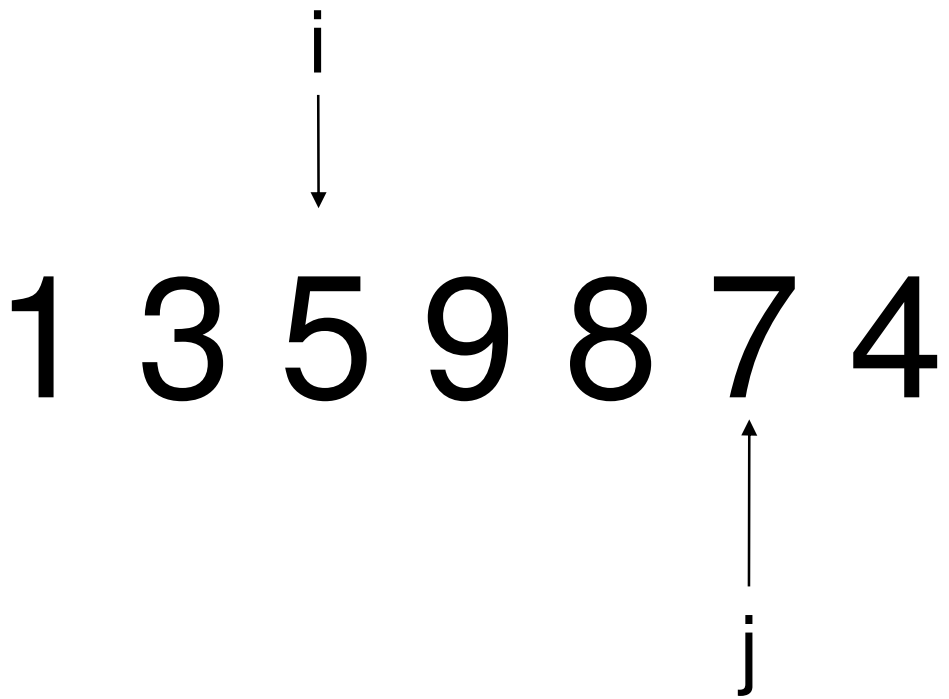

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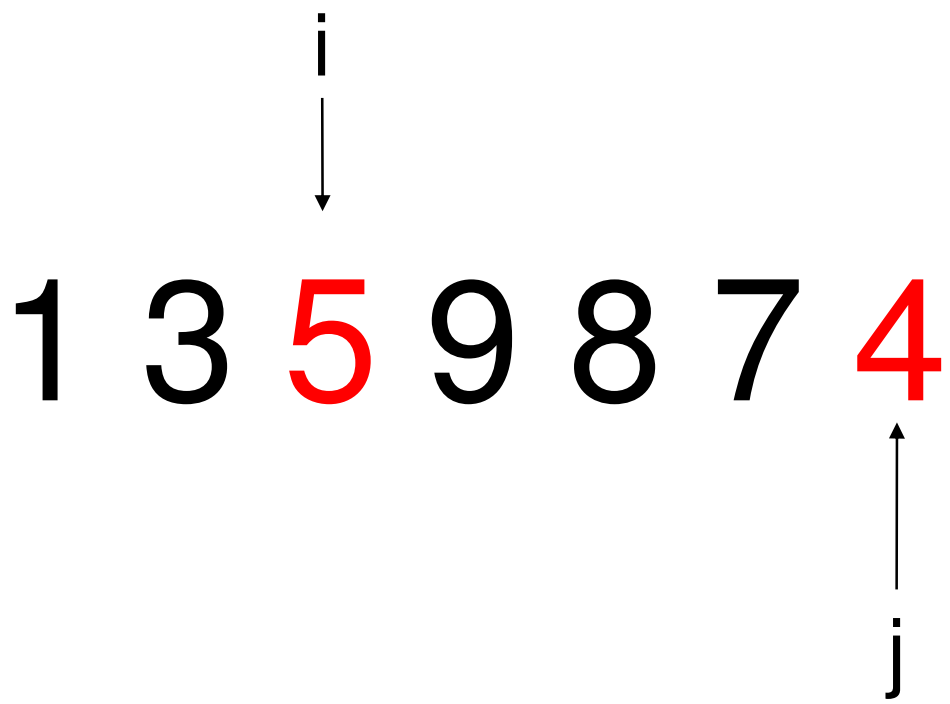

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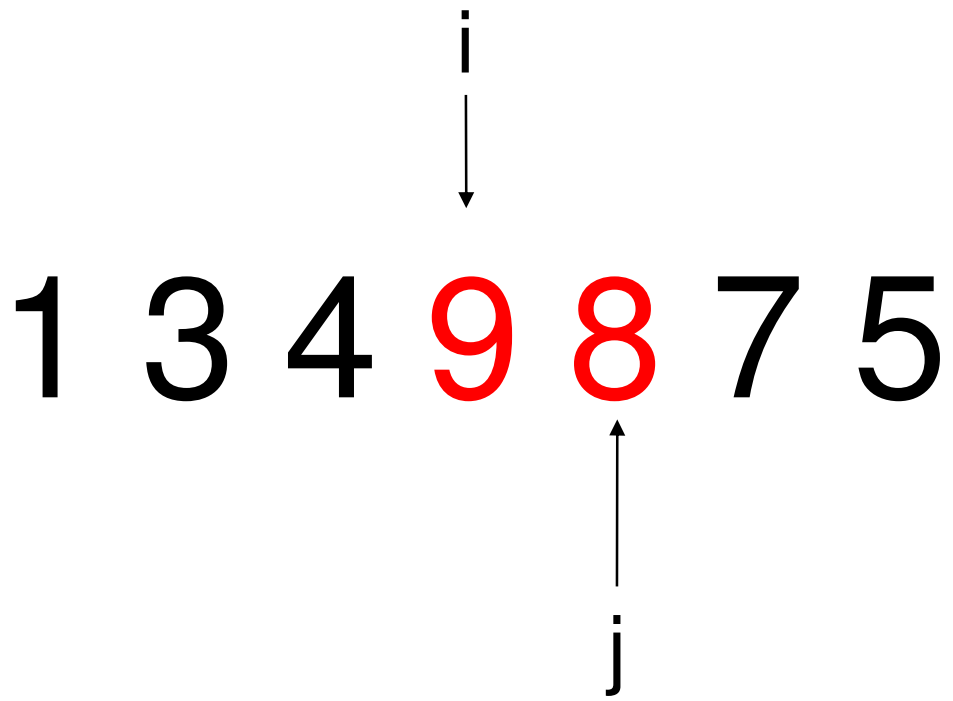

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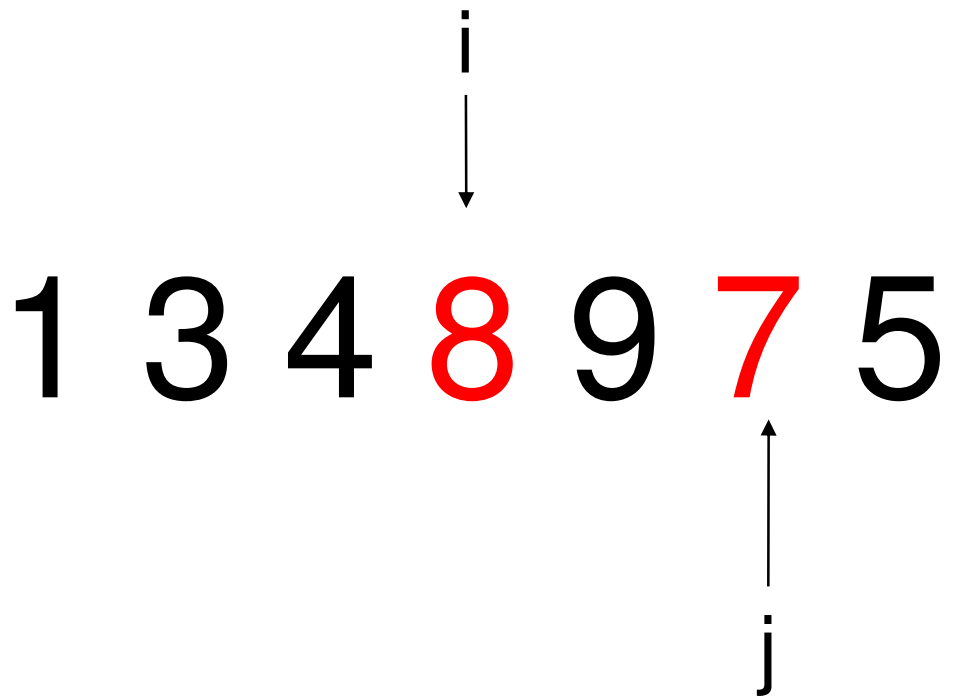

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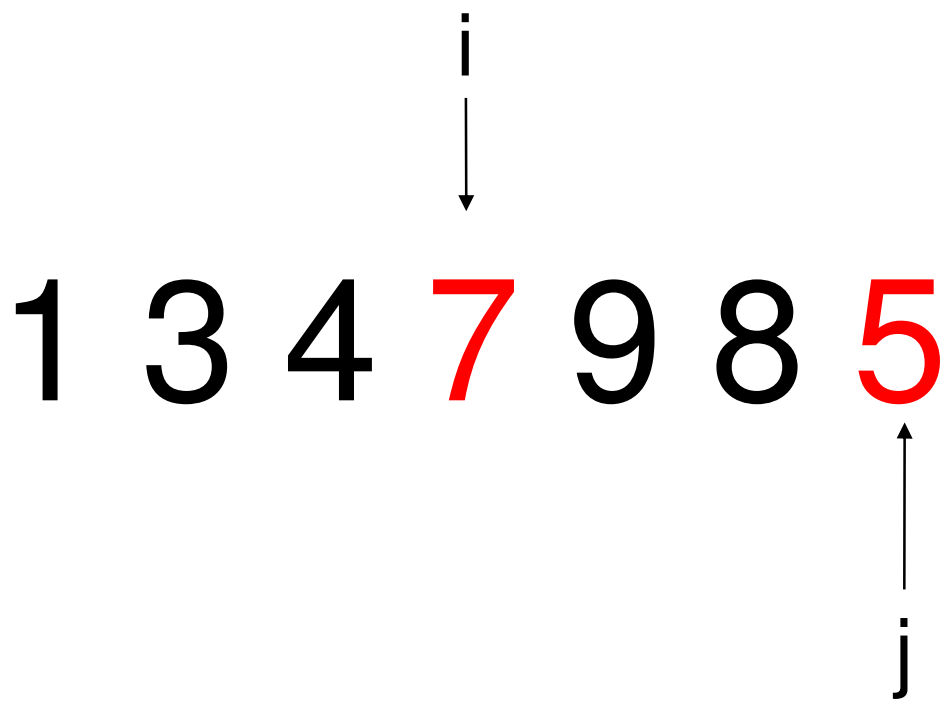

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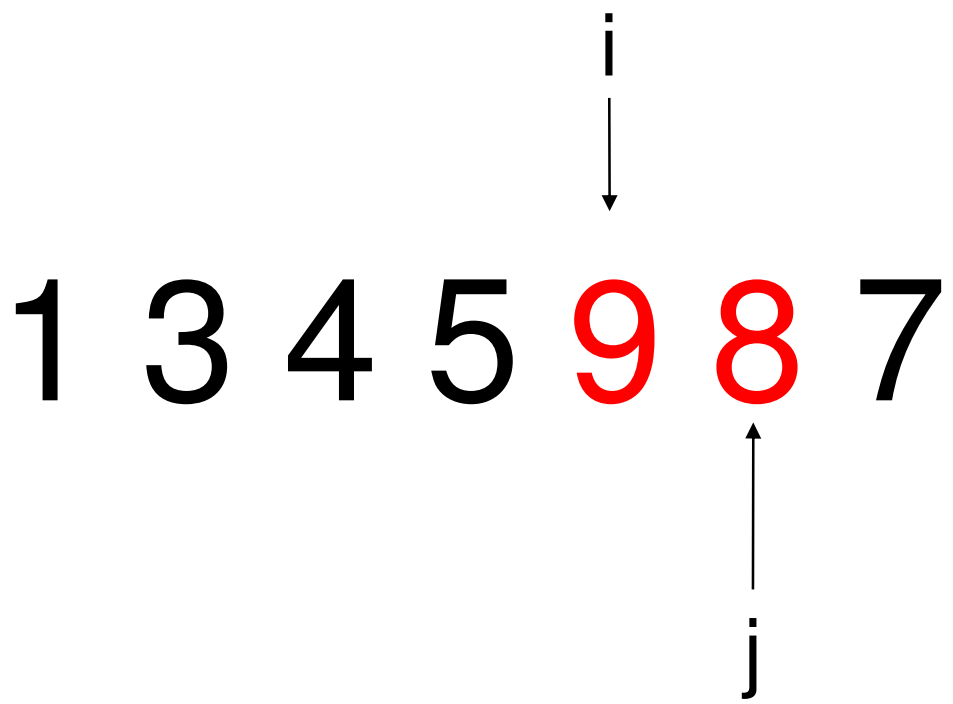

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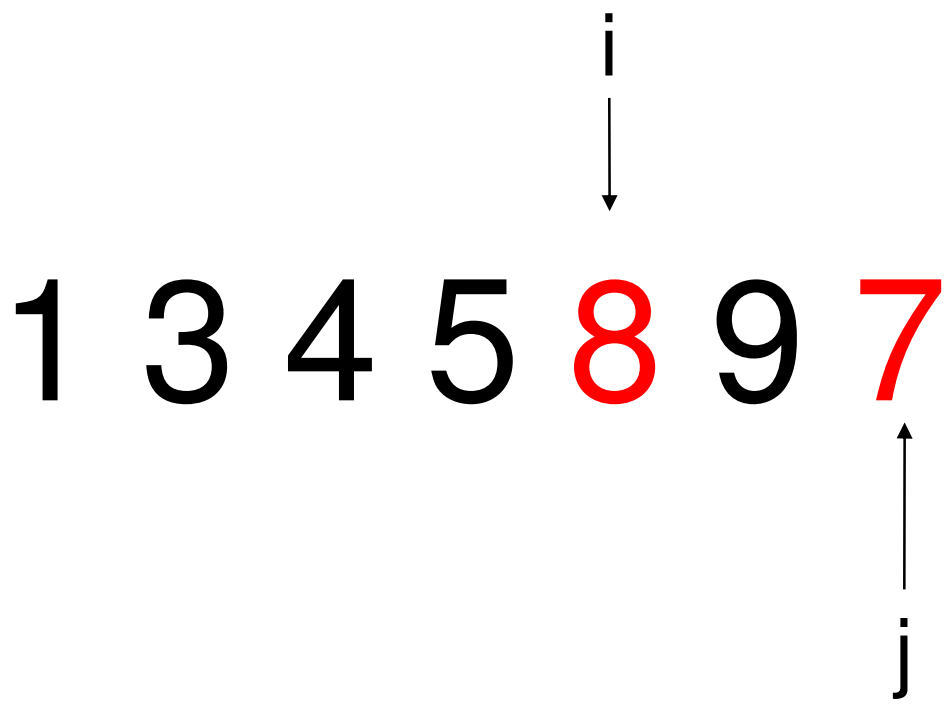

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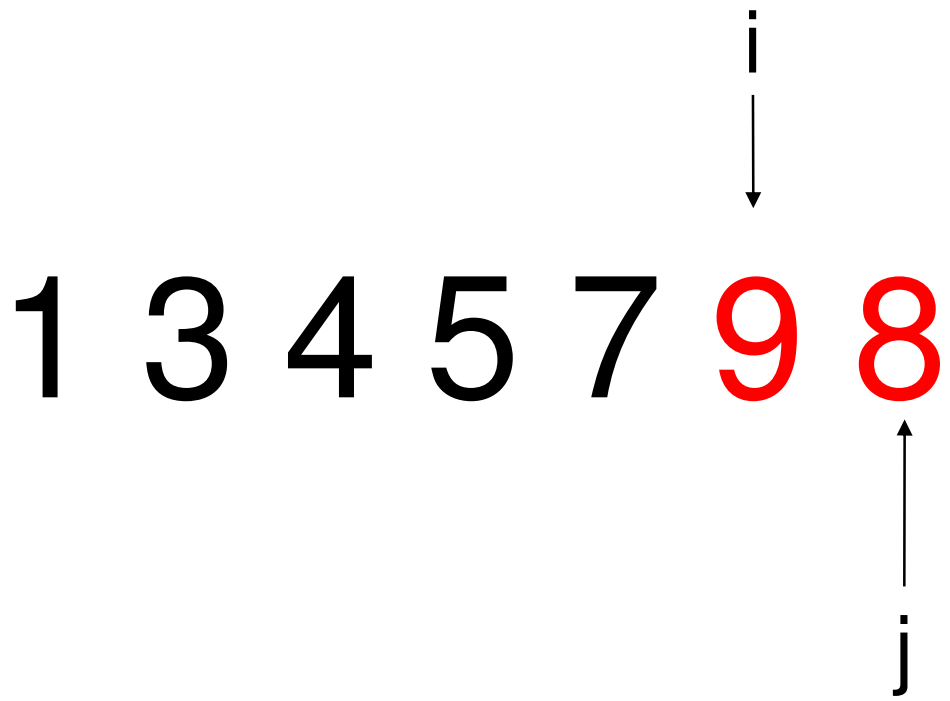


Insert Sort

1 3 4 5 7 8 9

Insert Sort

1 3 4 5 7 8 9

Número de operações:
(N-1) + (N-2) + (N-3) + … + 3 + 2 + 1

$$\frac{N*(N-1)}{2}$$

Insert Sort

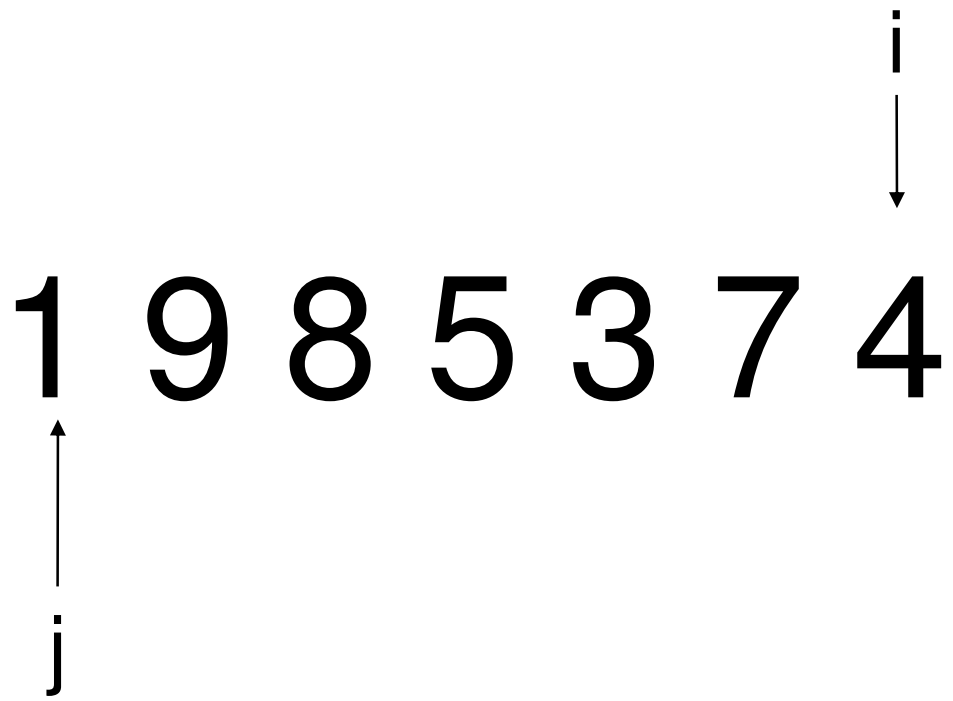
- Ideia:
  - Se o vetor já estiver ordenado em alguma interação, seria interessante detectar isso e parar o algoritmo.
- Como detecto se um vetor está ordenado?

```
ordenado = true
for i=1,N do
    if v[i]>v[i+1] then ordenado = false end
end
```

Insert Sort (melhoria)

```
for i=N,2,-1 do
    trocas = false
    for j=1,i-1 do
        if v[j]>v[j+1] then
            v[j],v[j+1] = v[j+1],v[j]
            trocas = true
        end
    end
    if not trocas then break end
end
```

Insert Sort (melhoria)



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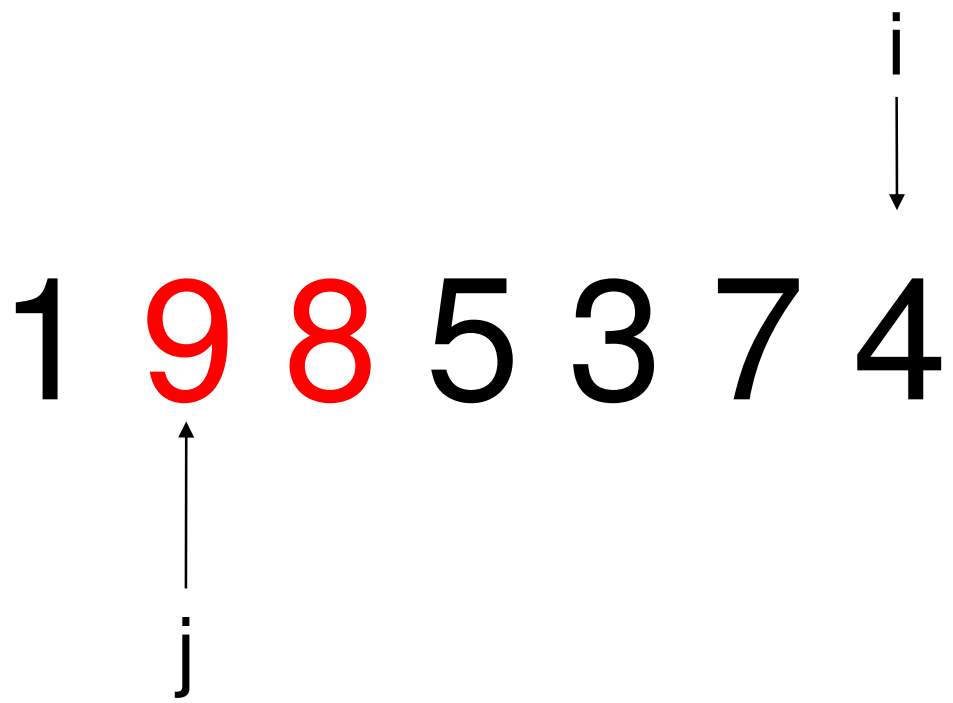

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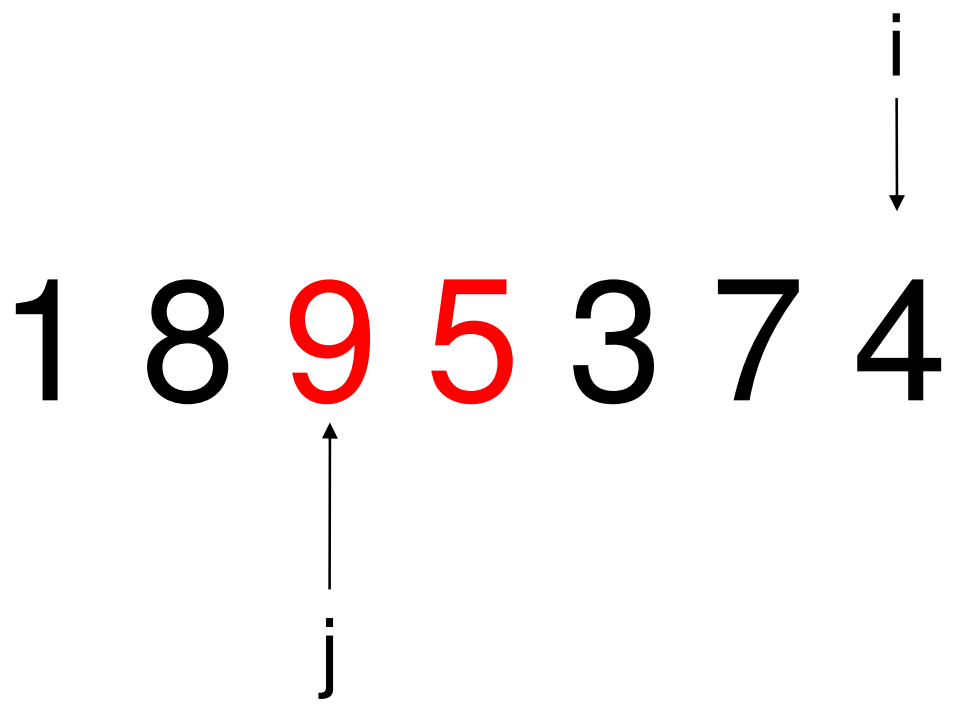

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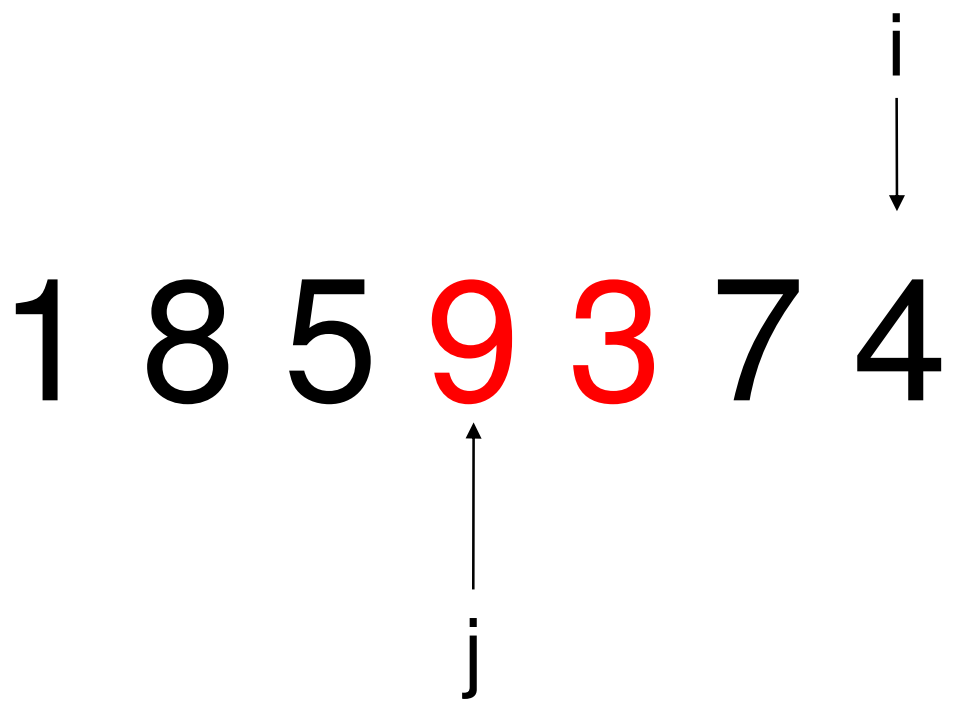

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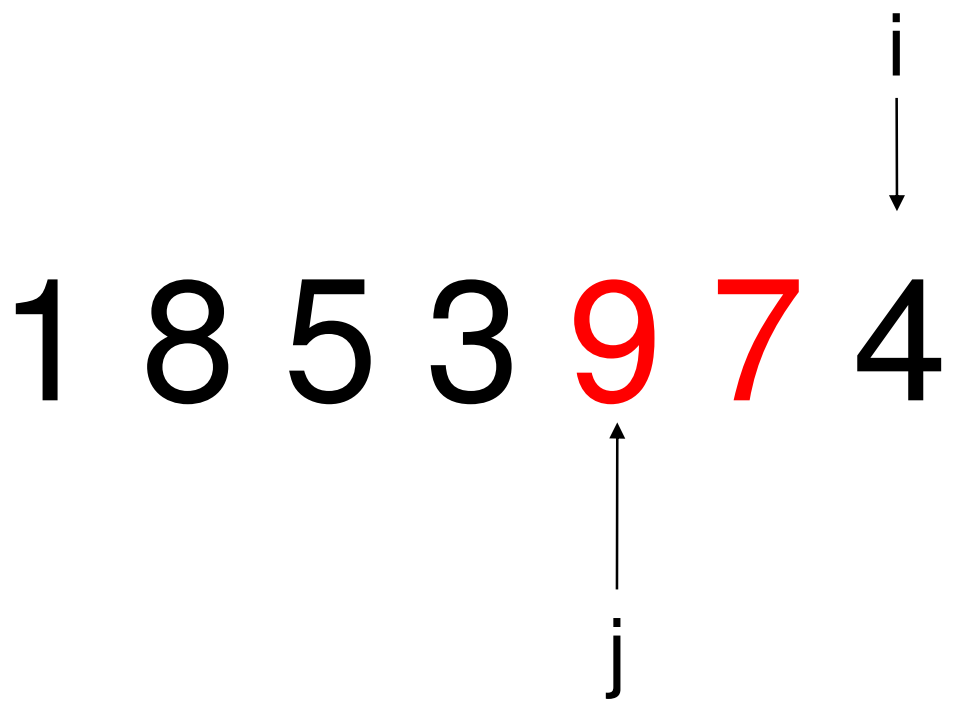

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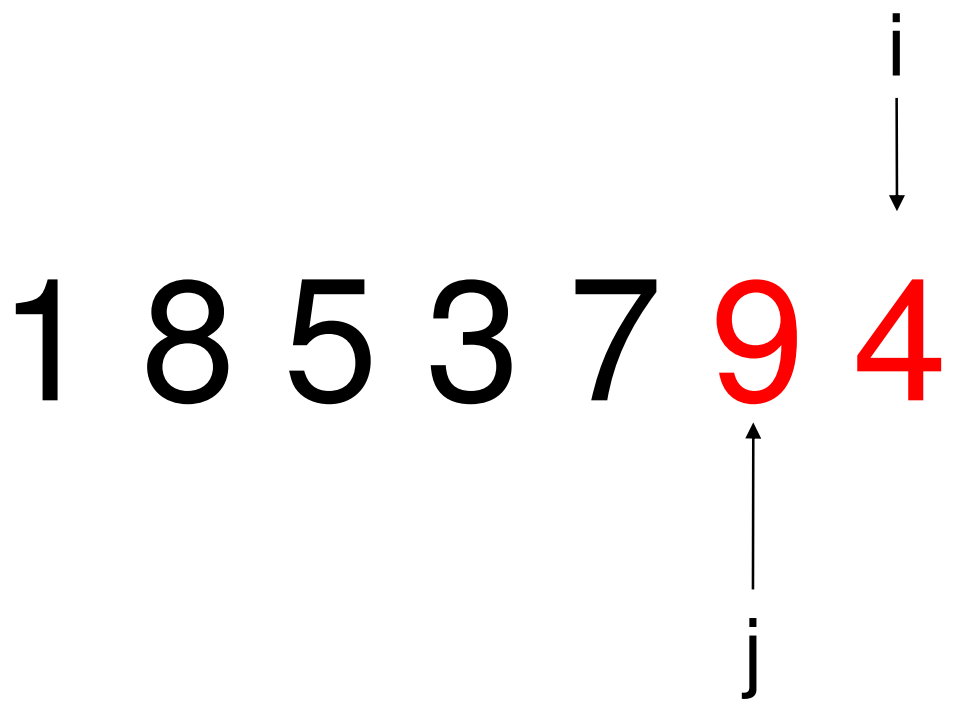

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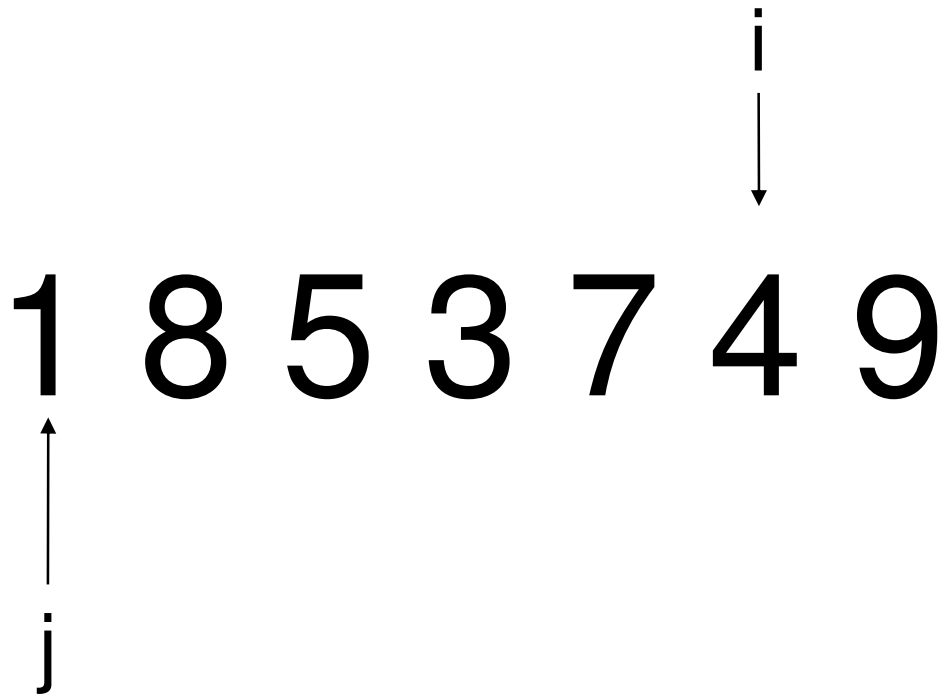

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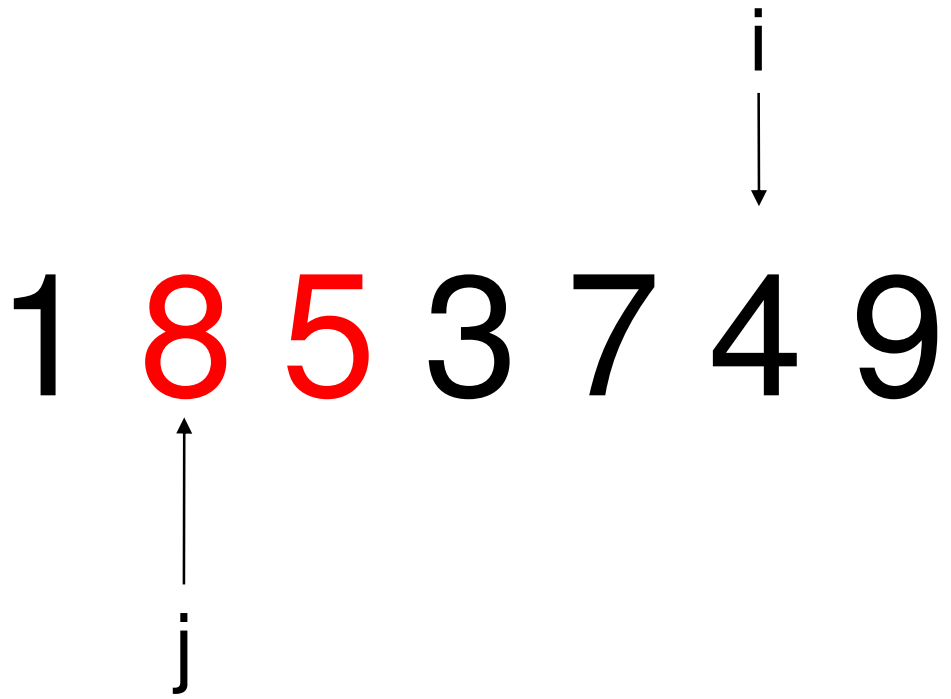

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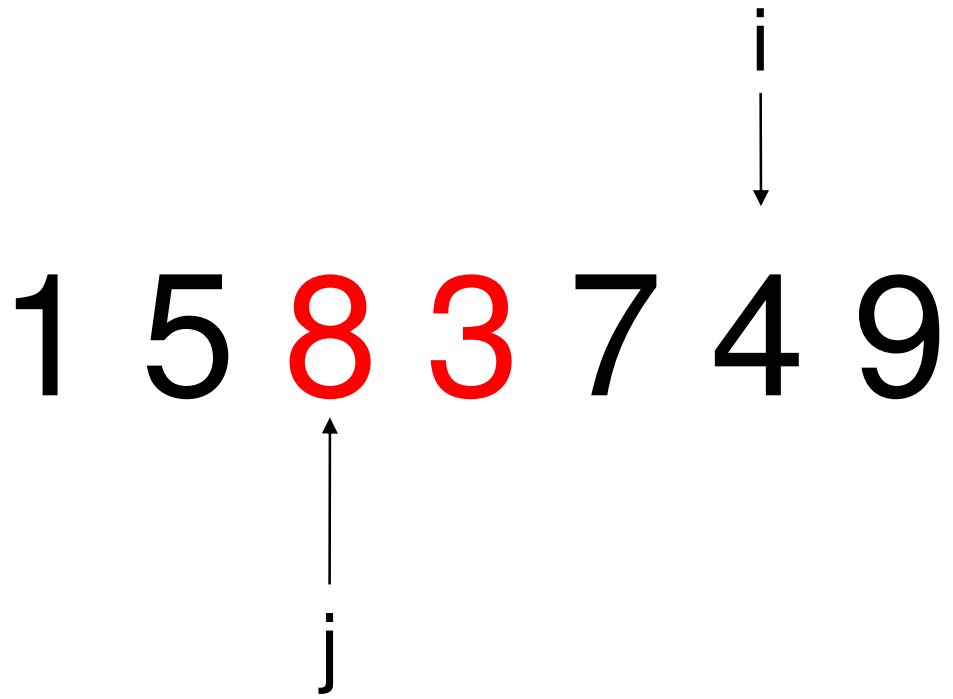

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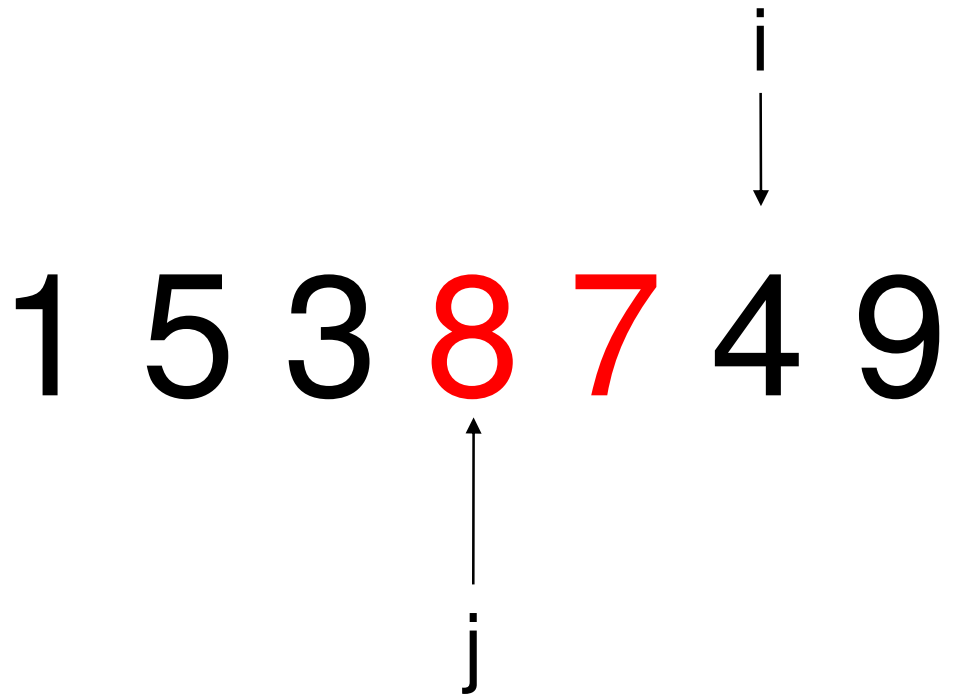

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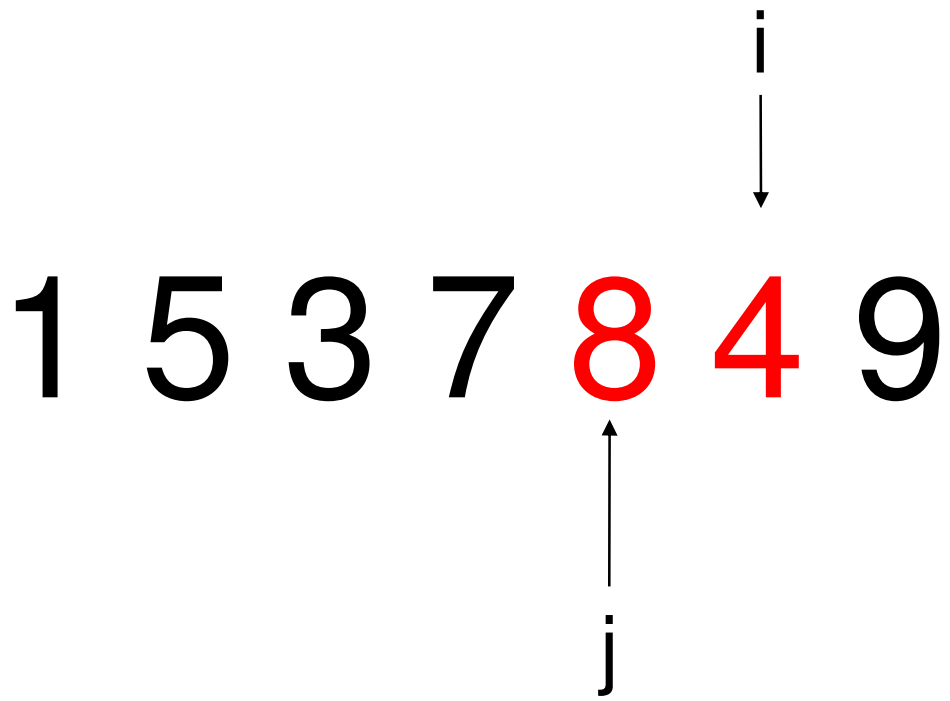

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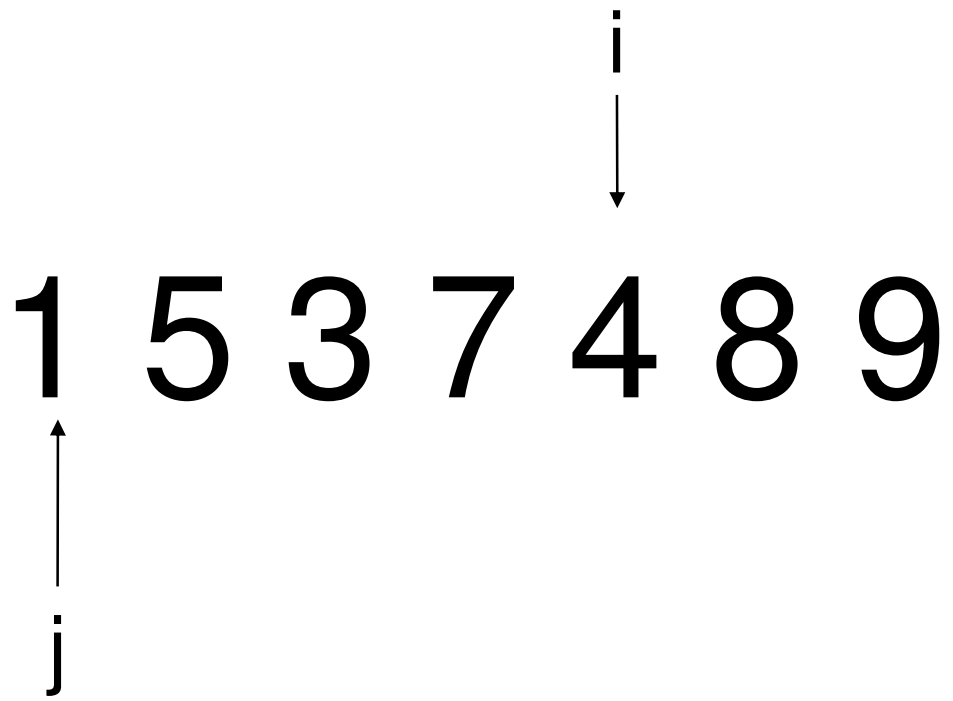

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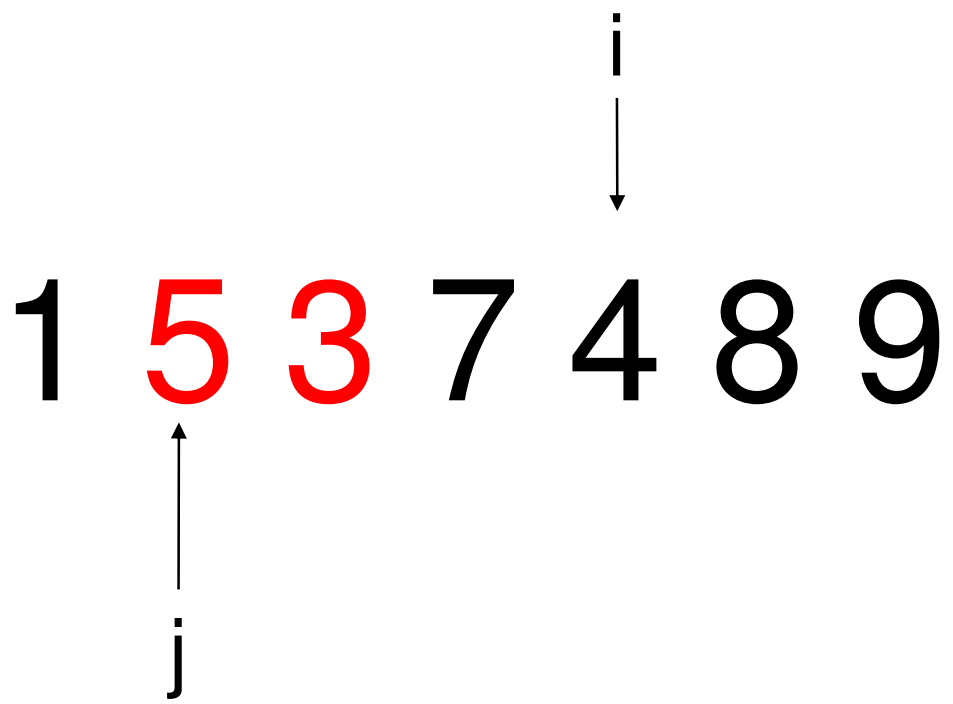

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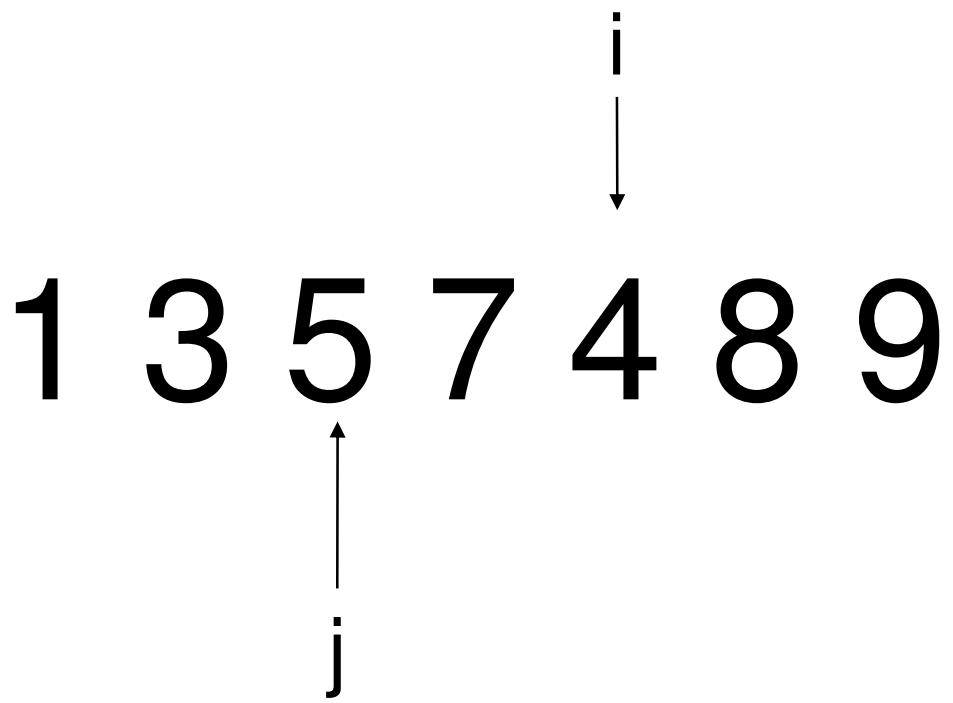

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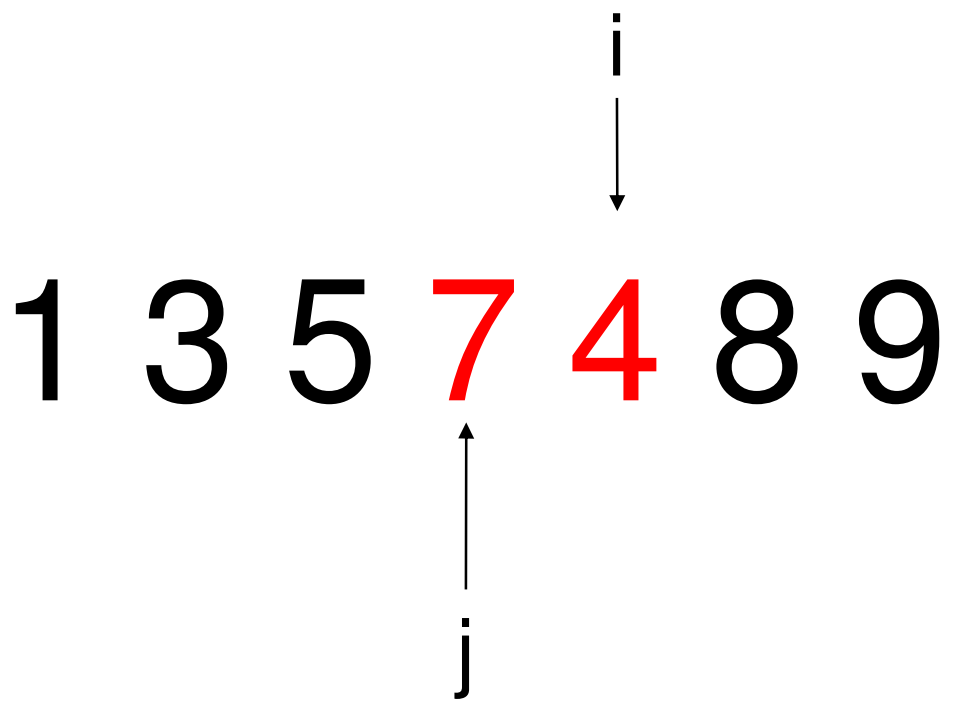

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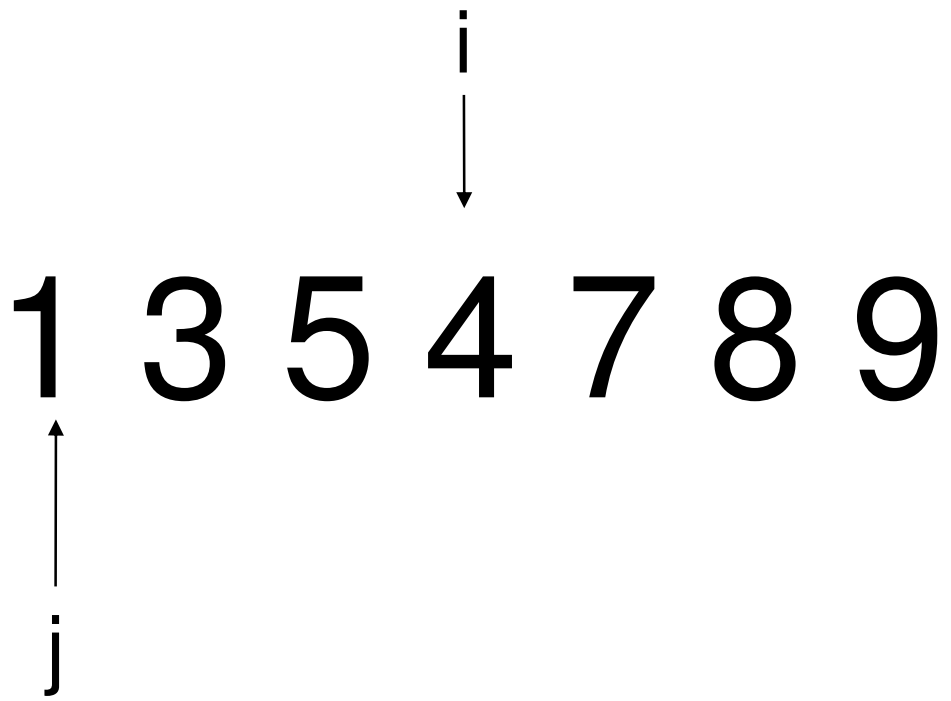

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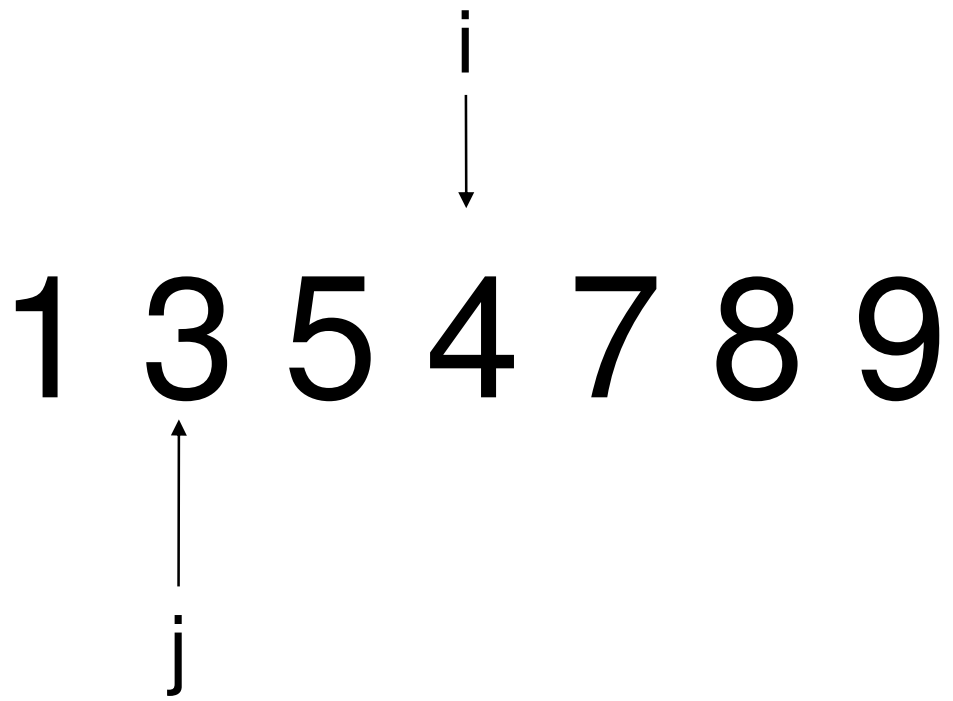

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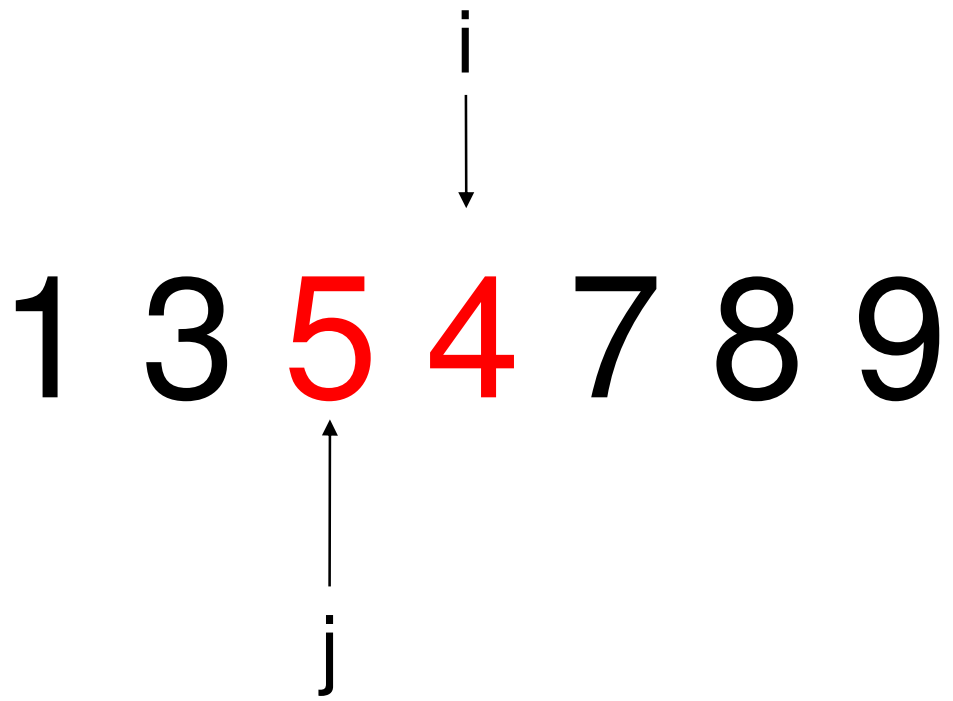

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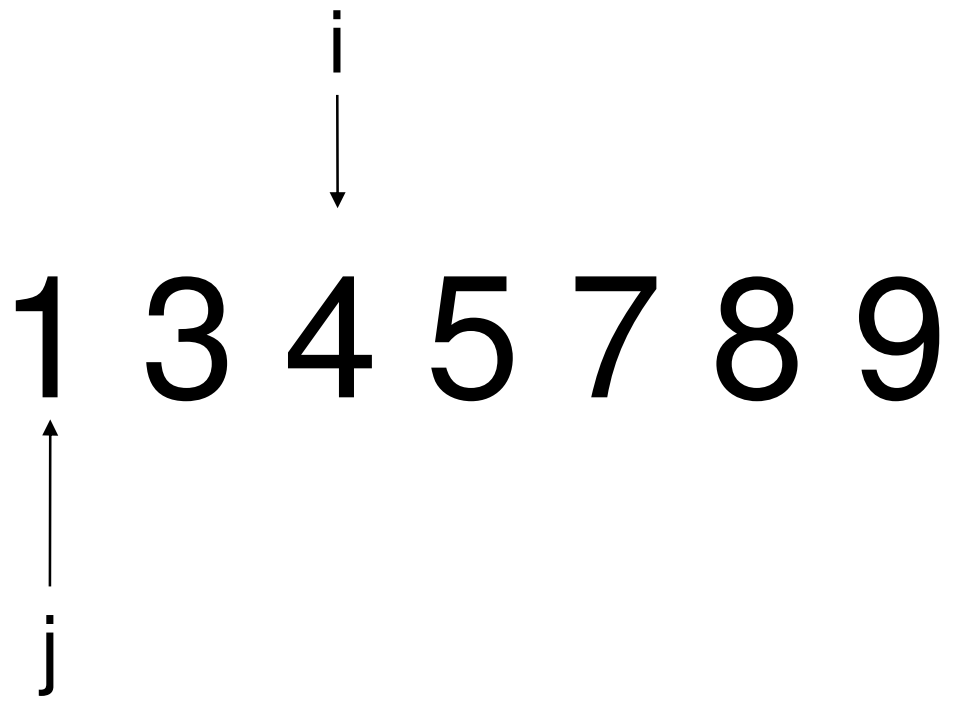

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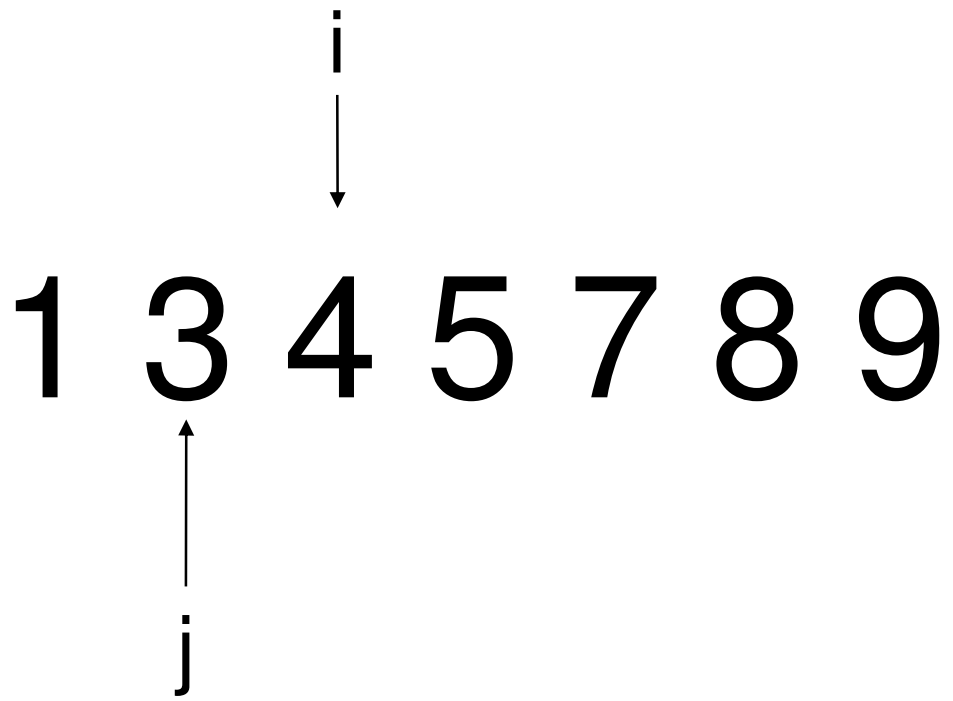

Insert Sort (melhoria)

1 3 4 5 7 8 9