

CC3001-2

2017-08-10

Analysis de Algoritmos

I Ejemplos

Complejidad en el **peor caso**
sobre instancias **de tamaño n**
= 9

(en operaciones tomando
tiempo **CONSTANTE**)

- Bubble Sort

9 8 7 6 5 4 3 2 1
(1 2 3 4 5 6 7 8 9)

$$\frac{(n-1)n}{2} \left| \begin{array}{l} \text{cmps} \\ \text{swaps} \end{array} \right.$$

- Insertion Sort

9 8 7 6 5 4 3 2 1
(1 2 3 4 5 6 7 8 9)

$$\frac{(n-1)n}{2} \left| \begin{array}{l} \text{cmps} \\ \text{swaps} \end{array} \right.$$

→ n comparacion
o swaps

- Selection Sort

9 8 7 6 5 4 3 2 1
(1 2 3 4 5 6 7 8 9)

$$\frac{(n-1)n}{2} \left| \begin{array}{l} \text{cmps} \\ \text{swaps} \end{array} \right.$$

II "Trampas" y Notaciones

$$① \quad f(n) \in \mathcal{O}(g(n))$$

$$f(n) = \mathcal{O}(g(n))$$

$$\exists N, \exists c > 0 \forall n > N \quad \text{t.q.} \quad f(n) \leq c \cdot g(n) \quad (\text{def 1})$$

$$\exists c > 0 \quad \lim_{n \rightarrow \infty} \frac{f(n)}{g(n)} \leq c$$

(def 2)

Ejemplos

$$\frac{n(n-1)}{2} \in \mathcal{O}(n^2)$$

$$100000 n^3 + 88888 n^2 + \frac{\sqrt{5}+1}{2} n + 2^{25} \in \mathcal{O}(n^3)$$

$$2^n + 3^n + 4^n \in \mathcal{O}(4^n)$$

$$\mathcal{O}\left(\frac{n(n-1)}{2}\right) = \mathcal{O}\left(\frac{n^2}{2}\right) = \mathcal{O}(n^2) \subset \mathcal{O}(n^3) = \mathcal{O}(2^{2n})$$

$$\textcircled{2} \quad f(n) \in \Omega(g(n))$$

$$g(n) \in O(f(n))$$

$$\text{MAX} \in \Omega(n)$$

$$\textcircled{3} \quad f(n) \in \Theta(g(n))$$

$$\text{si} \quad \begin{array}{l|l} f(n) \in O(g(n)) & f(n) \in O(g(n)) \\ \textcircled{y} \quad f(n) \in \Omega(g(n)) & g(n) \in O(f(n)) \end{array}$$

III Propiedades

$$f_1(n), f_2(n) \in O(g(n))$$

$$f_1(n) + f_2(n) \in O(g(n))$$

$$25000 f_1(n) \in O(g(n))$$

~~$$\frac{f_1(n)}{f_2(n)} \in O(1)$$~~

$$f_1(n) * f_2(n) \in O(g(n)^2)$$