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Complejidad Computacional Básica

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Notacion

Introduction to algorithms, Thomas H. Cormen . . . [et al.]. 3rd ed.

$$\Theta(g(n)) = \{f(n) : \text{there exist positive constants } c_1, c_2, \text{ and } n_0 \text{ such that } 0 \le c_1 g(n) \le f(n) \le c_2 g(n) \text{ for all } n \ge n_0\}\ .^{1}$$

$$O(g(n)) = \{f(n) : \text{there exist positive constants } c \text{ and } n_0 \text{ such that } 0 \le f(n) \le c g(n) \text{ for all } n \ge n_0\}\ .$$

$$\Omega(g(n)) = \{f(n) : \text{there exist positive constants } c \text{ and } n_0 \text{ such that } 0 \le c g(n) \le f(n) \text{ for all } n \ge n_0\}\ .$$

[1] Within set notation, a colon means "such that."

Ejemplos

- Multiplicar un vector de n elementos por un escalar $\mathcal{O}(n)$
- Multiplicar 2 vectores de n elementos $\mathcal{O}(n)$
- Multiplicar una matriz de n x m por un vector de m elementos $\mathcal{O}(nm)$
- Encontrar un elemento en un arreglo ordenado $\mathcal{O}(\log n)$
- DFT $X_k = \sum_{n=0}^{N-1} x_n e^{\frac{-2\pi i}{N} kn}$ $\mathcal{O}(n^2)$
- FFT $\mathcal{O}(n \log n)$
- Convolución 1D vecotres de tamaño n y m $\mathcal{O}(nm)$
- Convolucion 2D $\mathcal{O}(n_x n_y m^2)$
- Convolucion 2D separable en x e y $\mathcal{O}(n_x n_y m)$

$$\mathcal{O}(n_x n_y(\log n_x + \log n_y) + (n_x + n_y)m \log m)$$