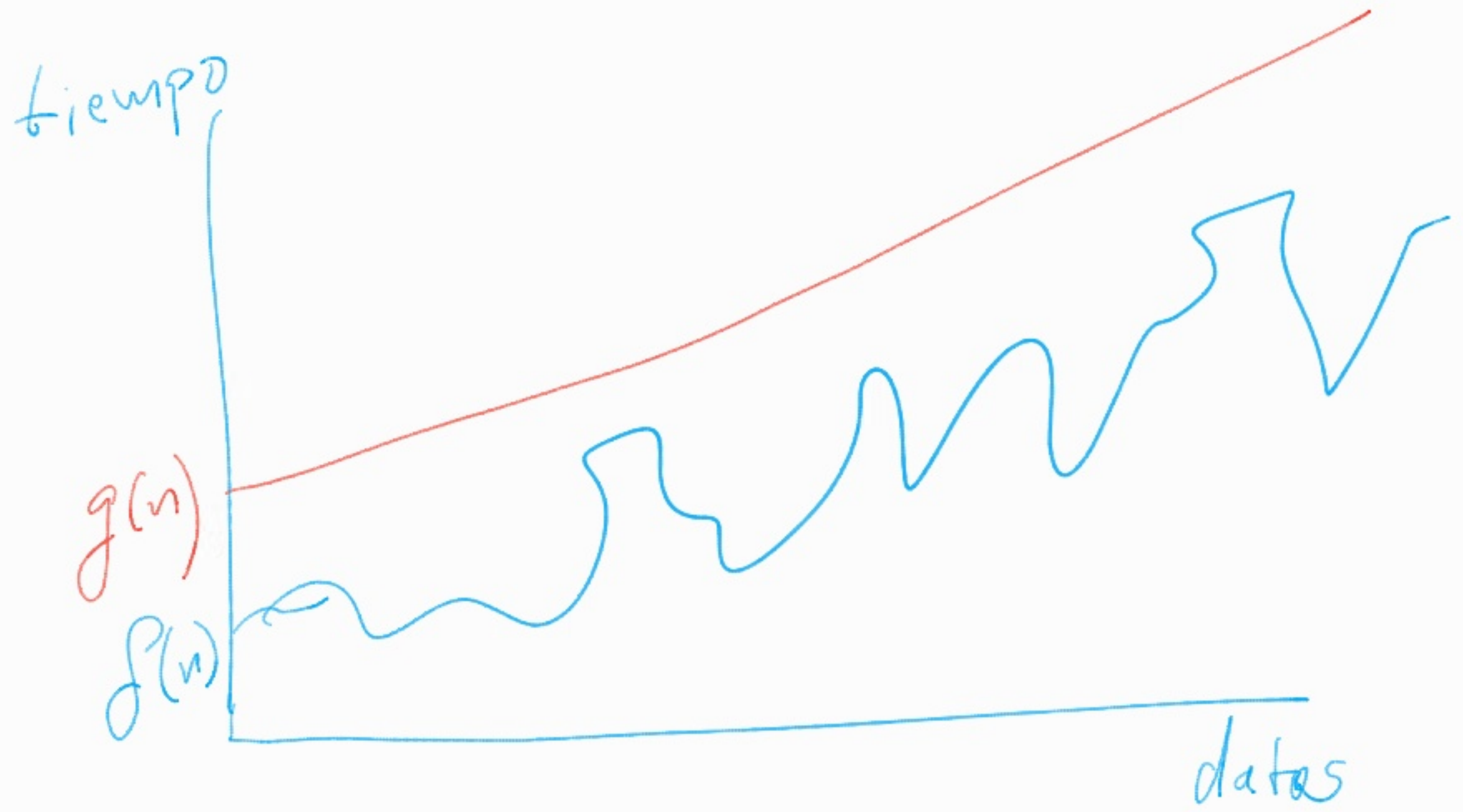


Estructuras de datos

2024-06-04

Análisis de algoritmos

¡ Buenos días!



$n \leftrightarrow$	$V$
1	0
4	2
8	3
16	4
32	5
64	6
128	7

$$\ln(n) = \log_e(n)$$

$$n \leq 2^v$$

$$\Rightarrow v = \log_2(n)$$

$$\log(n) = \log_{10}(n)$$

$$\lg(n) = \log_2(n)$$

```

int iterativa (int n) {
    int x = 1; asig
    while (x <= n) {
        x *= 3;
    }
    return x;
}

```

①

$$T(\text{iterativa}(n)) = T(n) =$$

$$\begin{matrix} T(\text{asig}) \\ + T(\text{while}) \end{matrix}$$

$$+ T(\text{return})$$

$$+ (T(\text{cond}) + T(\text{cuerpo}))v$$

$$+ 1$$

$$= 2 + 2v$$

n	v	x	n	v	n	v
1	1	1*3	5	2	27	4
2	1	1*3	6	2	:	
3	2	1*3*3	8	2		
4	2	1*3*3	9	3		
			:			
			26	3		

$$n \leq 3^v$$

$$\Rightarrow v = \log_3(n)$$

$$\Rightarrow T(n) = 2 + 2 + 2\log_3(n) + 1$$



② Aplicar  $O(n)$

$$O(T(n)) = O(4 + 2\log_3(n))$$

R. Suma

$$= \max(O(4), O(2\log_3(n)))$$

$$= O(2\log_3(n))$$

R. Constantes

$$O(n) = \log_3(n)$$

```

int iterativa (int n) {
    int x = 1;
    while (x <= n) {
        x *= 3;
    }
    return x;
}

```

n	x	r
2	8	
3	8	4
4	8	5
5	8	
6	8	
7	8	
8	8	
9	8	

n	x	r
1	3	1
2	3	1
3	9	11=2
4	9	11=2
5	9	2
6	9	2
7	9	2
8	9	2
9	27	23.
10	27	3
11	27	4

	1	1
<u>→</u>	2	1
	3	2
	9	3
	27	4
	81	5
	$n$	$v$

$$n \leq 3^{v-1}$$

$$\Rightarrow v-1 = \log_3(n)$$

$$v = \log_3(n) + 1$$



```

int factorial (int n) {
    if ( $n \leq 0$ )
        return 1;
    else
        return  $n * \text{factorial}(n-1)$ ;
}

```

1.1

$T(n) =$

$$n=0 \quad T(\text{cond}) + T(\text{ret}) = t + t = 2t$$

$$n>0 \quad \begin{aligned} &T(\text{cond}) + T(\text{ret/exp}) \\ &+ T(n-1) \\ &= t + t + T(n-1) = 2t + T(n-1) \end{aligned}$$

$$\begin{aligned}
 1.2) \quad T(n) &= 2 + T(n-1) \quad (1) \\
 &= 2 + [2 + T(n-2)] = 2*2 + T(n-2) \quad (2) \\
 &= 4 + [2 + T(n-3)] = 2*2 + 2 + T(n-3) \\
 &= 3*2 + T(n-3) \quad (3) \\
 &= 3*2 + [2 + T(n-4)] = 4*2 + T(n-4) \quad (4) \\
 &\vdots \\
 &= K*2 + T(n-K) \quad (K)
 \end{aligned}$$

1.3) cond. iniciales

$$T(\emptyset) = 2t$$

$$\Rightarrow n-K = \emptyset \Rightarrow n = K$$



$$T(n) = 2k + T(n-k)$$

$$T(0) = 2 \text{ \& } n-k = 0 \Rightarrow n=k$$

$\Rightarrow$  Sust.

$$T(n) = 2n + T(n-n) = 2n + T(0)$$

$$= 2n + 2 \Rightarrow T(n) = 2 + 2n$$

$$\textcircled{2} \quad O(T(n)) = O(2 + 2n) = O(2n) = n$$

linear  $\leftarrow$  #