Introduction

Note Title 9/1/2019

ICS 553 – Advanced Algorithms

Review on ICS 353 topics :

1] Searching : linears search : n element comp. $\Rightarrow O(n)$

binary search : $\lfloor \log_2 n \rfloor + 1 \Rightarrow O(\log n)$

2] Sorting :

Insertion sort

Selection sort (Ibrahim)

bubble sort

merge sort (Yousef)

quicksort (Abdulmajid)

heap sort (Fahd)

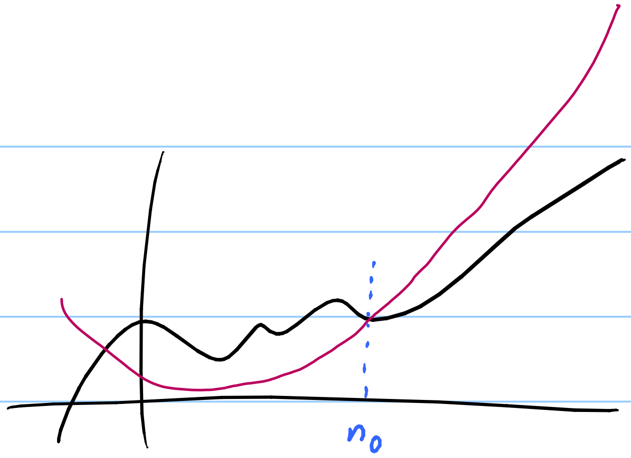
3] Time complexity notations

Big-O notation "upper bound"

Ω - notation " lower bound"

Θ - notation "both O and Ω"

Small-oh " different class"



Big-O notation

$f(n) = O(g(n))$

if $\exists\, c > 0,\ \exists\, n_0$ s.t.

$f(n) \leq c \cdot g(n) \quad \forall n \geq n_0$

Ω- notation $f(n) = \Omega(g(n))$

if $\exists\, c > 0,\ \exists\, n_0$ s.t.

$f(n) \geq c . g(n) \quad \forall\, n \geq n_0$

Small-oh

$f(n) = o(g(n))$

if $\forall c > 0, \exists n_0$ s.t.

$f(n) < c \cdot g(n) \quad \forall n \geq n_0$

4] Exer:

① $f(n) = n^2 + 2n \log \quad = O(n^2)$

② $f(n) = n^2 + 2n + \sqrt{n^5}$

$= n^2 + 2n + n^{2.5} \quad = O(n^{2.5})$

③ $f(n) = \log n + n^{0.1} \quad = O(n^{0.1})$

for $c = 1$, $n_0 = 2^{100}$

Read §1.1 — 1.8 (2016)