

CS341 Notes

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1 Asymptotic Notation and Recurrences

1.1 master method

$$T(n) = aT\left(\frac{n}{b}\right) + O(n^d)$$

a = #recursive calls, $a > 1$

b = input size shrinkage factor ($b > 1$)

d exponent in the runtime $d > 0$

$$T(n) = \begin{cases} O(n^d \log(n)) & a = b^d \\ O(n^d) & a < b^d \\ O(n^{\log_b a}) = O(a^{\log_b n}) & a > b^d \end{cases}$$

Math Rule 5:

$$\sum_{i=0}^k c^i = \begin{cases} \Theta(c^k) & c > 1 \\ \Theta(k) & c = 1 \\ \Theta(1) & c < 1 \end{cases}$$

1.1.1 2D maximal

Input: a set P of 2D points

Output: all "maximal" points

Def(maximal): P is maximal if no point P "dominates" p

i.e. $\nexists p'$, such that $p'.x > p.x, p'.y > p.y$

1.1.2 Closest Pair

Input: a set P of 2D points

Output: pair (p,q) that has min Euclidean distance