CSE3990

HW3 due NOW

Exam 3 on 12.8.16 @ 3:30pm HERE

(2) $X = k_1, k_2, \ldots, k_i, k_{i+1}, \ldots, k_n$

$$\sum_{j=1}^{i} k_j \geq y$$

PERFORM A PREFIX SUMS COMP. ON X.

Let the result be

$k_1', k_2', \ldots, k_n'$

$y = 18$

$X = 3, 2, 5, 7, 4, 6, 8$

$X' = 3, 5, 10, 17, 21, 27, 35$

③ Multiply two $n \times n$ Boolean Matrices

$$C_{ij} = \sum_{k=1}^{n} A_{ik} B_{kj}$$

④

let $X = \underbrace{k_1, k_2, \ldots, k_{\frac{n}{2}}}_{X_1}, \underbrace{k_{\frac{n}{2}+1}, \ldots, k_n}_{X_2}$ be the input.

① Sort X_1 recursively using $\frac{n}{2}$ proc. $\Rightarrow X_1'$

Sort X_2 " " " $\Rightarrow X_2'$

② Merge X_1' and X_2' using valiants alg

let $T(n)$ be the RUN TIME on any input of size n using n proc.

$$T(n) = T\left(\frac{n}{2}\right) + O(\log\log n)$$

$$= O(\log n \log\log n).$$

$n = |V|$.

(5) For each subset S of k nodes check if these k nodes form a clique.

$$\text{TIME} = O\left(\binom{n}{k}\binom{k}{2}\right)$$

$$= O(n^k k^2) = O(n^k).$$

(6) Show that the folg problem is NP-complete:

<u>INPUT:</u> $G(V,E); K$.

CLIQUE $\propto$ INDSET.

Create the folg. instance of INDSET:

$G'(V,E'); K \rightarrow$ COMPLEMENT OF G.

G' can be constructed in $O(|V|^2)$ TIME.

CORRECTNESS:

(A): Assume G has a clique of size k.

C will be an indep. set in G'

Ily if G' has an ind. set of size k, then these k nodes will form a clique in G.

2014

$A = a_1, a_2, \ldots, a_n$, $B = b_1, b_2, \ldots, b_n$

Sets

1: INPUT: A, B,

with $|A| = |B| = n$.

Check if $A \cap B = \phi$.

in $O(1)$ TIME & n^2 proc

For each element in A

assign n proc.

2) Input $X = K_1, K_2, \ldots K_n$

Find the right neighbor of each key in sorted order.

in $O(1)$ TIME using n^3 proc.

Ex. $X = 3, 8, 7, 12, 6, 5, 4, 17, 14$

$$\begin{array}{ccccccccc} 3 & 8 & 7 & 12 & 6 & 5 & 4 & 17 & 14 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 4 & 12 & 8 & 14 & 7 & 6 & 5 & \infty & 17 \end{array}$$

$+\infty$	8	7	12	6	5	4	17	14

(3) INPUT:

$X = b_1, b_2, \ldots, b_n \rightarrow$ BITS.

Output the position of the left most 1.

If $X = 0, 0, 0, 1, 0, 1, 0, 1$

Output 4

Define $\oplus$:

$$(b,i) \oplus (c,j) \begin{cases} = (b,i) & \text{if } b=1. \\ = (c,j) & \text{if } b=0 \end{cases}$$

$X' = (b_1,1), (b_2,2), \ldots, (b_n,n)$

Do a prefix comp. on X' using $\oplus$.

Output: if $(b_1,1) \oplus (b_2,2) \oplus \ldots \oplus (b_n,n) = (1,i)$

then output i