CS612 Assignment Hints

Institute of Computing Technology,
Chinese Academy of Sciences, Beijing, China

January 25, 2010

Assingment 4:

Problem 1:

Let $S(P, IN)$ be sum of the ratings, if employee P attends the meeting, and $S(P, OUT1)$ be the sum if P prefers to absent himself, and $S(P, OUT2)$ be the sum if P has to drop the meeting because his supervisor presents. Given P's left-child L and right-sibling R, we have

$$S(P, IN) = S(L, OUT1) + \max\{S(R, IN), S(R, OUT2)\}$$
$$S(P, OUT1) = \max\{S(L, IN), S(L, OUT2)\} + S(R, OUT1)$$
$$S(P, OUT2) = \max\{S(L, IN), S(L, OUT2)\} + \max\{S(R, IN), S(R, OUT2)\}$$

Problem 2:

Let $b_1, ..., b_n$ be the jobs ranked by deadline, $P(T, i)$ be the profit after time T and job i passed, we have
$P(T, i) = \max\{(P(T + t_i, i + 1) + P_i)\delta(T + t_i, d_i), P(T, i + 1)\}$,
where $\delta(a, b) = 1$ if $a \leq b$, 0 otherwise.

Problem 3:

Let $d(u, v)$ and $c(u, v)$ be the shortest length and the corresponding number of shortest pathes between u and v, and $d_w(u, v)$ be the shortest length without w, then

$$
\begin{aligned}
d(u,v) &= \min\{d(u,w)+d(w,v), d_w(u,v)\} \\
c(u,v) &= c(u,w) * c(w,v) \quad \text{if} d(u,w)+d(w,v) < d_w(u,v); \quad 1 \quad \text{otherwise.}
\end{aligned}
$$

Problem 5:

Let $S(i)$ be the length of the maximum subsequence till i, then

$$S(i) = \max_{j=1}^{i-1} S(j) + 1 \quad \text{if} \quad a_i > a_j$$

Assignment 5

Problem 2:

Rank the nodes by their degrees, add edges to the largest node by connecting it to its following nodes; proceed to the next node and repeat the procedure.

Problem 4:

Rank the skiers and skies respectively, and assign a skier with a ski of the same rank.
The algorithm can be proved using the following inequity:
Let $p_i \leq p_j$ and $s_i \leq s_j$, we have $|p_i - s_i| + |p_j - s_j| \leq |p_i - s_j| + |p_j - s_i|$.

Problem 5:

Minimize the number of lines.