Solution for a3 of CS4335

Q1. (a)

Let d(i) be the max number of pairs for the first I numbers in the first I number $a_1a_2…a_i$.

d(i) = max { d(i-1), 1+d(j)}, where j is the largest integer <I and $a_i==a_j$.

(b) Let d(i) be the max weight of pairs for the first I numbers in the first I number $a_1a_2…a_i$.

d(i) = max { d(i-1), (a_i+a_j)+d(j)}, where j is the largest integer <I and ai==aj.

The pseudo code and backtracking are omitted here (20%) Similar to the weighted interval scheduling problem.

Q2.

Let d(i, j) be the cost of the opt solution for the interval ai…aj.

d(i,j) = 1+d(i+1, j-1) if ai=aj.

Otherwise

d(i, j)= max $_{i<k<j}$ {d(i+1, j), d(I, j-1)， d(i, k)+d(k+1, j)}

Pseudo codes are similar to that of the weighted binary search tree construction problem. (20%)

Q3: Let d(i, j, k) be the max total value the first play can get, where i+j+k=2q for some q.

d(i, j, k) = max {a, b c}, where

a= a_i+ min {d(i-1, j-1,k-1), d(i-1, j, k-2), d(i-1, j-2, k), d(i-2, j-1, k), d(i-2, j, k-1), d(i-3, j, k}}

First play chooses a_i from row 1 and the other two have 6 choices.

b=b_j+min{d(i-1,j-1,k-1), d(i, j-1, k-2), d(i-2, j-1, k), d(i, j-2, k-1), d(i-1, j-2, k), d(I,j-3, k)}

First play chooses b_j from row 2 and the other two have 6 choices.

d= c_k+ min {d(i-1, j-1, k-1), d(i-2, j, k-1), d(I, j-2, k-1), d(i-1, j, k-2), d(I, j-1, k-2), d(I, j, k-3)}

First play chooses c_k from row 3 and the other two have 6 choices.

and all the index on the right hand side must >=0 (if negative, ignore that term.)

Initial value d(0, 0, 0)=0.

Assume that row 1 contains a_1, a_2, ..a_n, row 2 contains b_1, b_2, …, b_n and row 3contains c_1, c_2, …, c_n. We need to take a_i (b_i and c_i) first before take a_{i-1}. (b_{i-1} and c_{i-1})