

z5242692

Chenqu Zhao

COMP9101 (T2-2020)

Homework 4 – Q4

Let i denote that the path ends at this node and k denote the length of the path. So that i could be any vertex in the graph and k ranges from 1 to K . Now we want to solve the following problem: for every node i and every length k , find the maximum weight path of length exactly k which ends at node i .

Use $w(u, i)$ to denote the weight of the edge between two adjacent vertices pointed from u to i . And E denotes a set which contains all these kinds of edges pointed to i .

The base cases are $opt(i, 1) = \max_{(u, i) \in E} \{w(u, i)\}$ for every i . The state transfer function is as follow:

$$opt(i, k) = \max_{(u, i) \in E} \{opt(u, k - 1) + w(u, i)\}$$

Do this recursion until we solve $opt(i, K)$ for every node i . Denote the maximum values among these i numbers as $opt(I, K)$.

Now apply back-tracking technique using the value $opt(I, K)$ to generate the exact path. Initialize list P with only a single element I . Strictly follow the above state transfer function to solve the u which is the last node we choose. Append this node to a list P . Do this recursion until k is eliminated to 1.

The **reverse list** of list P is the path we want.