演算法Homework 20191121

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A screenshot of a social media post

Description automatically generated

(1)

Let the length of path between 2 adjacent vertices is 1.

x = The length of the longest simple path ≥ The length of any simple paths.

At first, the tree of the simple path has one root of tree which do not has any verticle with more than 2 branches except for the root. That is the tree looks like line. Then, the height of the tree can be indicated like below.

x/2 ≤ the height ≤ x

So, the correctness of (1) holds. The root of the tree is minimal and the minimal height is x/2, when the middle of the height of the tree has a vertex.

(2)

a) The simple path always has v when the vertex v is in the simple path.  
b) According to (1), the root of the tree which makes the height of tree minimal is in the longest simple path

c) According to the definition of simple path, the root of the tree v must be in the simple path.

From a), b) and c) above, the statement of (2) holds

(3)

According to (1), “the root of the tree is minimal and the minimal height is x/2, when the middle of the height of the tree has a vertex”. So The middle of the longest path always makes the minimal tree.

Here, there are counterpart. Let the length of the paths between 2 vertices is different each like (a,b)=1, (b,c)=10, (c,d)=10, (d,e)=10, (e,f)=10, (f,g)=20. In this case the statement is not correct because the middle of the vertex is d and the height is 40 but the minimal height would be 31. The reason why the statement does not always hold.

The correct statement is “the nearest vertex to the middle of the longest path is always the answer to the problem”.