

graph question – need some help...

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Hi All,

I need to solve the following problem. I have a direct weighted (edge) graph, and set of "origin" nodes.

There are 2 special characteristics to the graph:

- 1) Part of the origin nodes are "split" into 2 nodes– v_i and v_i' – (their union represent just 1 node.–> v_i)
- 2) Some nodes doesn't have incoming edges. We will call these nodes– initiators and the have some weigh associated with them.

I want to visit all the node (for nodes that were split i can visit v_i or v_i' (or both), and for initiator's node i must pay their weight) in the minimum cost.

for nodes that are not initiators– i MUST use the edges from the graph.

Output: given the knowledge about the graph(nodes,split,initiator and weights) i want a list of nodes to visit them and the total cost.

For example: this graph includes 5 origin nodes: v_1, v_2, \dots, v_5

- 1) v_2, v_4, v_5 are splits into v_2, v_2', v_4, v_4' and v_5, v_5' .
- 2) v_1 and v_3 are initiators. v_1 weight is $(a+x_1)$ and v_3 is also $(a+x_1)$.
- 3) the transitions cost from node n_i to n_j , are in the matrix below:
moving from v_2 to v_4 is: $(a+x_2)$
the empty cells mean that there is no edge between the nodes.

to

$v_1 \ v_2 \ v_2' \ v_3 \ v_4 \ v_4' \ v_5 \ v_5'$

f v_1 x_2
 v_2 a $(a+x_2)$ $(a+x_2)$
 v_2' 0 0
 v_3 x_2 x_2
 v_4 a $(a+x_2)$
 v_4' 0
 v_5 a
 v_5'

Generally, how should i solve this problem, what is the complexity of

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this problem? Does anyone know any good reference ?

any help will be appreciated,
Kiwi

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