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N_K Algorithm to Lay Milk Line for Transporting Maximum Capacity Through Shortest Route

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Abstract

This paper describes a N_K Algorithm for finding single-paired shortest route problem by assuming starting node as source node and other node as end point. This is one of the shortest routes finding algorithm of cyclic nature with major application in the areas of transportation and networking, especially for milk collections from distinct areas of certain region. Here the N_K Algorithm which gives good results and possibly transports maximum capacity with minimum cost.

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1 Introduction to Pipeline Problem

Pipelines are the leading method of transporting refined petroleum, and they are an especially important mode of transportation, where large volumes of oil must be moved over land. [5]extensive network of pipelines for the transport of refined petroleum owned and managed, for the most part, by the large, vertically integrated operations of the major oil companies. In 2001, firms in the industry operated a network moving petroleum products through 91,000 miles of pipeline, or approximately 51 percent of the all petroleum pipelines (crude and refined) totaling 177,000 miles. Though pipeline grew at a crawling pace from the mid-1980s through the mid-1990s, the late 1990s ushered in a more successful period for the industry, and demand for refined petroleum products was predicted to increase modestly in the United States and abroad. In 2001, total value of petroleum pipeline put in place (carrying both crude and refined products) totaled $943 million.

The pipeline network contains gathering systems of pipelines, which are used to bring crude petroleum from the oil fields and pump it to storage. Then, oil fields have a network of small-diameter "gathering lines" collecting crude oil from individual wells and transporting the output to a large-diameter "trunk line" for shipment to a refinery. Pipelines move refined products to markets. [4] In 2000 U.S. oil refineries moved 7.5 billion barrels of petroleum products.

2 Milk Line

Here, it's discussed about construction of [4] pipeline to transport milk from primary society to chilling center with maximum capacity of milk with minimum cost through pipe line, It is a major work, involves lot of cost and an idea. This kind of pipe line is called milk line. Milk line helps to avoid vehicle routing and its related problem.

The problem of sequencing the input of commodities milk products to a pipeline might reduce a surrogate for pumping and maintenance costs. This problem is complicated by the need to impose a discrete framework which handles the sequencing choices on a continuous flow problem. By focusing on the discrete aspects of the problem, the proposed model allows decomposition of the sequencing problem into sub problems which can be easily priced out.

3 Introduction to N_ K Algorithm

The problem is also sometimes called the single-pair shortest path problem, it will help to lay pipe line with shortest distance ,to distinguish it from the [5] following generalizations:

- The single-source shortest path problem, in which we have to find shortest paths from a source vertex v to all other vertices in the graph.

- The single-destination shortest path problem, in which we have to find shortest paths from all vertices in the graph to a single destination vertex v. This can be reduced to the single-source shortest path problem by reversing the edges in the graph.

- The all-pairs shortest path problem, in which we have to find shortest paths between every pair of vertices v, v' in the graph.

- These generalizations have significantly more efficient algorithms than the simplistic approach of running a single-pair shortest path algorithm on all relevant pairs of vertices

3.1 Introduction tO N_ K Reverse Sorting Model

Notations

Let $\{i \to j, D_{ij}, W_{ij}\}$
i is source node
j is destination node
W_{ij}= Capacity to transport from source i to destination j
D_{ij}= Distance between source i to destination j

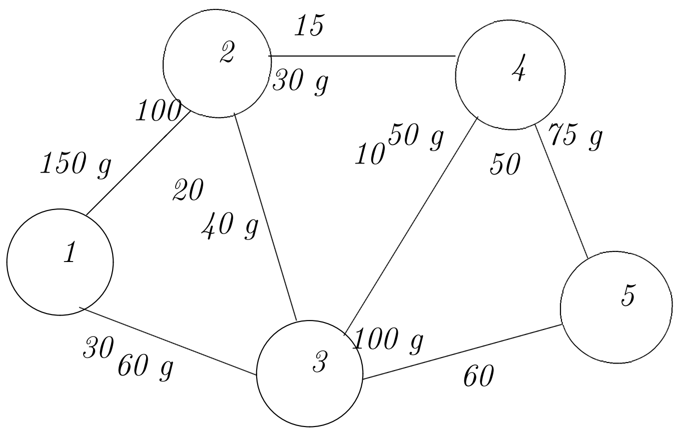
STEP 1: Select max $\{i \to j_x, W_i j_x\}$ where $x = 123, \cdots, n$ by ignoring D_{ij}. If the result is unique then declare as stage-I solution. If not then follow step 2.

STEP 2: If Max $\{i \to j_x, W_i j_x\} = \{W_i j_x\}$ for $x = 1 = 2 = 3, \cdots, = n$. Then select Min $\{D_{ij}\}$ from [Max $\{i \to j_x, W_i j_x\}$ where $x = 123, \cdots, n$]. If the result is unique then declare as stage-I solution. If not then follow STEP 3.

STEP 3: If Max $\{i \to j_x, D_i j_x\} = \{D_i j_x\}$ for $x = 1 = 2 = 3 = \cdots = n$. Then select Max ratio $\{W_i j_x / D_i j_x\}$ for $x = 1 = 2 = 3 = \cdots = n$.

STEP 4: Repeat STEP 1,2,3 till reaching destination node with Minimum cost and Maximum capacity.

Example 3.1 *The following [2] figure 1 depicts the pipe line routes to supply milk*



STEP 1: *Select Max* $\{[1 \rightarrow 2, 150], [1 \rightarrow 3, 60]\}$. *Stage I solution is* $[1 \rightarrow 2, 150]$,

STEP 2: *Select Max* $\{[2 \rightarrow 3, 40], [2 \rightarrow 4, 30]\}$. *Stage II solution is* $[2 \rightarrow 3, 40]$,

STEP 3: *Select Max* $\{[3 \rightarrow 4, 50], [3 \rightarrow 5, 100]\}$. *Stage III solution is* $[3 \rightarrow 5, 100]$,

In the above case, in all the stages solution are unique, therefore optimal solution is $\{1 \rightarrow 2 \rightarrow 3 \rightarrow 5, 180, 290\}$

The above optimal solution is chosen regarding the Maximum capacity and Minimum cost.

3.2 Conclusion

This algorithm gives complete solution for transporting maximum capacity with shortest route, also its gives idea to lay pipeline and to supply chain.

3.3 Open problem

Researchers can try same kind of problem with multi objectives; it may yield another dimension solution for shortest route and milk line.

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