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Mathematical Modeling on Network Fractional Routing Through Minimum Spanning Tree

P.Vanitha Muthu
Assistant Professor, Department of Computer Science and Engineering
Government College of Engineering, Srirangam - 620012,
Tiruchirappalli, Tamilnadu, India

Abstract - A minimum Spanning Tree is one of the most important optimization techniques to help Decision Making in Network. A Minimum spanning Tree problem calls for optimizing linear functions of variables called objective function. The objective function minimizes the total outflow from source node to sink node. I will prove fractional routing capacity for some solvable networks using minimum spanning tree.

Keywords - capacity, flow, fractional routing, spanning tree.

I. INTRODUCTION

The maximum flow problem can be solved by minimum spanning tree. All the variables are nonnegative. Network Fractional Routing has been proved to be an effective technology in solving network information flow problem, for each source nodes, the messages it transmits through intermediate nodes to target nodes through edge set. For each target node, the message it requires is a subset of messages from source nodes. The intermediate nodes can not only duplicate and forward messages they receive from in-edges, but also use mathematical functions to compute these messages before forwarding them. If I can find a set of spanning tree functions which help satisfy all target nodes, then this network is solvable and found a solution for it. If output message of each intermediate node is one of its incoming messages, then it called as Routing Solution.

II. RELATED WORK

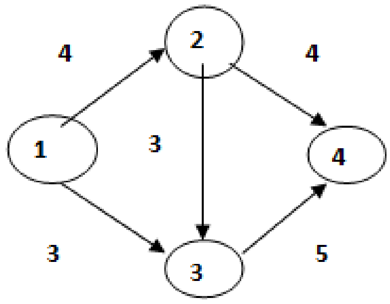

Fig. 1. Capacity Diagram

Minimum Cut Problem:

A partition of the node into two sets S and T. The origin node must be in S and the destination node must be in T. Examples

Where $S_1 = \{1,2,3\}$ and $T_1=\{4\}$

The value of a cut V(S,T) is the sum of all the arc capacities that have their tails in S and their heads in T.

$V(S_1,T_1) = 9$.

Where $S_2 = \{1,2\}$ and $T_2 = \{3,4\}$

$V(S_2,T_2) = 10$.

Where $S_3 = \{1\}$ and $T_3 = \{2,3,4\}$

$V(S_3,T_3) = 7$.

The maximum flow = $\min(V(S_1,T_1), V(S_2,T_2), V(S_3,T_3))$

$= 7$

The value of maximum flow is equal to the value of Minimum Cut.

III. PROPOSED ALGORITHM

Step 1: Select the path from source node to sink node with positive flow.
Step 2: Find the Arc and distance using the capacity.
Step 3: Sort by distance using the capacity.

Step 4: Connect all the vertices using the capacity.
Step 5: Visit all the nodes one by one. If the nodes are already connected, then the values are Rejected otherwise the values are accepted.
Step 6: Repeat the step 4 and step 5 until all the nodes are connected.
Step 7: Finally, the spanning trees are optimal solution is also called a Minimum Spanning Tree.

IV. FRACTIONAL ROUTING EXAMPLE

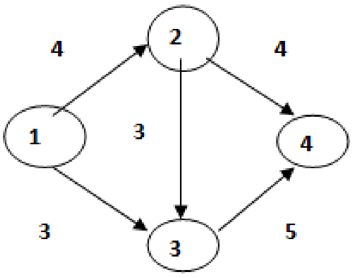

Fig. 2. Flow and Capacity Diagram

Step 1:

Arc	Distance
Node 1:	
1->2	**4**
1->3	**3**
Node 2:	
2->3	**3**
2->4	**4**
Node 3:	
3->4	**5**
Node 4:	**NIL**

Step 2:

Sort by Distance using the Capacity.

Arc	Distance
1->3	**3**
2->3	**3**
1->2	**4**
2->4	**4**
3->4	**5**

Step 3:

Connect all the Vertices using the Minimum edges

Arc	Distance
1->3	**3 Accept**
2->3	**3 Accept**
1->2	**4 Reject**
2->4	**4 Accept**
3->4	**5 Reject**

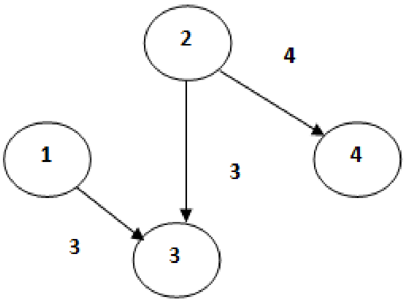

Fig. 3.Minimum Spanning Tree

The Maximum Flow = Cost – No. Of Edges
= 7

The value of the Maximum flow is equal to the total outflow from source node or the total inflow from the sink node. The meaningful objective of this problem is to determine the maximum flow of fluid form a given source node to a given destination node.

V. RESULT AND DISCUSSION

Fractional Routing = Flow / Capacity

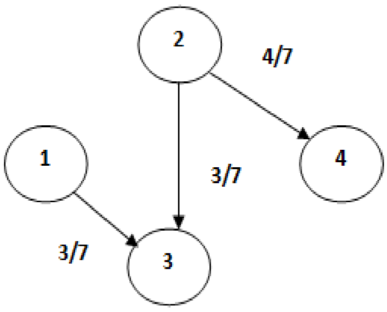

Fig.4.Fractional Routing Diagram using Spanning Tree

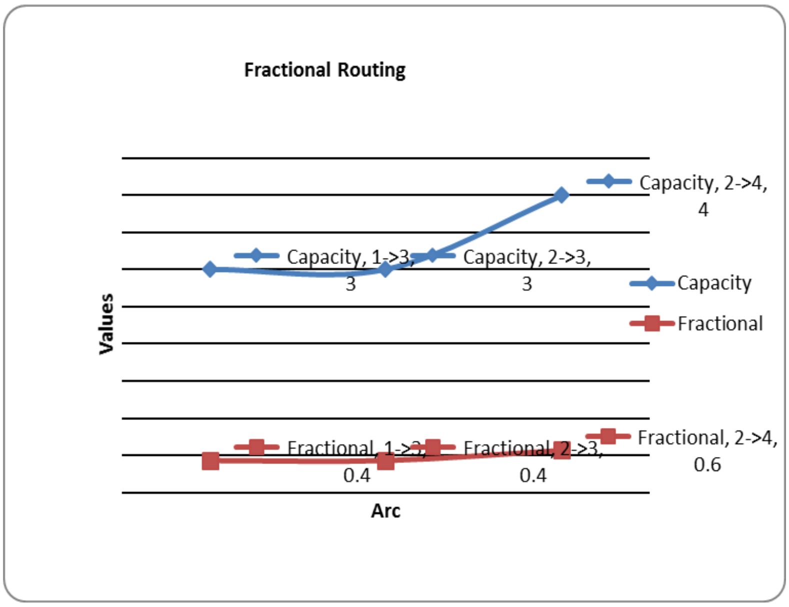

Fig.5. Network Fractional Routing

The fractional Routing values are lies between 0 and 1. The minimum spanning tree can be used to determine the routing capacity of a Network. The purpose of this analysis is to reduce the edges time required to obtain the changes in the optimal solution.

VI. CONCLUSION

The objective function minimizes the total outflow from source node or the total inflow to sink node. A set of nodes which are satisfied by any minimal Fractional routing solution is formulated. The maximum flow problem is a special case of more complex network flow problem. The max-flow value of quantities with multiple constraints. A multicast network that has a solution for a given alphabet might not have a solution for all larger alphabets. The routing capacity of every nondegenerate network is reachable.

VII. FUTURE WORK

This network has a linear coding solution but no routing solution. The Spanning trees are a mathematical technique of optimization using multi stage decision process. Every solvable multicast network has a scalar linear solution over a sufficiently large finite field alphabet. The Routing capacity of every network is balanced nondegenerate network is reachable. I will briefly describe some of the algorithm for solving Derivation Trees.

REFERENCES

[1] S.Asokan, P.Vanitha muthu, "Mathematical Modeling on Network Fractional Routing Through Inequalities", International Journal on Computer Science and Engineering, Vol.6, No.12, pp 374 - 378, Dec 2014.

[2] S.Asokan, V.Palanisamy "Linear Network Fractional Routing", International Journal on Computer Science and Engineering, vol. 03, No.07, pp2733 -2738, July 2011.

[3] V.Palanisamy, S.Asokan "Network Fractional Routing", International Journal on Computer Science and Engineering, vol. 02, No.04, pp. 1303 -1307, July 2010.

[4] Jillian Cannons, Randall Dougherty,Chris Freiling and Kenneth Zeger",Network Routing Capacity", IEEE transactions on information theroy, vol.52, No. 3, march 2006.

[5] S.-Y. R. Li, R. W. Yeung, and N. Cai, "Linear network coding," IEEE Trans. Inf. Theory, vol. 49, no. 2, pp. 371– 381, Feb. 2003.

[6] S. Riis, "Linear versus nonlinear boolean functions in network flow," in Proc. 38th Annu. Conf. Information Science and Systems (CISS), Princeton, NJ, Mar. 2004.

[7] R. W. Yeung, A First Course in Information Theory. New York: Kluwer, 2002.

