Study of Network Maximum Capacity through Nonlinear Function Optimization in Tree Structures

[1]**Ravi Padma,** [2]**K. Pushpa Latha,** [3]**A. Chandra Sekhar**
[1,2,3]Assistant Professor, [1,2,3]Department of H & S, Brilliant Institute of Engineering and Technology, Hyderabad, India

ABSTRACT
One of the most crucial data structures for system decision-making is a tree. A non-linear data structure is a tree. Optimizing non-linear objective functions of variables is required for a tree issue. The objective function is to maximize the overall outflow from source node to sink node. Using tree designs, we shall demonstrate a network's maximum capacity.
Keywords – capacity, Network, Tree, Source Node, Sink Node

INTRODUCTION

A basic linked, weighted, directed graph (G) is called a flow network if each directed edge has a weight that is not zero. In a flow network, this amount, denoted Cij for the edge oriented from vertex I to vertex j, represents the capacity of the edge. The tree is a very practical and common tool in combinatorial operations research. The major difficulty with such a flow network is to either maximize flow or lower the cost of a prescribed flow. As previously stated, a flow network with a single source and single drain is covered by the maximum flow minimum-cut theorem. One vertex of a rooted tree can be identified from every other vertex.

RELATED WORK

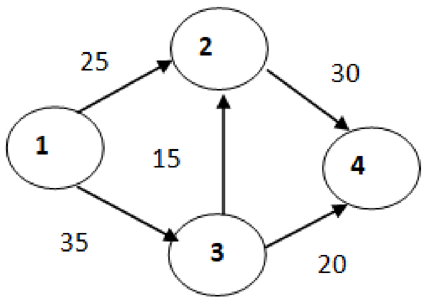


Fig. 1. Weighted Graph

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

Cut 1:
Where S 1 = {1} and T 1 = { 2,3,4}
S 1 X T 1 = {(1,2) + (1,3) + (1,4)}
= 60
Cut 2:
Where S 2 = {1,2} and T 2 = {3,4}
S 2 X T 2 = {(1,3) + (1,4) + (2,3) + (2,4)}
= 50
Cut 3:
Where S 3 = {1,2,3} and T 3 = {4}
S 3 X T 3 = {(1,4) + (2,4) + (3,4)}

= 50

Capacity = Maximum (Cut 1, Cut 2, Cut 3)
= Maximum (60, 50, 50)
= 60

PROPOSED ALGORITHM

Step 1: Find the Network is balanced or unbalanced using In-degree and Out-degree.

Step 2: If the Network is balanced then the Network is tree structure otherwise is not tree structure. Step 3: If the Network is tree structure then find the Maximum capacity value using Arc and Distance.Step 4: Consider the weighted graph, select the Arc and Distance.

Step 5: Sort by the distance and connect all the vertices one by one.

Step 6: Finally, the tree structure is given and the sum of the edges value is inmaximum capacity Network value.

MAXIMUM CAPACITY NETWORK EXAMPLE

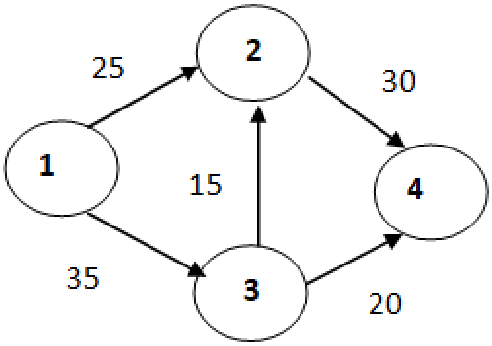
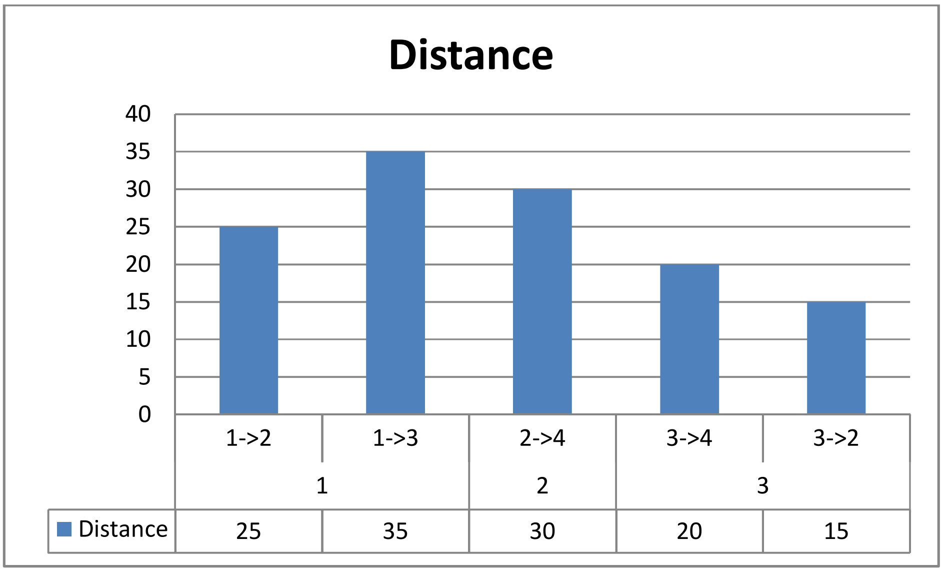


Fig. 2. Weighted Network diagram

Step 1: Find the Network is balanced or unbalanced.Table 1: Indegree and Outdegree value

Node	Indegree	Outdegree
1	0	60
2	40	30
3	35	35
4	50	0
TOTAL	125	125

Step 2: Find the Arc and Distance using weighted graph.Table 2: Arc and Distance value



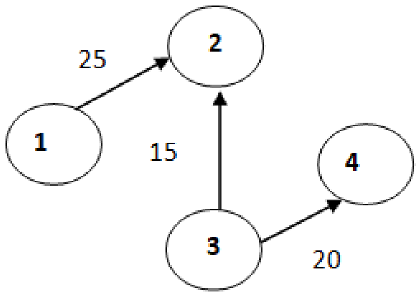


Fig. 3. Maximum Capacity Diagram

Step 3 : Sorting by the Distance Table 3: Sorting by Distance value

Node	Arc	Distance
3	3->2 3->4	15 20
1	1->2	25
2	2->4	30
1	1->3	35

RESULT AND DISCUSSION

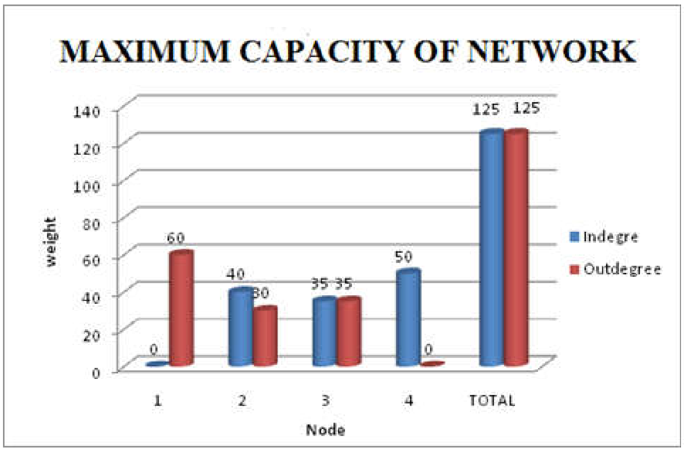


Fig. 4. Maximum Capacity of Network Diagram

The sum of the edges value is in maximum capacity Network value is 60.

CONCLUSION

At the absolute least, every linked graph has a spanning tree. A graph is only considered to be a tree if all of its nodes are minimally related. Any linked graph with n vertices and n-1 edges is referred to as a tree. n-1 edges make up an n-vertex tree the creation of a set of nodes that can be satisfied by any maximum routing solution. Every non-degenerate network can reach its maximum capacity.

FUTURE WORK

The maximum capacity of every network is balanced non-degenerate network is solvable. The maximum capacity is a mathematical technique of optimization is used to find the flow value. In a directed tree, any node which has out-degree zero is called a terminal node. All other nodes called a branch node. The level of any node is the length of the path from the root. Every directed tree musthave at least one node. An isolated node is also a directed tree. We will briefly describe some of the algorithm for solving Distributive Lattice method.

REFERENCES

[1] P. Vanitha Muthu, "Mathematical Modeling on Network Fractional Routing Through Orthogonal Set", Strad Research(Strad), Vol 7, Issue 11, pp 374 – 379, November 2020.

[2] P. Vanitha Muthu, **S. Asokan**, " Mathematical Modeling on Network Fractional Routing Through Systems of Linear Equations", Journal of Interdisciplinary Cycle Research (JICR), Vol11, Issue 10, pp 627 – 631, Oct 2019.

[3] P. Vanitha Muthu, **S. Asokan**, "Mathematical Modeling on Network Fractional Routing Through Regular Expression", Journal of Applied Science and Computations (JASC), Vol 5, Issue 11, pp 435 – 439, Nov 2018.

[4] P.Vanitha Muthu, "Mathematical Modeling on Network Fractional Routing Through Minimization of Finite Automata", International Journal of Advanced Research in Computer Science and Software Engineering, Vol.6, Issue No.12, pp 143 - 145, Dec 2016.

[5] P.Vanitha Muthu, "Mathematical Modeling on Network Fractional Routing Through Minimum Spanning Tree", International Journal of Advanced Research in Computer Science and Software Engineering, Vol.5, Issue No.12, pp 391 - 394, Dec 2015.

[6] **S.Asokan,** "Mathematical Modeling on Network Fractional Routing Through Numerical Analysis Method", Journal of Applied Science and Computations (JASC), Vol 7, Issue 12, pp 323 – 327, December 2020.

[7] B.Jothi, P. Vanitha Muthu, **S. Asokan**, "Mathematical Modeling on Network Fractional Routing Through Matrix Inversion", Journal of Interdisciplinary Cycle Research (JICR), Vol 11, Issue 11, pp 231 – 235, November 2019.

[8] P.Vanitha Muthu, **S.Asokan** "Mathematical Modeling on Network Fractional Routing Through Derivation Tree", International Journal of Advanced Research in Computer Science and Software Engineering, Vol.7, Issue No.11, pp 191 - 194, Nov 2017.

[9] **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.

[10] **S.Asokan,** V.Palanisamy "Linear Network Fractional Routing", International Journal onComputer Science and Engineering, Vol. 03, No.07, pp2733 -2738, July 2011.

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