Industrial Engineering Journal
ISSN: 0970-2555
Volume : 49, Issue 8, No. 1, August : 2020

Optimizing a non linear function for Maximum Capacity of Networks in Tree Structures

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

INTRODUCTION

A Flow Network is a basic linked, weighted, Directed Graph G. if every Directed edge in G has a weight that is a non-negative value. This quantity, which is labeled as Cij for the edge directed from vertex I to vertex j, in a flow network reflects the edge's capacity. A highly useful and natural tool in combinatorial operations research is the tree. In such a flow network, the main challenge is to either maximize flow or reduce the cost of a prescribed flow. The maximum flow minimum-cut theorem applies to a flow network with a single source and one drain, as stated. A rooted tree is a tree in which one vertex can be distinguished from every other vertex.

RELATED WORK

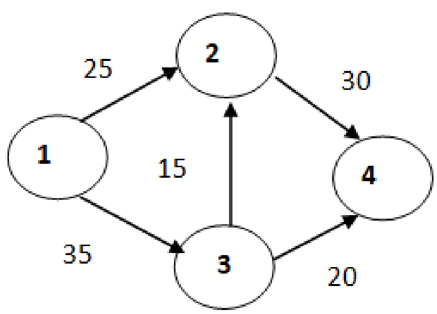

Fig. 1. Weighted Graph

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)}

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= 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

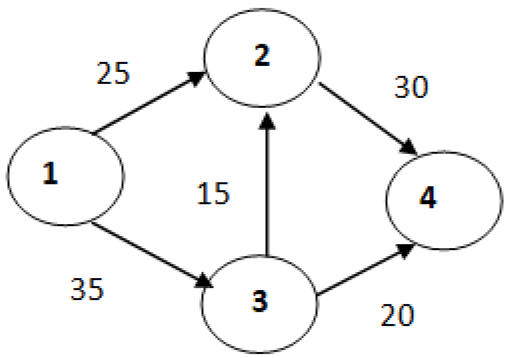

Fig. 2. Weighted Network diagram

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

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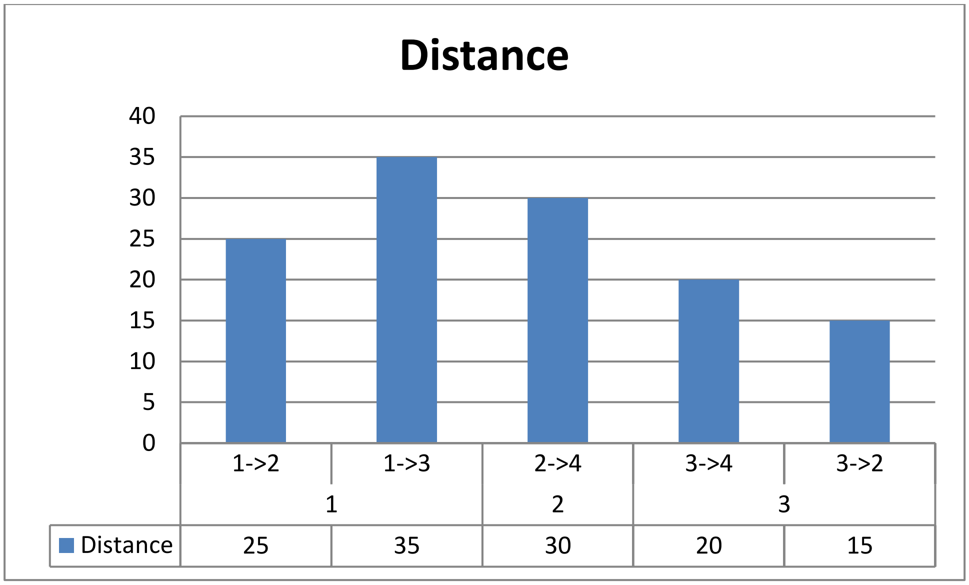

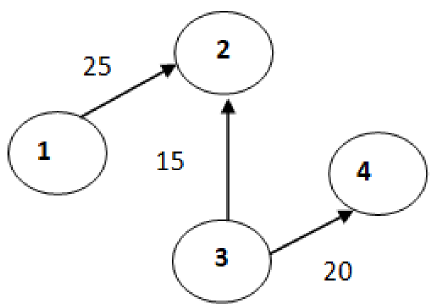

Fig. 3. Maximum Capacity Diagram

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

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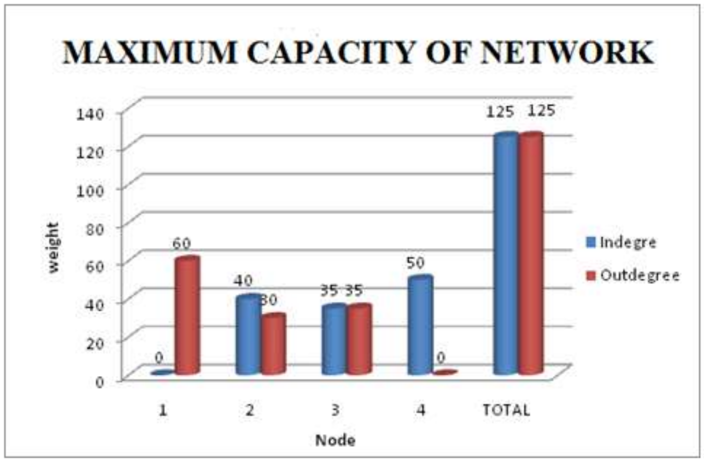

Fig. 4. Maximum Capacity of Network Diagram

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

CONCLUSION

Every linked graph has a spanning tree, at the very least. If and only if a graph is minimally linked, it qualifies as a tree. A tree is any linked graph that has n vertices and n-1 edges. An n-vertex tree has n-1 edges. The formulation of a set of nodes that any maximum routing solution can satisfy. In every non-degenerate network, the maximum capacity is attainable.

FUTURE WORK

The maximum capacity of every network is balanced non-degenerate network is solvable. The maximum capacity is a mathematical techniques 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 must have atleast one node. An isolated node is also a directed tree. We will briefly describe some of the algorithm for solving Distributive Lattice method.

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