Performance on Coupled Network in Node Unbiased Level Raise To Unprejudiced Network– Directed Graph Approach

S.K.Binu Siva Singh, K.V. Karthikeyan

Abstract: ***In this study we observed the concept of source node, sink node and bye-pass node from network topology. Defined Single Source out Node and Single Sink in Node for the network to get optimized balanced entire network. The proposed definitions will be very useful in future for different types of network topologies to get corresponding optimized balanced network.***

Keyword: Balanced, Bye-pass node, in degree, out degree, Single Sink in Node, Single Source out Node, Sink node, Source node.

I. PRELIMINARY&DEFINITIONS:[1, 2, 3, 4,5,&6]

Source Node: This node having only out degree in the network.
Sink Node: This node contains only in degree in the network.
By-Pass Node: Both in degree and out degree are exists at this node in the network.
Single Source out Node:Single in degree and highest out degree node in the network.
Single Sink in Node:Single out degree and highest in degree node in the network.
Balanced Node:In Network,any node in Degree is equal to its out Degree then node is called as Balanced node.
Balanced network: It means every node is balanced node in the network is called Balance Network
Single Balanced Source Network: The balanced network work contains the Single Source out Node.
Single Balanced Sink Network: The balanced network work contains the Single Sink in Node.

II. ILLUSTRATIONS AND NATURE OF THE DIFFERENT CONNECTED NETWORKS AND NODES AVAILABLE IN TOPOLOGY:

Example 1[7]: Consider the following Network,

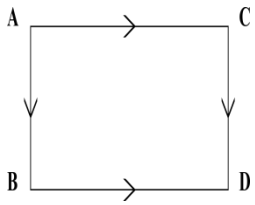

Fig. 1

Here we observed the following,

Name of the Node	in Degree	out Degree
A	**0**	**2**
B	**1**	**1**
C	**1**	**1**
D	**2**	**0**

A is source node
B&C are By-pass nodes
D is sink node

Example2: Consider the following Network,

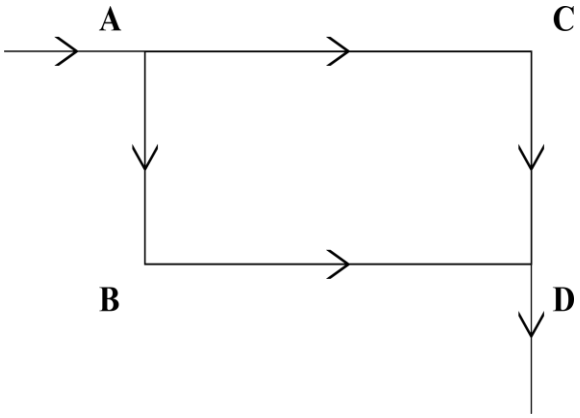

Fig. 2

Here we observed the following,

Name of the Node	In Degree	Out Degree
A	**1**	**2**
B	**1**	**1**
C	**1**	**1**
D	**2**	**1**

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A is called single source out node,
B&C are Bypass node or transit node
D is called single sink in node

Example 3: Consider the following Network,

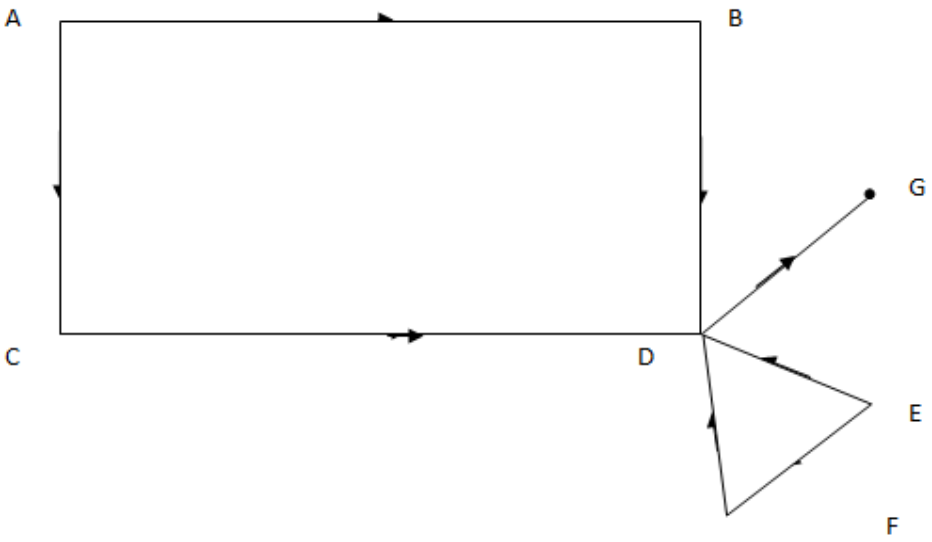

Fig. 3

Here we observed the following, D is called single source in node.

Name of the Node	In Degree	Out Degree
A	**1**	**1**
B	**1**	**1**
C	**1**	**1**
D	**4**	**1**
E	**0**	**2**
F	**1**	**1**

Example 4: Consider the following Network,

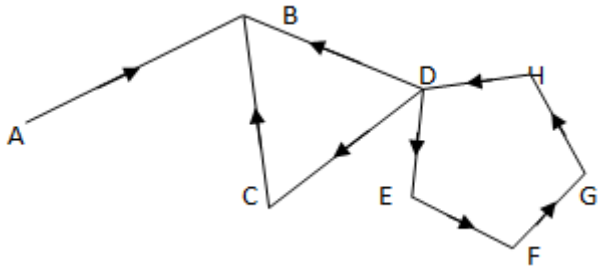

Fig. 4

Here we observed the following,

Name of the Node	In Degree	Out Degree
A	**0**	**1**
B	**1**	**2**
C	**1**	**1**
D	**1**	**3**
E	**1**	**1**
F	**1**	**1**
G	**1**	**1**
H	**1**	**1**

B&D is called single source out node
C,E,F & G are called BALANCEDsingle sink in node.

Example 5: Consider the following Network,Source at I:

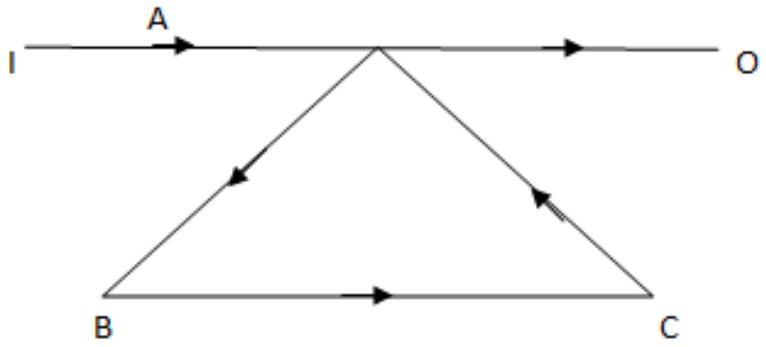

Fig. 5

Name of the Node	in Degree	out Degree	Nature
I	**0**	**1**	**Fixed as Source**
A	**2**	**2**	**Balanced Node**
B	**1**	**1**	**Balanced Node**
C	**1**	**1**	**Balanced Node**
O	**1**	**0**	**Fixed as Sink**

Here we observed the following; **Example 5** is Single Balanced Source in Network and Single Balanced Sink out Network
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Example 6: Consider the following Network,

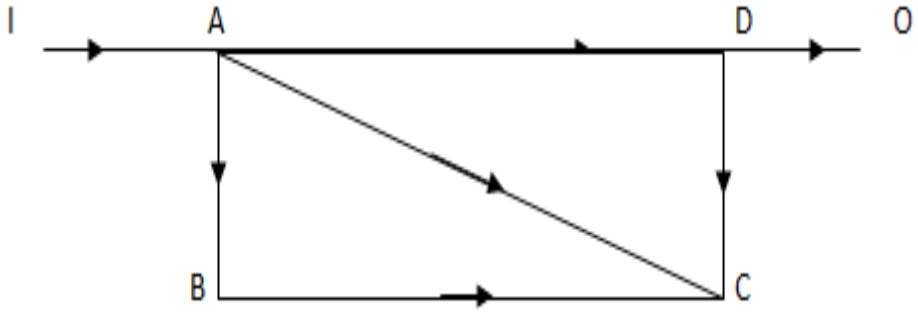

Fig: 6

Here we observed the following,

Name of the Node	in Degree	out Degree	Nature
I	**0**	**1**	**Fixed as Source node**
A	**1**	**3**	**Single Sourceout node**
B	**1**	**1**	**Balanced**
C	**3**	**0**	**Sink**
D	**1**	**2**	**Single Sinkout node**
O	**1**	**0**	**Fixed as Sink node**

Example 7: Consider the following Network,

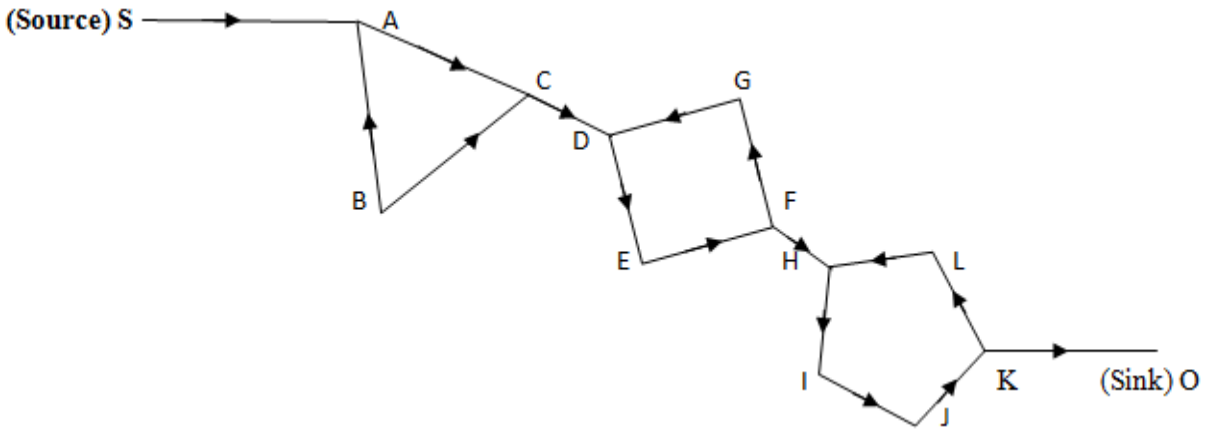

Fig: 7

Name Of The Node	In Degree	Out Degree	Nature
S	0	1	Fixed as Source
A	2	1	Single Sink in Node
B	1	1	Balanced
C	2	1	Single Sink in Node
D	2	1	Single Sink in Node
E	1	1	Balanced
F	1	2	Single Source out Node
G	1	1	Balanced
H	2	1	Single Sink in Node
I	1	1	Balanced
J	1	1	Balanced
K	1	2	Single Source out Node
L	1	1	Balanced
O	1	0	Fixed as Sink

Here we observed the following, Route starting from the Source node as I to A to B to C to D to E to F to H to I to J to K to O as Sink node, But here some nodes G & L are acting as balanced not covered by this particular route (Missing nodes).

Example 8: Consider the following Network,

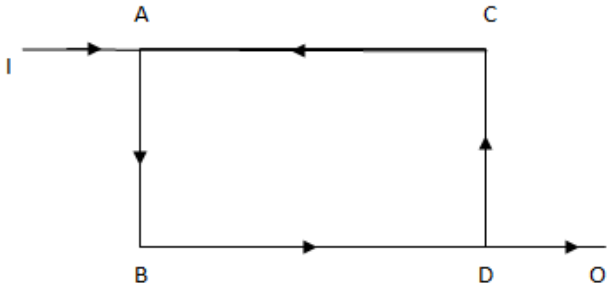

Fig: 8

Name Of The Node	In Degree	Out Degree	Nature
I	0	1	Fixed as Source
A	2	1	Single Sink in Node
B	1	1	Balanced
C	1	1	Balanced
D	1	2	Single Source out Node
O	1	0	Fixed as Sink

Here we observed the following,Route starting from the Source node as I to A to B to D to O as Sink node, But here some node C is acting as balanced not covered by this particular route (Missing node exists).

Example 9: Consider the following Network,

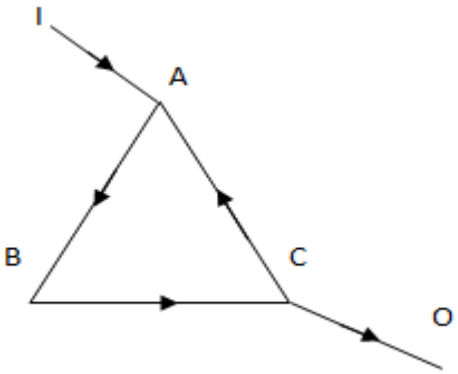

Fig:9

Name Of The Node	In Degree	Out Degree	Nature
I	**0**	**1**	**Fixed as Source**
A	**2**	**1**	**Single Sink in Node**
B	**1**	**1**	**Balanced**
C	**1**	**2**	**Single Source out Node**
O	**1**	**0**	**Fixed as Sink**

Here we observed the following, Route starting from the Source node as I to A to B to C to O as Sink node. Here no node missing and every node is acting as balanced node, except source (I)and sink node(O) in this particular route .

Example 10: Consider the following Network,

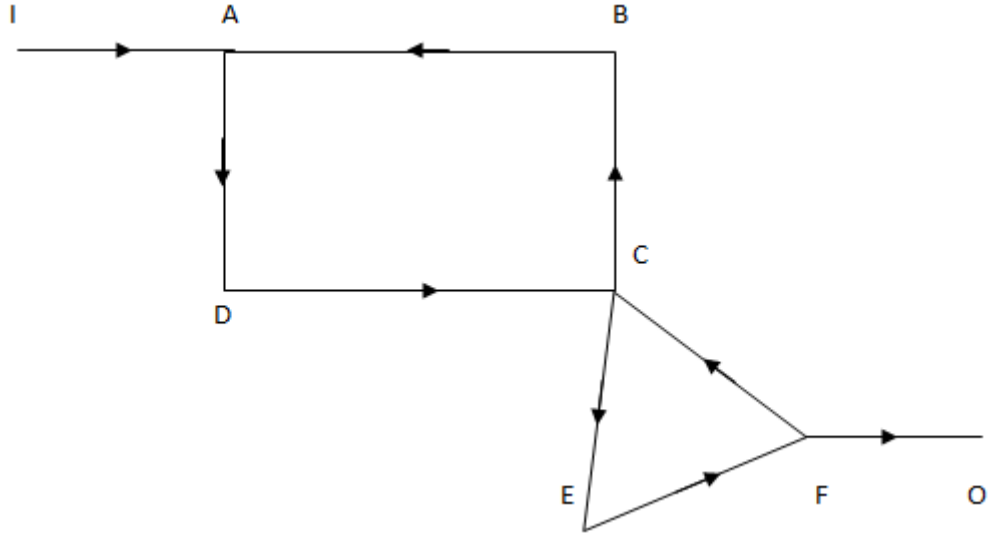

Fig.10

Here we observed the following, Route starting from the Source node as I to A to B to C to E to F to O as Sink node, But here one node B is acting as balanced not covered by this particular route (Missing node exists) therefore this network is not balanced.

Example 11: Consider the following Network,

Name Of The Node	In Degree	Out Degree	Nature
I	0	1	Fixed as Source
A	2	1	Single Sink in Node
B	1	1	Balanced
C	1	1	Balanced
D	1	2	Single Source out Node
E	1	1	Balanced
F	2	2	Balanced
G	1	1	Balanced
H	1	1	Balanced
J	1	2	Single Sink out Node
O	1	0	Fixed as Sink

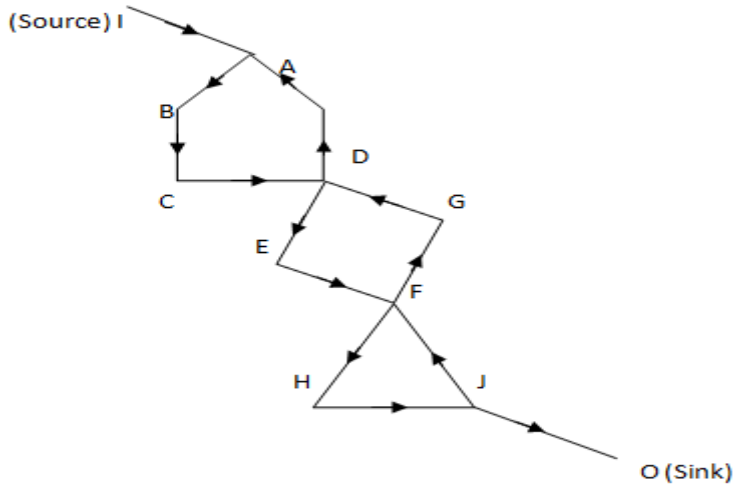

Fig. 11

Here we observed the following, Route starting from the Source node as I to A to B to C to D to E to F to H to J to O as Sink node, But here Some nodes G, J are acting as balanced not covered by this particular route therefore this entire network is not balanced (since Missing nodes exist).

Theorem 1: If the connected network contains exactly one single source node & only Single sink node, then it contains exactly one closed cycle.

Proof: Through the observation from example 8 and 9.

Theorem 2: If the directed network is balanced if and only if every node of the network will be exactly appeared in the closed walk exactly one time from the Source node to Sink node.

Proof: Through the observation from example 8, 9, and 10.

III. CONCLUSION

Concept of source node, sink node and bye-pass node from network topology being observed in this paper for obtaining optimized network.

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