Self-Centeredness of Derived Graphs Using D-Distance

M.V. Ramanjaneyulu, Varma P. L. N, D. Reddy Babu

Abstract: In communication networks, the number of switches on the short- est path between input and output that are farthest apart is the diameter of network. Thus an approximate measure of worst case latency is given by diameter. We study graphs for which the radius and diameter are equal using D-distance in this article. We study the D-self-centeredness of a graph and its derived graphs, namely, line graph, middle graph and total graph using D-distance. We end the article with some open problems.

Key Words:

I. INTRODUCTION

We say a graph G is self-centered if the eccentricity of each vertex is equal or radius and diameter of G are equal. Throughout this article, we use the D-distance introduced by Reddy Babu and Varma in [4].

Any graph G gives rise to three new graphs, namely, line graph L(G), middle graph M(G), total graph T(G). (For definitions see next section.) We call these graphs as derived graphs of G!

Consider the cyclic graph C_n (n odd). Then C_n and all its derived graphs L(C_n), M(C_n), T(C_n) are D-self-centered. For the graph G given in the example 3.2 below, G is D-self-centered but none of its derived graphs are D-self-centered. For the graph 'hut' H (see example 3.1 below) H and L(H) are D-self-centered but M(H), T(H) are not D-self-centered. Similarly, for the star graph $St_{n,1}$, among the four only the line graph is D-self-centered.

Thus the study of self-centeredness of a graph G and its derived graphs using D-distance becomes very interesting.

In this article, we look at the D-self-centeredness of the cyclic graph C_n complete graph K_n, star graph $St_{n,1}$ and their derived graphs. We prove that C_n , L(C_n), T(C_n) are all D-self-centered for all n and the middle graph M(C_n) is D-self- centered only when n is odd. Similarly, we prove that the complete graph K_n, L(K_n), T(K_n) are D-self-centered for all n ≥ 3 but M(K_n) is not D-self-centered for all n ≥ 4 where as M(K_3) is D-self-centered. Further we prove that in case of star graph, $St_{n,1}$, the line graph is D-self-centered but none of the other three, including $St_{n,1}$ are D-self-centered. Also we discuss some examples. Unless otherwise specified all graphs are finite, simple and connected.

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II. PRELIMINARIES

In this section we recall some definitions etc. for reader convenience. We refer [4] for the definition of D-length oa a path, D-distance between vertices of a graph and D-eccentricity, D-radius and D-diameter.

Definition 2.1. (Inserted Vertex) Let G be any graph. If e is any edge joining the vertices v_i and v_j ,we treat this edge as a vertex (denoted by $x_{i,j}$) while defining the derived graphs. This is known as an inserted vertex of the edge e.

Definition 2.2. (Line Graph) In a graph G consider all the inserted vertices $x_{i,j}$. In the line graph, L(G), of G, the vertex set is all inserted vertices and two of them are adjacent if they have a common vertex in G.

Definition 2.3. (Middle Graph) Let G be a graph. Then consider all the inserted vertices $x_{i,j}$. In the middle graph, M(G), of G, the vertex set is the set of all vertices of G and inserted vertices (i.e., all edges of G). Two of them are adjacent if and only if either they are adjacent edges of G or one is a verte3x of G and other is an edge incident with it.

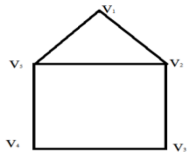
Definition 2.4. (Total Graph) In the total graph, T(G), of a graph G, the vertex set is all vertices of G and inserted vertices. Two of them are adjacent if and only if they are adjacent or incident in G.

III. EXAMPLES

In this section we discuss two examples.

Example 3.1. Consider the graph 'hut' H with 5 vertices and 6 edges as shown below.

The graph H



The graph H

For this graph H, both H and L(H) are D-self-centered but M(H),T(H) are not.

The fact that H is D-self-centered follows from Example 3.2 of [1].

The line graph of H is as follows

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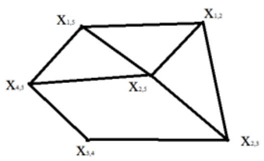


Line Graph L(H) of H

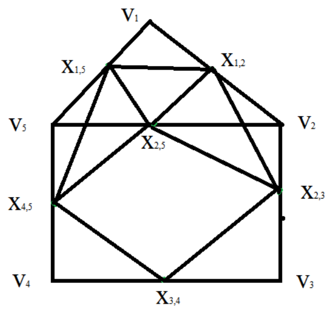
In this graph the distances between vertices are as in table 1.

Table 1. D-distance in L(H)

	$x_{1,2}$	$x_{2,3}$	$x_{3,4}$	$x_{4,5}$	$x_{1,5}$	$x_{2,5}$	Ecc
$x_{1,2}$	0	7	10	11	7	8	11
$x_{2,3}$	7	0	6	10	11	8	11
$x_{3,4}$	10	6	0	6	10	11	11
$x_{4,5}$	11	10	6	0	7	8	11
$x_{4,5}$	7	11	10	7	0	8	11
$x_{2,5}$	8	8	11	8	8	0	11

From this it is clear that the D-eccentricity of all vertices is 11. Thus $r^D(H)=d^D(H)=11$ and hence L(H) is D-self-centered.

The middle graph of H, M(H) is a graph with 11 vertices and 21 edges, as shown below :



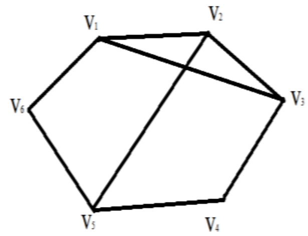
Middle Graph M(H) of H

The D-distance between vertices in M(H) are as shown in the table below

	v_1	v_2	v_3	v_4	v_5	$x_{1,2}$	$x_{2,3}$	$x_{3,4}$	$x_{4,5}$	$x_{1,5}$	$x_{2,5}$	ecc
v_1	0	12	17	17	12	8	14	19	14	8	15	19
v_2	12	0	12	17	14	9	9	14	16	15	10	17
v_3	17	12	0	10	17	14	8	7	13	19	15	17
v_4	17	17	10	0	12	19	13	7	8	14	15	19
v_5	12	14	17	12	0	15	16	14	9	9	10	17
$x_{1,2}$	8	9	14	19	15	0	11	16	17	11	12	19
$x_{2,3}$	14	9	8	13	16	11	0	10	16	17	12	17
$x_{3,4}$	19	14	7	7	14	16	10	0	10	16	17	17
$x_{4,5}$	14	16	13	8	9	17	16	10	0	11	12	17
$x_{1,5}$	8	15	19	14	9	11	17	16	11	0	12	17
$x_{2,5}$	15	10	15	15	10	12	12	17	12	12	0	17

Its clear from the table that the eccentricities of vertices in M(H) are either 17 or 19. Hence $r^D(M(H)) = 17$ and $d^D(M(H)) = 19$. Thus M(H) is not D-self- centered. Similarly, we can show that the total graph T(H) is not D-self-centered (see Example 2.4 of [2]).

Example 3.2. Consider the graph G with 6 vertices and 8 edges as shown below.



The Graph G

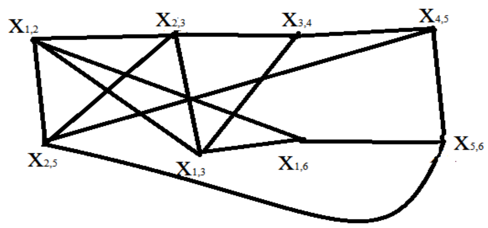
For this graph G, G is D-self-centered but none of the derived graphs are D- self-centered.

The D-distances between vertices of G are as shown in the table 3. From this table it is clear that D-eccentricity of all vertices is 10. Thus G is D-self-centered.

Table 2. D-distance in G

	v_1	v_2	v_3	v_4	v_5	v_6	Ecc
v_1	0	7	7	10	10	6	10
v_2	7	0	7	10	7	10	10
v_3	7	7	0	6	10	10	10
v_4	10	10	6	0	6	9	10
v_5	10	7	10	6	0	6	10
v_6	6	10	10	9	6	0	10

The Line graph of G will have 8 vertices and 14 edges and is as shown below:



Line Graph L(G) of G

D-distance between the vertices of L(G) are as shown below:

Table 3. D-distance in L(G)

	$x_{1,2}$	$x_{2,3}$	$x_{3,4}$	$x_{4,5}$	$x_{5,6}$	$x_{1,6}$	$x_{1,3}$	$x_{2,5}$	Ecc
$x_{1,2}$	0	9	13	13	12	8	9	9	13
$x_{2,3}$	9	0	8	12	13	13	9	9	13
$x_{3,4}$	13	8	0	7	11	12	8	12	13
$x_{4,5}$	13	12	7	0	7	11	12	8	13
$x_{5,6}$	12	13	11	7	0	7	12	8	13
$x_{1,6}$	8	13	12	11	7	0	8	12	13
$x_{1,3}$	9	9	8	12	12	8	0	14	14
$x_{2,5}$	9	9	12	8	8	121	14	0	14

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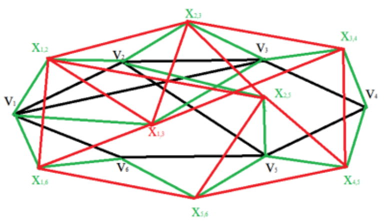
From this table it is clear that the D-eccentricities of various vertices are either 13 or 14. Thus $r^D(L(G)) = 13$ and $d^D(L(G)) = 14$. Thus it is clear that the line graph L(G) is not D-self-centered . Similarly, the middle graph of G will have 14 vertices and 30 edges, whose degree sequence is {2,2,3,3,3,3,5,5,5,5,6,6,6,6}. The D-distances between various vertices of M(G) are given below in 4. From this table we can see that the D-eccentricities of vertices of G as vertices of M(G) are {19,21,22} and those of the inserted vertices are {20,21,22}. Thus D-radius is 19 and D-diameter is 22. Therefore the middle graph M(G) is not D-self-centered. The total graph of G will have 14 vertices and 38 edges which is as follows:

Table 4. D-distance in M(G)

	v_1	v_2	v_3	v_4	v_5	v_6	$x_{1,2}$	$x_{2,3}$	$x_{3,4}$	$x_{4,5}$	$x_{5,6}$	$x_{1,6}$	$x_{1,3}$	$x_{2,5}$	Ecc
v_1	0	14	14	19	19	12	10	17	16	21	15	9	10	17	21
v_2	14	0	14	19	14	19	10	10	16	16	16	16	17	10	19
v_3	14	14	0	12	19	19	17	10	9	15	21	16	10	17	21
v_4	19	19	12	0	12	17	22	15	8	8	14	20	15	15	22
v_5	19	14	19	12	0	12	17	17	15	9	9	15	22	10	22
v_6	12	19	19	17	12	0	15	22	20	14	8	8	15	15	22
$x_{1,2}$	10	10	17	22	17	15	0	13	19	19	18	12	13	13	22
$x_{2,3}$	17	10	10	15	17	22	13	0	12	18	19	19	13	13	22
$x_{3,4}$	16	16	9	8	15	20	19	12	0	11	17	18	12	18	20
$x_{4,5}$	21	16	15	8	9	14	19	18	11	0	11	17	18	12	21
$x_{5,6}$	15	16	21	14	9	8	18	19	17	11	0	11	18	12	21
$x_{1,6}$	9	16	16	20	15	8	12	19	18	17	11	0	12	18	20
$x_{1,3}$	10	17	10	15	22	15	13	13	12	18	18	12	0	20	22
$x_{2,5}$	17	10	17	15	10	15	13	13	18	12	12	18	20	0	20



Total Graph T(G) of G

The degree sequence of this graph is {4,4,5,5,5,5,6,6,6,6,6,6,6,6}. The D-distances between various vertices of T(G) are given below table 5.

Table 5 D-distance in T(G)

	v_1	v_2	v_3	v_4	v_5	v_6	$x_{1,2}$	$x_{2,3}$	$x_{3,4}$	$x_{4,5}$	$x_{5,6}$	$x_{1,6}$	$x_{2,5}$	$x_{1,3}$	Ecc
v_1	0	13	13	18	20	13	13	20	19	24	18	12	20	13	24
v_2	13	0	13	18	13	20	13	13	19	19	17	19	13	20	20
v_3	13	13	0	11	18	18	20	13	12	17	23	19	20	13	23
v_4	18	18	11	0	11	16	24	17	10	10	17	22	18	18	24
v_5	20	13	18	11	0	11	20	20	17	12	12	17	13	24	24
v_6	13	20	18	16	11	0	18	24	23	17	10	10	18	17	24
$x_{1,2}$	13	13	20	24	20	18	0	13	19	19	18	12	13	13	24
$x_{2,3}$	20	13	13	17	20	24	13	0	12	19	19	19	13	13	24
$x_{3,4}$	19	19	12	10	17	23	19	12	0	11	17	23	19	19	23
$x_{4,5}$	24	19	17	10	12	17	19	19	11	0	11	17	12	24	24
$x_{5,6}$	18	17	23	17	12	10	18	19	17	11	0	11	12	18	23
$x_{1,6}$	12	19	19	22	17	10	12	19	23	17	11	0	19	19	23
$x_{2,5}$	20	13	20	18	13	18	13	13	19	12	12	19	0	20	20
$x_{1,3}$	13	20	13	18	24	17	13	13	19	24	18	19	20	0	24

From the last column its clear that the D-eccentricities of $\{v_1, v_2, \cdots, v_6\}$ in T(G) are either 20 or 24 and those of inserted vertices are 23 or 24. Hence the D-radius of total graph is 20 and D-diameter is 24 and consequently T(G) is not D-self-centered.

IV. THE CYCLIC GRAPH & RESULTS

In this section we study the cyclic graph and its derived graphs. We will show that the graphs Cn, L(Cn) and T(Cn) are D-self-centered for all n where as the middle graph M(Cn) is D-self-centered only when n is odd.

Theorem 4.1. The graph C_n is D-self-centered.

Proof. In the cyclic graph C_n each vertex has degree 2. The D-radius and D-diameter of C_n are

The graph C_n has n vertices and n edges and each vertex of degree "2" . The D-radius and D-diameter of C_n is

$$\begin{cases} \frac{3n+4}{2} & \text{if } n \text{ is even} \\ \frac{3n+1}{2} & \text{if } n \text{ is odd} \end{cases}$$

(See [4]) Hence C_n is D-self-centered.

Theorem 4.2. For the cyclic C_n graph on n vertices its line graph L(C_n) is D- self-centered.

Proof. From the construction its clear that the line graph of C_n is isomorpic to C_n . Hence the theorem follows from the above theorem.

Theorem 4.3. For the cyclic graph C_n on n vertices its total graph T(C_n) is D-self-centered.

Proof. The total graph of C_n has 2n vertices and 4n edges. The vertex set is given by

$\{v_1, v_2, \cdots, v_n, x_{1,2}, x_{2,3}, x_{3,4}, \cdots, x_{n,1}\}$. The degrees of all vertices is 4, i.e., the graph is 4-regular. We compute the D-eccentricities of the vertices separately, when n is even and odd.

Case (i) n is odd. say $n = 2m+1$

In this case the D-distances between vertices of T(C_n)are presented in the table 6 From this, we can see that D-eccentricities of every vertex is

$$\frac{5n+13}{2} = \frac{5(2m+1)+13}{2} = 5m+9$$

Thus D-radius = D-diameter = $\frac{5n+13}{2} = \frac{5(2m+1)+13}{2} = 5m+9$ and hence $T(C_n)$ is D-self centered graph.

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Table 6

	v_1	v_2	$\cdots$	v_{m+1}	v_{m+2}	$\cdots$	v_{2m+1}	$x_{1,2}$	$x_{2,3}$	$\cdots$	$x_{m,m+1}$	$x_{m+1,m+2}$	$x_{m+2,m+3}$	$\cdots$	$x_{1,2m+1}$
v_1	0	9		$5m+4$	$5m+4$		9	9	14		$5m+4$	$5m+9$	$5m+4$		9
v_2	9	0		$5m-1$	$5m+4$		14	9	9		$5m-1$	$5m+4$	$5m+9$		14
$\vdots$															
v_{m+1}	$5m+4$	$5m-1$		0	9		$5m+4$	$5m+4$	14		9	9	14		$5m+9$
v_{m+2}	$5m+4$	$5m+4$		9	0		$5m-1$	$5m+9$	$5m+4$		$5m-1$	9	9		$5m+4$
$\vdots$															
v_{2m+1}	9	14		$5m+4$	$5m-1$		0	14	$5m+4$		$5m+9$	$5m+4$	$5m-1$		9
$x_{1,2}$	9	9		$5m+4$	$5m+9$		14	0	9		$5m-1$	$5m+4$	$5m+4$		9
$x_{2,3}$	14	9		14	$5m+4$		$5m+4$	9	0		$5m-6$	$5m-1$	$5m+4$		$5m-6$
$\vdots$															
$x_{m,m+1}$	$5m+4$	$5m-1$		9	$5m-1$		$5m+9$	$5m-1$	$5m-6$		0	9	14		$5m+4$
$x_{m+1,m+2}$	$5m+9$	$5m+4$		9	9		$5m+4$	$5m+4$	$5m-1$		9	0	9		$5m+4$
$x_{m+2,m+3}$	$5m+4$	$5m+9$		14	9		$5m-1$	$5m+4$	$5m+4$		14	9	0		
$\vdots$															$5m-1$
$x_{1,2m+1}$	9	14		$5m+9$	$5m+4$		9	9	$5m-6$		$5m+4$	$5m+4$	$5m-1$		0

Case (ii) n is even, say $n=2m$

In this case the D-distance between vertices of T(C_n) are given table 7. From this we see that D- eccentricities of every vertex is $\frac{5n+8}{2}=\frac{5(2m)+8}{2}=5m+4$

Thus D-radius = D-diameter = $\frac{5n+8}{2}=\frac{5(2m)+8}{2}=5m+4$ and hence $T\left(C_n\right)$ is D-self centered graph.

Table 7

	v_1	v_2	$\cdots$	v_m	v_{m+1}	v_{m+2}	$\cdots$	v_{2m}	$x_{1,2}$	$x_{2,3}$	$\cdots$	$x_{m,m+1}$	$x_{m+1,m+2}$	$\cdots$	$x_{1,2m}$
v_1	0	9		$5m-1$	$5m+4$	$5m-1$		9	9	14		$5m+4$	$5m+4$		9
v_2	9	0		$5m-6$	$5m-1$	$5m+4$		14	9	9		$5m-1$	$5m+4$		14
$\vdots$															
v_m	$5m-1$	$5m-6$		0	9	14		$5m+4$	$5m-1$	$5m-6$		9	9		$5m+4$
v_{m+1}	$5m+4$	$5m-1$		9	0	9		$5m-1$	$5m+4$	$5m-1$		9	9		$5m-1$
v_{m+2}	$5m-1$	$5m+4$		14	9	0		14	$5m+4$	$5m+4$		14	9		$5m-1$
$\vdots$															
v_{2m}	9	14		$5m+4$	$5m-1$	14		0	14	$5m-1$		$5m+4$	$5m-1$		9
$x_{1,2}$	9	9		$5m-1$	$5m+4$	$5m+4$		14	0	9		$5m-1$	$5m+4$		9
$x_{2,3}$	14	9		$5m-6$	$5m-1$	$5m+4$		$5m-1$	9	0		14	$5m-1$		14
$\vdots$															
$x_{m,m+1}$	$5m+4$	$5m-1$		9	9	14		$5m+4$	$5m-1$	14		0	9		$5m+4$
$x_{m+1,m+2}$	$5m+4$	$5m+4$		9	9	9		$5m-1$	$5m+4$	$5m-1$		9	0		$5m-1$
$\vdots$															
$x_{1,2m}$	9	14		$5m+4$	$5m-1$	$5m-1$		9	9	14		$5m+4$	$5m-1$		0

Theorem 4.4. Consider the cyclic C_n graph on n vertices. Then (1) If n is odd, then the middle graph M(C_n) is D-self-centered. (2) If n is even, then the middle graph M(C_n) is never D-self-centered.

The proof of this theorem will be presented in a forthcoming article [3].

V. THE COMPLETE GRAPH

Now we look at the D-self-centeredness of the complete graph Kn on n ≥ 3 vertices and its derived graphs. We prove that the graphs K_n, L(K_n), T(K_n) are D-self-centered for n ≥ 3 but M(K_n) is D-self-centered for n = 3 only.

Theorem 5.1. The complete graph K_n is D-self-centered for n ≥ 3.

Proof. The degree of each vertex in K_n is n−1. Thus the D-radius and D-diameter of K_n are both 2n − 1. (See [4].) Thus K_n is D-self-centered.

Next we have

Theorem 5.2. The line graph of K_n is D-self-centered for n ≥ 3.

Proof. The number of vertices and edges in the line graph L(K_n) is $\frac{n(n-1)}{2}$ and $\frac{n(n-1)(n-2)}{2}$ respectively. The degree of each vertex is 2n − 4. For any two vertices { $x_{i,j}, x_{k,l}$ } a path between them is given by $x_{i,j} \rightarrow x_{i,l} \rightarrow x_{k,l}$ *or* $x_{i,j} \rightarrow x_{k,j} \rightarrow x_{k,l}$. Thus $d^D(x_{i,j}, x_{k,l}) = 6n - 10$ *for* $i,j,k,l \in \{1,2,\cdots,n\}$, $i \neq l$ then *and* $j \neq k$. *If either* $i = l$ *or* $j = k$ these vertices are adjacent and hence D-distance between them is 4n − 7. Thus D-eccentricity of each vertex is 6n − 10. Therefore $r^D(L(Kn)) = d^D(L(Kn)) = 6n - 10$ and hence L(K_n) is D-self-centered.

Theorem 5.3. The total graph T(K_n) of K_n is D-self-centered n ≥ 3.

Proof. $T(K_n)$ is Total graph of K_n has $\frac{n^2+n}{2}$ vertices and $\frac{n(n^2-1)}{2}$ edges. It follows from theorem 2.4 of [1] that The D-radius = D-diameter = $6n-4$. Thus we conclude that the Total graph $T(K_n)$ is D-self centered graph

Theorem 5.4. The middle graph of Kn is not D-self-centered n ≥ 4.

Proof. $M(K_n)$ is middle graph of K_n has $\frac{n^2+n}{2}$ vertices and $\frac{n^2(n-1)}{2}$ edges. The degree of all vertices is $d(v_i) = n-1, d(x_{ij}) = 2n-2,$ *for* $i, j \in \{1,2,3,\cdots,n\}, i \neq j.$

Then it proved that $e^D(v_i) = 5n-3, e^D(x_{ij}) = 6n-4$. Therefore D-radius $= 5n-3$, D-diameter = $6n-4$ implying that the middle graph $M(K_n)$ is not D-self centered for n ≥ 4.

Remark 1. The graph $M(K_n)$ is D-self-centered n = 3.

This is because the complete graph on 3 vertices is nothing but the cyclic graph C_3 and hence the result follows from theorem above.

VI. THE STAR GRAPH

In this section we look the D-self-centeredness of the star graph $St_{n,1}$ on n + 1 vertices and its derived graphs. We prove that the line graph L($St_{n,1}$) is D- self-centered where as the middle graph and total graph are not D-self-centered. Further, the graph $St_{n,1}$ itself is not D-self-centered. We begin with the following

Theorem 6.1. The graph $St_{n,1}$ is not D-self-centered.

Proof. Let the vertex set of the star graph be { $v_0, v_1, v_2, \cdots, v_n$ }. Assume that the degree of v_0 is n and that of all other vertices is 1. Further, the D-radius is n + 2 and D-diameter is n + 4 (see theorem 2.1 of [1]). that Thus this graph is not D-self-centered.

Theorem 6.2. The line graph L($St_{n,1}$) of $St_{n,1}$ is D-self-centered for all n.

Proof. Consider a star graph $St_{n,1}$ containing n + 1 vertices. Then its line graph L($St_{n,1}$) has n vertices and $\frac{n(n-1)}{2}$ edges. Observe that the Line graph of $St_{n,1}$ is noting but complete graph. Thus D-radius = D-diameter = 2n−1 implying that the line graph L($St_{n,1}$) is D-self-centered, as claimed.

Theorem 6.3. The middle graph M($St_{n,1}$) of $St_{n,1}$ is not D-self-centered for all n.

Proof. The middle graph M($St_{n,1}$) of $St_{n,1}$ consists of 2n+1 vertices { $v_0, v_1, \cdots, v_n, x_{0,1}, x_{0,2}, \cdots, x_{0,n}$ }. Further d(v_0) = n, d(v_i) = 1 for other i and d($x_{0,i}$) = n + 1 for for all i. Hence the eccentricities are given by $e^D(v_0) = 2n + 4$, $e^D(v_i) = 2n + 7$ *and* $e^D(x_{0,i}) = 2n + 5$. Therefore, the D-radius is 2n + 4, D-diameter is 2n + 7 showing that the middle graph M($St_{n,1}$) is not D-self-centered.

Theorem 6.4. The total graph T($St_{n,1}$) of $St_{n,1}$ is not D-self-centered for all n.

Proof. The total graph T($St_{n,1}$) of $St_{n,1}$ has 2n + 1 vertices and $\frac{n^2+5n}{2}$ edges.The D-radius, D-diameter are 2n+6, 3n+2 respectively. (See Theorem 2.1 of [2].) Hence the total graph T($St_{n,1}$) is not D-self-centered.

VII. OPEN PROBLEMS

From the above examples and results presented, one may be interested in the following open problems. Characterize all graphs G for which

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(1) the graph and its derived graphs are D-self-centered.

(2) G is D-self-centered but none of the three derived graphs are D-self-centered.

(3) G is not D-self-centered but all the three derived graphs are D-self-centered.

REFERENCES

1. M.V. Ramanjaneyulu, L.N. Varma, P., D. Reddy Babu, Self Centered Self Graphs w.r.t D-Distance, Proceedings of the DST-SERB sponsored National Conference Essence of Math- ematics and Engineering Applications, KLEF, Vaddeswaram, 22-25, (ISBN 9788193063880)
2. M.V. Ramanjaneyulu, L.N. Varma, P., D. Reddy Babu, Self Centeredness of Total Graphs w.r.t. D-Distance, Int. Jour. of Engg. and Tech., 7(4.10), 2018, 366-370.
3. M.V. Ramanjaneyulu, L.N. Varma, P., D. Reddy Babu, Self-centeredness of Derived Graphs using D-distance - II, Preprint, 2018.
4. D. Reddy Babu, L.N. Varma, P., D-distance in Graphs, Golden Research Thoughts, 2 (2013) 53-58.