STATUS SEQUENCE AND DETOUR STATUS SEQUENCE OF STAR GRAPH FAMILIES

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Abstract: Let G=(V,E) be a simple undirected connected graph. The status of a vertex $v \in V$ of a graph G is the sum of shortest distance from v to the other vertices of G. The status sequence of G is the list of its status value in non-decreasing order. The detour status of a vertex $v \in V$ of a graph G is the sum of longest distance from v to the other vertices of G. The detour status sequence of G is the list of its detour status values in non-decreasing order. In this paper a status sequence (SS) and detour status sequence (DSS) of star graphs are investigated.

Keywords: status sequence, detour status sequence, status values, detour status values.

Introduction: Let G=(V,E) be a simple undirected connected graph. For vertices u and v in a connected graph G, the distance d(u,v) is the length of a shortest u-v path in G. A u-v path of length d(u,v) is called u-v geodesic. The status of a vertex of a graph G is the sum of the shortest distances from v to the other vertices of G. The status sequence(SS) of G is the list of its status value in non-decreasing order. The length of a longest u-v path between two vertices u and v in G is called a detour distance D(u,v) between u and v. A u-v path of length D(u,v) is a u-v detour. The detour status of a vertex $v \in V$ of a graph G is the sum of longest distance from v to the other vertices of G. The detour status sequence(DSS) of G is the list of its detour status values in non-decreasing order. In this paper, a status sequence (SS) and detour status sequence (DSS) of star graph families are investigated with some examples.

2. Main Results:

Theorem:2.1

The status sequence of a double star graph

$SS(k_{1,n,n}) = \{SS(u_0) = 3n$,
$SS(u_i) = 3n+1$ for i=1 to n ,
$SS(u_j) = 7n-4$ for j=n+1 to 2n
and Detour status sequence of
$DSS(k_{1,n,n}) = \{ SS(u_0) = 3n$,
$SS(u_i) = 3n+1$ for i=1 to n ,
$SS(u_j) = 7n-4$ for j=n+1 to 2n }

Proof: Let $V(K_{1,n,n}) = \{u_i$ / i =0 to 2n } be the vertex set of $K_{1,n,n}$.
$E(K_{1,n,n}) = \{u_0u_i, u_iu_{i+n}$ / i=1 to n}, the edge set $K_{1,n,n}$
If n=2, the SS & DSS of $K_{1,2,2}$ is
$SS(K_{1,2,2}) = \{6,7,7,10,10\}$ and
$DSS(K_{1,3,3}) = \{6,7,7,10,10\}$
The result is true for n=2.
By mathematical induction,
Let us assume that the result is true for k= n & $n \geq 2$.
Clearly, this result is true for k=n+1
Therefore the SS & DSS of $K_{1,n,n}$ is given by
$SS(K_{1,n,n}) = \{SS(u_0) = 3n$, $SS(u_i) = 3n+1$
for i=1 to n,$SS(u_j) = 7n-4$ for j=n+1 to 2n}
$DSS(K_{1,n,n}) = \{ SS(u_0) = 3n$, $SS(u_i) = 3n+1$
for i=1 to n,$SS(u_j) = 7n-4$ for j=n+1 to 2n}

Theorem:2.2

The status sequence of a triple star graph $SS(K_{1,n,n,n}) = \{SS(u_0) = 6n, SS(u_i) = 9n-5$ for i=1 to n, $SS(u_j) = 12n-8$ for j=n+1 to 2n, $SS(u_k) = 15n-9$ for k=2n+1 to 3n} and Detour status sequence of a triple star $DSS(K_{1,n,n,n}) = \{SS(u_0) = 6n$, $SS(u_i) = 9n-5$ for i=1 to n, $SS(u_j) = 2n-8$ for j=n+1 to 2n $SS(u_k) = 15n-9$ for k=2n+1 to 3n}

Proof: Let $V(K_{1,n,n,n}) = \{u_i$ / i =0 to 3n } be the vertex set of $K_{1,n,n,n}$
$E(K_{1,n,n,n}) = \{u_0u_i, u_iu_{i+n}, u_{i+n}u_{i+2n}$ / i=1 to n} be the edge set $K_{1,n,n,n}$
If n=3, the SS & DSS of $K_{1,3,3,3}$ is
$SS(K_{1,3,3,3}) = \{12,13,13,16,16,21,21\}$ and
$DSS(K_{1,3,3,3}) = \{12,13,13,16,16,21,21\}$
The result is true for n=3.
By mathematical induction,
Let as assume that the result is true for k= n & $n \geq 3$.
Clearly, this result is true for k=n+1
Therefore the SS & DSS of $k_{1,n,n,n}$ is given by
$SS(k_{1,n,n,n}) = \{SS(u_0) = 6n$,
$SS(u_i) = 9n-5$ for i=1 to n ,
$SS(u_j) = 12n-8$ for j=n+1 to 2n,
$SS(u_k) = 15n-9$ for k=2n+1 to 3n}
and $DSS(K_{1,n,n,n}) = \{SS(u_0) = 6n, SS(u_i) = 9n-5$
for i=1 to n,
$SS(u_j) = 12n-8$ for j=n+1 to 2n
$SS(u_k) = 15n-9$ for k=2n+1 to 3n}

Conclusion: Motivated by the definition of Status sequence and detour status sequence of a graph, we have discussed the SS and DSS of star graphs. The Problem of SS and DSS of cycle related graphs are under investigation.

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