Neighbor rupture degree of transformation graphs

Ekrem Oz

(joint work with Goksen Bacak-Turan)

The endurance of the network to breakdown after the failure of certain locations or connecting lines are measured by the vulnerability parameters. There will be a loss in a network's efficiency if it loses any locations or connecting lines. Thus, a communication network must be built according to both breakdown and possible reconstruction of the network. In spy networks, if a spy or a station is revealed, then we cannot trust the adjacent stations. There are very few vulnerability parameters concerning neighborhoods such as neighbor connectivity, neighbor integrity, neighbor scattering and neighbor rupture degree.

The neighbor rupture degree of a noncomplete connected graph G is defined to be $Nr(G) = \max\{w(G/S) - |S| - c(G/S) : S \subset V(G), w(G/S) \geq 1\}$ where S is any vertex subversion strategy of G, $w(G/S)$ is the number of connected components in G/S, and $c(G/S)$ is the maximum order of the components of G/S [1].

Transformation graphs takes information from the original graph and converts source information into a new structure. If it is possible to figure out the given graph from the transformed graph in polynomial time, such operation may be used to survey miscellaneous structural properties of the original graph considering the transformation graphs. Therefore it fosters to study the research of transformation graphs and their structural properties [2]. Let $G = (V(G), E(G))$ be a graph, and x, y, z be three variables taking values $+$ or $-$. The transformation graph G^{xyz} is the graph having $V(G) \cup E(G)$ as the vertex set, and for $\alpha, \beta \in V(G) \cup E(G)$, α and β are adjacent in G^{xyz} if and only if [3]

(a) $\alpha, \beta \in V(G)$, α and β are adjacent in G if $x = +$;
α and β are not adjacent in G if $x = -$;

(b) $\alpha, \beta \in E(G)$, α and β are adjacent in G if $y = +$;
α and β are not adjacent in G if $y = -$;

(c) $\alpha \in V(G)$, $\beta \in E(G)$, α and β are incident in G if $z = +$;
α and β are not incident in G if $z = -$.

In this talk, we investigate the neighbor rupture degree of transformation graphs G^{---} and G^{+--}.

References

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