

Towards a Characterization of Graphs with Distinct Betweenness Centralities

Darren A. Narayan* Rochester Institute of Technology

In a social network individuals have prominent centrality if they are intermediaries between the communication of others. The betweenness centrality of a vertex measures the number of intersecting geodesics between two other vertices. Formally, the betweenness centrality of a vertex v is the ratio of the number of shortest paths between two other vertices x and y to the total number of shortest paths between x and y . We consider the problem of characterizing all graphs with distinct betweenness centralities. This results in a specialized class of graphs with unusual symmetries including a trivial automorphism group. We begin by solving the problem for all graphs with less than or equal to seven vertices. Then we consider the general problem by investigating the density and minimality of graphs with distinct betweenness centralities. Finally, we investigate the problem of creating infinite families of graphs with this property.

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