Local Out-Tournaments with Upset Tournament Strong Components: Real and Nonnegative Integer Ranks of Adjacency Matrices

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A local out-tournament is a digraph in which the outset of every vertex is a tournament. Here, local out-tournaments with upset tournament strong components that are examined. The nonnegative and real ranks of the adjacency matrices of these digraphs depend on the ranks of the components, considered individually, and the connections between the components. For an upset tournament, these two ranks are equal. We look to find the cases when these two ranks are equal for local out-tournaments with upset tournament strong components. We use the fact that nonnegative integer rank of the adjacency matrix is equal to the biclique partition number for any upset tournament. We consider the cases in which the ranks are a maximum value and those in which a minimum value is attained.

Keywords: local out-tournament, upset tournament, \(\{0,1\}\)-matrix ranks, biclique partition numbers