SEICC-GTC 2025

February 4, 2025

Minimum Rank of Small Graphs

Wayne Barrett[1], Mark Hunnell[2], John Hutchens[3], John Sinkovic[4]
[1]Brigham Young University, [*2]Winston-Salem State University, [3]University of San Francisco, [4]Brigham Young University - Idaho

The minimum rank of a graph G of order n is the smallest possible rank over all real symmetric $n \times n$ matrices whose ijth entry, for $i \neq j$, is nonzero whenever ij is an edge of G and zero otherwise. There are many techniques in the literature to bound the minimum rank of a graph, and these were used previously to determine the minimum rank of all graphs of order at most 7. We survey these results and extend characterizations to larger graphs by implementing novel approaches to the determination of the minimum rank of a graph G using knowledge of the minimum rank of subgraphs of G. These approaches include implementations of matroid theory and iterable linear algebraic algorithms.