

Matroids and minimum rank problems for matrix patterns and graphs

Louis Deaett, Quinnipiac University

A matroid is a mathematical structure that captures essential combinatorial properties of linear independence (and hence also of rank) in a vector space. Therefore, when we study how the rank of a matrix is related to some combinatorial description of the matrix, it is natural to explore the extent to which matroid theory can explain what is going on. While assuming no prior familiarity with matroids, this talk will introduce the framework necessary to apply matroid theory to study the minimum rank of matrices described by zero-nonzero patterns, as well as by graphs. We show how basic lower bounds on the minimum rank can be explained by matroid theory, and even extended to a more general matroid-theoretic setting. This gives a revealing perspective on some known results, and leads to some open questions whose answers would enhance our understanding of minimum rank problems in both settings.

Keywords: matroids, matrix patterns, minimum rank