

1057-05-75

Thomas Zaslavsky* (zaslav@math.binghamton.edu), Dept. of Mathematical Sciences, Binghamton University (SUNY), Binghamton, NY 13902-6000. *Signed graphs, lattice points, and social psychology.*

Some people like, dislike, or are indifferent to some objects. Construct a signed bipartite graph Σ with vertex sets U for persons and W for objects and edges labelled $+$ for liking and $-$ for disliking. Theories in social psychology due to Abelson & Rosenberg (1958) and to Mrvar & Doreian (2009) say there is stress measured by partitioning the people and objects.

(A&R) Partition $U \cup W$ into two sets; count negative edges within a set and positive edges between sets; minimize over all bipartitions. This *frustration index* l measures stress.

(M&D) Partition U and W into k_U sets U_i and k_W sets W_j . Count the $U_i W_j$ -edges of the minority sign amongst all $U_i W_j$ -edges; sum over i, j ; minimize over all partition pairs. This (k_U, k_W) -*biclusterability index* $Q(k_U, k_W)$ measures stress.

How do these indices compare? The critical value is $Q(2, 2)$, because $Q \geq l$ if $k_U = 1$ or $k_W = 1$, while $Q \leq l$ if $k_U, k_W \geq 2$. When Σ is $K_{2,n}$ with signs, the comparison of Q with l reduces to counting lattice points in the standard simplex in \mathbb{R}^4 . This extends to an asymptotic treatment of general signed graphs. (Received January 07, 2010)