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Isoperimetric numbers of randomly perturbed intersection graphs. (English) Zbl 1425.05144

Summary: Social networks describe social interactions between people, which are often modeled by intersection graphs. In this paper, we propose an intersection graph model that is induced by adding a sparse random bipartite graph to a given bipartite graph. Under some mild conditions, we show that the vertex-isoperimetric number and the edge-isoperimetric number of the randomly perturbed intersection graph on $n$ vertices are $\Omega(1/\ln n)$ asymptotically almost surely. Numerical simulations for small graphs extracted from two real-world social networks, namely, the board interlocking network and the scientific collaboration network, were performed. It was revealed that the effect of increasing isoperimetric numbers (i.e., expansion properties) on randomly perturbed intersection graphs is presumably independent of the order of the network.

MSC:
05C80 Random graphs (graph-theoretic aspects)
05C40 Connectivity
05C90 Applications of graph theory
91D30 Social networks; opinion dynamics

Keywords:
isoperimetric number; random graph; intersection graph; social network

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