Approximation Algorithms
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Approximation and hardness results for packing cycles

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Abstract

The cycle packing number $\nu_e(G)$ of a graph G is the maximum number of pairwise edge-disjoint cycles in G. In this talk, we present some approximation and hardness results for computing $\nu_e(G)$. In the undirected case we analyze a simple greedy algorithm and show it has approximation ratio $\Theta(\sqrt{\log n})$. In the directed case we present a simple $\sqrt{n}$-approximation algorithm. We give lower bounds for the integrality gap and approximability of $\nu_e(G)$ in directed graphs. Specifically, we prove a lower bound of $\Omega(\frac{\log n}{\log \log n})$ for the integrality gap of edge-disjoint cycle packing. Using this, show that it is quasi-NP-hard to approximate $\nu_e(G)$ in directed graphs within a factor of $O(\log^{1-\varepsilon} n)$ for any constant $\varepsilon > 0$.

This talk is based on a joint work with: M. Krivelevich, Z. Nutov, J. Verstraete, and R. Yuster.