

Matching Augmentation via Simultaneous Contractions

Wednesday, July 12, 2023 10:55 AM (20 minutes)

Mohit Garg, Felix Hommelsheim and Nicole Megow

Abstract: We consider the matching augmentation problem (MAP), where a matching of a graph needs to be extended into a 2-edge-connected spanning subgraph by adding the minimum number of edges to it. We present a polynomial-time algorithm with an approximation ratio of $13/8 = 1.625$ improving upon an earlier $5/3$ -approximation. The improvement builds on a new α -approximation preserving reduction for any $\alpha \geq 3/2$ from arbitrary MAP instances to well-structured instances that do not contain certain forbidden structures like parallel edges, small separators, and contractible subgraphs. We further introduce, as key ingredients, the technique of repeated simultaneous contractions and provide improved lower bounds for instances that cannot be contracted.

Presenter: HOMMELSHEIM, Felix

Session Classification: Track A-1