

Title : Finding a b -matching that Embeds the Maximum Number of Edge Pairs in a Given Set

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Major : Mathematics

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Type of presentation* (choose 1) : Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)
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 Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

Given a set of edge pairs in a complete bipartite graph, the objective is to find a bipartite b -matching that includes the maximum number of these edge pairs. The original problem, known as the maximum edge-pair embedding bipartite matching, was demonstrated to be NP-hard and inapproximable by Nguyen et al. in 2021. Building on this, and being inspired by the optimization of reconfigurable networks, we extend the problem in this paper to consider b -matchings, with a focus on scenarios where the number of edge pairs per node is bounded. Let k represent the maximum number of edge pairs that can be incident on a single node. We prove that when $k > b$, the problem is NP-hard. For the case when $b = 2$, we provide exact algorithms for $k = 1, 2$. Additionally, for any values of k and b , we provide a $\Theta(k)$ -approximation algorithm for this problem.

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