

## ***ABSTRACT***

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### **Exact formulations and Branch-and-price algorithms for Minimum Normalized Cuts**

The normalized cut function was defined to solve some issues concerning the interpretability of the minimum cut problem, which is a classical problem in graph theory whose aim is to provide the bipartition that minimizes the number of edges between nodes from different subsets, applied to community detection problems.

Instead of considering just the number of external edges of each community, the minimum k-way normalized cut problem tries to minimize the external edge density of each community of a k-partition, also considering the number of internal edges.

Some mixed integer linear programming formulations and a Branch-and-Price algorithm are developed, and their performances are compared over some families of random instances.