

Breaking the All Subsets Barrier for Min k -Cut

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Vaishali Surianarayanan, Daniel Lokshtanov and Saket Saurabh

Abstract: In the $\text{sc Min } k\text{-Cut}$ problem, the input is a graph G and an integer k . The task is to find a partition of the vertex set of G into k parts, while minimizing the number of edges that go between different parts of the partition. The problem is NP-complete, and admits a simple $3^n \cdot n^{O(1)}$ time dynamic programming algorithm, which can be improved to a $2^n \cdot n^{O(1)}$ time algorithm using the fast subset convolution framework by Björklund et al. [STOC'07]. In this paper we give an algorithm for $\text{sc Min } k\text{-Cut}$ with running time $O((2 - \varepsilon)^n)$, for $\varepsilon > 10^{-50}$. This is the first algorithm for $\text{sc Min } k\text{-Cut}$ with running time $O(c^n)$ for $c < 2$.

Presenter: SURIANARAYANAN, Vaishali

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