Subexponential Parameterized Algorithm for Minimum Fill-in *

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Abstract

The Minimum Fill-in problem is to decide if a graph can be triangulated by adding at most k edges. Kaplan, Shamir, and Tarjan [FOCS 1994] have shown that the problem is solvable in time $\mathcal{O}(2^{\mathcal{O}(k)} + k^2nm)$ on graphs with n vertices and m edges and thus is fixed parameter tractable. Here, we give the first subexponential parameterized algorithm solving Minimum Fill-in in time $\mathcal{O}(2^{\mathcal{O}(\sqrt{k}\log k)} + k^2nm)$. This substantially lowers the complexity of the problem. Techniques developed for Minimum Fill-in can be used to obtain subexponential parameterized algorithms for several related problems including Minimum Chain Completion, Chordal Graph Sandwich, and Triangulating Colored Graph.

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