Abstract

Performing Gaussian elimination to a sparse matrix may turn some zeroes into nonzero values, so called fill-ins, which we want to minimize to keep the matrix sparse. Let n denote the rows of the matrix and k the number of fill-ins. For the minimum fill-in problem, we exclude the existence of polynomial time approximation schemes, assuming P$\neq$NP, and the existence of $2^{O(n^{1-\delta})}$-time approximation schemes for any positive δ, assuming the Exponential Time Hypothesis. Also implied is a $2^{O(k^{1/2-\delta})} \cdot n^{O(1)}$ parameterized lower bound. Behind these results is a new reduction from vertex cover, which might be of its own interest: All previous reductions for similar problems are from some kind of graph layout problems.