COUNTING INDEPENDENT SETS IN CLAW-FREE GRAPHS

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Although many of the counting problems (e.g. counting independent sets or matchings in a graph) are known to be #P-Complete (see Vadhan [3]), a remarkable progress has been done in designing exponential time algorithms solving them. Dahllöf, Jonsson, Wahlström [2] constructed algorithms that count maximum weight models of 2-SAT formulas in time $O^*(1.2561^n)$. This bound bound was later improved to $O^*(1.2377^n)$ by Wahlström [4]. In particular this algorithm can be applied to count all independent sets and all independent sets of maximum size in a graph. In fact it was used by Björklund, Husfeldt and Koivisto [1] as a subroutine in their (based on the inclusion-exclusion principle) algorithm for graph coloring.

We present an algorithm for counting the number of all independent sets in a claw-free graph which works in time $O^*(1.08352^n)$ for graphs with no vertices of degree larger than 3 and $O^*(1.23544^n)$ for arbitrary claw-free graphs, where n is the number of vertices in the instance graph.

Keywords: counting algorithm, independent set, measure and conquer.

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