

A Fixed-Parameter Algorithm for SET PACKING

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Abstract

The PARAMETERIZED SET PACKING Problem asks, for input consisting of a collection C of n finite sets satisfying $|c| \leq m$ for any $c \in C$ and a positive integer k , whether C contains at least k mutually disjoint sets. We give a fixed-parameter tractable algorithm for this problem that runs in time $f(k, m) + g(k, m)n$, where

$f(k, m) = (m - 2)\sqrt{m - 1}k^4 \left[\frac{k^{m-2}(m-1)^{m-1}b_m}{e^{m-2}} \right]^k$, $g(k, m) = (m + 1)(m - 2)\sqrt{m - 1}k \left[\frac{k^{m-2}(m-1)^{m-1}b_m}{e^{m-2}} \right]^k + m$
 b_m is the minimal positive root of m -degree equation

$$x^m = \sum_{i=1}^{m-1} \binom{m}{i} x^{m-i}$$

and $e=2.7182818$

In particular, this gives an $O(k^4 (5.7k)^k + [k(5.7k)^k + 3]n)$ algorithm to construct mutually k disjoint sets when $|c| \leq 3$ for any $c \in C$.

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