

A Fast and Simple Parallel Algorithm for the Monotone Duality Problem

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We consider a hypergraph F and the problem of generating the family of its minimal transversals $G = F^d$. In the corresponding decision problem we given two hypergraphs, F and G , which is a subfamily $= F^d$, and we have to recognize if $G = F^d$, or produce an edge T belonging to $F^d - G$. These are long standing challenging problems, the complexity of which is not known. The first non-exponential algorithm is by Fredman and Khachiyan (1996) solves the decision problem in $O(N^{\log N / \log \log N})$, where $N = |F| + |G|$. We introduce a decomposition technique, providing a family of parallel algorithms to solve the decision problem. We analyzed one variant and it runs in $O(\log N + \log |F| \log |G|)$ time and requires $O(N|F||G|^{\log |F|})$ processors. (Joint work with Kazuhisa Makino.)