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MDD propagation for sequence constraints. (English) Zbl 1366.68072

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Summary: We study propagation for the SEQUENCE constraint in the context of constraint programming based on limited-width MDDs. Our first contribution is proving that establishing MDD-consistency for SEQUENCE is NP-hard. Yet, we also show that this task is fixed parameter tractable with respect to the length of the sub-sequences. In addition, we propose a partial filtering algorithm that relies on a specific decomposition of the constraint and a novel extension of MDD filtering to node domains. We experimentally evaluate the performance of our proposed filtering algorithm, and demonstrate that the strength of the MDD propagation increases as the maximum width is increased. In particular, MDD propagation can outperform conventional domain propagation for SEQUENCE by reducing the search tree size and solving time by several orders of magnitude. Similar improvements are observed with respect to the current best MDD approach that applies the decomposition of SEQUENCE into AMONG constraints.

MSC:

- 68Q17** Computational difficulty of problems (lower bounds, completeness, difficulty of approximation, etc.)
- 68Q25** Analysis of algorithms and problem complexity
- 68T20** Problem solving in the context of artificial intelligence (heuristics, search strategies, etc.)

Cited in **6** Documents

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