Presentation Abstract

Transformation of Combinatorial Optimization Problems Written in Extended SQL into Constraint Problems

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The combinatorial optimization is an important area, which gives one of the best solutions for our real problems. This presentation focuses on an SQL style of declarative languages to ease descriptions of combinatorial optimization problems, and provides their solution method powered by state-of-the-art CP/SMT solvers. From the semantic point of view, the search space of a combinatorial problem is given as a finite set of relations, and a solution is a relation in the set. Relations in the search space are filtered by constraints of the problem in similar to `filter` function on lists in functional language, and the remaining relations are solutions of the problem. According to this notion, we extended Structured Query Language (SQL) by introducing some operations on set of relations: creating a set of relations, filtering them by constraints, and selecting a relation according to a goal function. Toward an effective implementation, a set of relations is represented as a pair of a relation containing variables with finite domains and a constraint on variables, which enable to solve the target problem by CP/SMT solvers. One of the benefit of this approach is fresh variables, whose design is the most intelligent and difficult part, are automatically introduced according to the nested structure in the given specification.

This is the abstract of an unrefereed presentation, and it should not preclude subsequent publication.

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