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Native Cardinlaity Constraints: More Expressive, More Efficient Constraints

Jordyn C. Maglalang
Illinois Wesleyan University

Mark Liffiton, Faculty Advisor
Illinois Wesleyan University

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NATIVE CARDINLAITY CONSTRAINTS: MORE EXPRESSIVE, MORE EFFICIENT CONSTRAINTS

Jordyn C. Maglalang and Mark Liffiton*
Computer Science Department, Illinois Wesleyan University

Boolean cardinality constraints are commonly translated (encoded) into Boolean CNF clauses, a standard form of Boolean satisfiability, which can be solved using a standard SAT solving program. However, cardinality constraints are a simple generalization of clauses, and the complexity entailed by encoding them into CND can be avoided by reasoning about cardinality constraints *natively* within a SAT solver. In this work, we compare the performance of two forms of native cardinality constrains against some of the best performing encodings from the literature. We designed a number of cardinality constrains including crafted, random and application problems, to be run in parallel on a cluster of computers. Native implementations substantially outperform CNF encodings on instances composed entirely of cardinality constraints, and instances that are mostly clauses with few cardinality constraints exhibit mixed results warranting further study.