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Performance Evaluation of $k - SAT$ Solvers
Applied to Graph Arrowing

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1 Introduction

In his 1972 seminal paper entitled, "Reducibility Among Combinatorial Problems," Karp introduced a list of 21 NP-complete problems, including Boolean satisfiability, the maximum cut of a graph, and 0-1 integer programming [?]. The complexity of these problems was proven by deriving a polynomial-time reduction from CIRCUIT-SAT = $\{\langle C \rangle : C$ is a satisfiable Boolean combinational circuit $\}$, the first problem shown to be NP-complete by Cook in 1971 [?], starting the rush of complexity theory research.

The problem $3 - SAT$, or more formally, $3 - CNFSAT$, is a special case of satisfiability. It is a decision problem in which takes as input a 3-CNF Boolean formula and returns YES if the formula is satisfiable, and NO otherwise [?]. A 3-CNF formula, more formally known as a Boolean formula in 3-conjunctive normal form, is expressed as the Boolean AND of arbitrarily many clauses, where each clause is the Boolean OR of three literals, which is a Boolean variable or its negation. Such a Boolean formula is said to be satisfiable if and only if there exists an assignment of truth values to the variables such that substituting them into the literals of the formula will cause it to evaluate to true (or 1). Expressed as a formal language, we have that $3 - SAT = \{\langle \phi \rangle : \phi$ is satisfiable $\}$.

TODO: sat problem, sat competition, categories of evaluation, types of problems, graph arrowing...

2 Selected $k-SAT$ Solvers

TODO: minisat, zchaff, glucose, ppfolio //, ppfolio seq, contrasat hack, 3S

3 Performance

TODO: table

References

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