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**SATzilla: portfolio-based algorithm selection for SAT.** (English) Zbl 1182.68272

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Summary: It has been widely observed that there is no single "dominant" SAT solver; instead, different solvers perform best on different instances. Rather than following the traditional approach of choosing the best solver for a given class of instances, we advocate making this decision online on a per-instance basis. Building on previous work, we describe SATzilla, an automated approach for constructing per-instance algorithm portfolios for SAT that use so-called empirical hardness models to choose among their constituent solvers. This approach takes as input a distribution of problem instances and a set of component solvers, and constructs a portfolio optimizing a given objective function (such as mean runtime, percent of instances solved, or score in a competition). The excellent performance of SATzilla was independently verified in the 2007 SAT Competition, where our SATzilla07 solvers won three gold, one silver and one bronze medal. In this article, we go well beyond SATzilla07 by making the portfolio construction scalable and completely automated, and improving it by integrating local search solvers as candidate solvers, by predicting performance score instead of runtime, and by using hierarchical hardness models that take into account different types of SAT instances. We demonstrate the effectiveness of these new techniques in extensive experimental results on data sets including instances from the most recent SAT competition.

**MSC:**

**68T20** Problem solving in the context of artificial intelligence (heuristics, search strategies, etc.)

**68W05** Nonnumerical algorithms

Cited in **73** Documents

**Keywords:**

[per-instance algorithm portfolios for SAT](#)

**Software:**

[Zchaff2004](#); [SATzilla](#)

**Full Text:** [arXiv](#)