

Guest Editors Conclusion

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This special issue comprises six papers devoted to SAT solving and three papers devoted to MAXSAT solving. With two exception, the papers contain detailed information about some of the best solvers from the 5th SAT solver competition and from the 2nd MAX-SAT solver competition, which took place as side event of the 10th International Conference on Theory and Applications of Satisfiability Testing SAT 2007, in Lisboa/ Portugal. The paper by Heras, et al. deals with the contributed instances for the MAX-SAT evaluations and the paper by Argelich, et al. reports on the First and Second MAX-SAT evaluations in 2006 and 2007.

The first paper *PicoSAT Essentials* presents three nice concepts: optimized compact data structures for watching literals, a new restart strategy, and an efficient proof encoding. Experiments demonstrate, that this low level optimization saves memory and speeds up the SAT solver considerably.

The second paper *Parallel SAT Solving using Bit-level Operations* describes a technic for speeding up local search SAT solvers by using multi-bit Boolean operations, leveraging that k-bit CPUs can do k-bit Boolean operations in one time step. Modifying the state-of-the-art local search SAT solver Unit Walk according to this technic yields a much faster implementation than the original one.

The third paper *Whose side are you on? Finding solutions in a biased search-tree* uses so called direction heuristics for selecting good assignments to the decision variables in order to guide the search into those parts of the search tree that are more likely to contain solutions. The SAT solver march ks, based on this idea was the winner of the crafted category during the SAT 2007 competition.

The fourth paper *Combining Adaptive and Dynamic Local Search for Satisfiability* presents the SAT solver gNovelty+, the winner of the random category during the SAT 2007 competition. A combination of two basic approaches in the local search area, namely adaptation and dynamics is favorably exploited.

The fifth paper *tts: A SAT-Solver for Small, Difficult Instances* describes a SAT solver showing a good performance when applied to difficult small instances and was number two in the category handmade during SAT 2007. A static ternary tree data structure to represent simplified formulas under all admissible partial assignments is the basis of the efficiency.

The sixth paper *Solving Weighted Max-SAT Problems in a Reduced Search Space: A Performance Analysis* follows a branch and bound approach for solving MAX-SAT problems favorably exploiting lower bounds by compiling deterministic decomposable negation normal form formulas into which MAX-SAT instances are transformed.

The seventh paper *A Switching Criterion for Intensification and Diversification in Local Search for SAT* analyses strengths and weaknesses of two known algorithms. It is shown empirically that one algorithm has superior intensification while the other has superior diversification. By intelligently alternating between these two algorithms, a hybrid algorithm combining the strengths of both is created and its strength is experimentally demonstrated.

The eighth paper *2006 and 2007 Max-SAT Evaluations: Contributed Instances* overviews the instances submitted to the MAX-SAT evaluation. Especially the translation methods of instances originating from other optimization problems into the MAX-SAT framework are shown.

The ninth paper *The First and Second Max-SAT Evaluations* compares the 2006 MAX-SAT evaluation that was affiliated with the 9th International Conference on Theory and Applications of Satisfiability Testing SAT 2006, in Seattle/WA, with the 2007 evaluation. The progress, the insights gained, and new directions for forthcoming evaluations are depicted.

In the call for papers to this special issue its target was formulated as follows: The JSAT special issue on the SAT 2007 competitions and evaluation aims at widening the scope and strengthening the impact of these events by providing further technical contributions from researchers involved in the SAT and QBF competitions or in the Pseudo-Boolean and Max-SAT evaluations.

We hope this special issue comes close to these objectives. We have to thank the referees for their willingness of providing careful reports. And especially we have to thank the contributors for having chosen this special issue of JSAT for publishing.