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Theory and Applications of Satisfiability Testing – SAT 2017

20th International Conference

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Proceedings

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Preface

This volume contains the papers presented at SAT 2017, the 20th International Conference on Theory and Applications of Satisfiability Testing, held from 28 August until 1 September 2017 in Melbourne, Australia. This 20th edition of SAT was co-located with CP 2017 (23rd International Conference on Principles and Practice of Constraint Programming) and ICLP 2017 (33rd International Conference on Logic Programming), featuring joint workshops, tutorials, invited talks, social events, and a doctoral consortium. It was held at the Melbourne Convention and Exhibition Centre, starting with a workshop day on 28 August 2017.

The International Conference on Theory and Applications of Satisfiability Testing (SAT) is the premier annual meeting for researchers focusing on the theory and applications of the satisfiability problem, broadly construed. In addition to plain propositional satisfiability, it also includes Boolean optimization (such as MaxSAT and Pseudo-Boolean (PB) constraints), Quantified Boolean Formulas (QBF), Satisfiability Modulo Theories (SMT), and Constraint Programming (CP) for problems with clear connections to Boolean-level reasoning.

Many hard combinatorial problems can be tackled using SAT-based techniques including problems that arise in Formal Verification, Artificial Intelligence, Operations Research, Computational Biology, Cryptography, Data Mining, Machine Learning, Mathematics, etc. Indeed, the theoretical and practical advances in SAT research over the past 25 years have contributed to making SAT technology an indispensable tool in a variety of domains.

SAT 2017 aimed to further advance the field by welcoming original theoretical and practical contributions in these areas with a clear connection to satisfiability. Specifically, SAT 2017 welcomed scientific contributions addressing different aspects of SAT interpreted in a broad sense, including (but not restricted to) theoretical advances (such as algorithms, proof complexity, parameterized complexity, and other complexity issues), practical search algorithms, knowledge compilation, implementation-level details of SAT solvers and SAT-based systems, problem encodings and reformulations, applications (including both novel application domains and improvements to existing approaches), as well as case studies and reports on findings based on rigorous experimentation.

A total of 65 papers were submitted to SAT, including 47 long papers, 13 short papers, and 5 tool papers. The Program Committee chairs decided on a summary reject for one short paper. Each of the remaining 64 submissions was reviewed by at least 3 Program Committee members, sometimes with the help of expert external reviewers. The committee decided to accept 30 papers, consisting of 22 long papers, 5 short papers, and 3 tool papers. This included two conditional accepts that were accepted after a revision. There was no reclassification of papers.

The Program Committee decided to single out the following three papers:

- Joshua Blinkhorn and Olaf Beyersdorff, Shortening QBF Proofs with Dependency Schemes
for the Best Paper Award,
- Miguel Terra-Neves, Inês Lynce, and Vasco Manquinho, Introducing Pareto Minimal Correction Subsets
for the Best Student Paper Award, and
- Jia Liang, Vijay Ganesh, Krzysztof Czarnecki, Pascal Poupart, and Hari Govind V K, An Empirical Study of Branching Heuristics through the Lens of Global Learning Rate
for a Best Student Paper Honourable Mention.

In addition to the contributed talks, the program featured five invited talks, which were joint invited talks with CP 2017 and ICLP 2017:

- The Role of SAT, CP, and Logic Programming in Computational Biology
by Agostino Dovier (University of Udine, Italy),
- The Best of Both Worlds: Machine Learning Meets Logical Reasoning
by Holger H. Hoos (Leiden Institute of Advanced Computer Science, Netherlands and University of British Columbia, Canada),
- Recent Advances in Maximum Satisfiability
by Nina Narodytska (VMware Research, USA),
- Back to the Future - Parallelism and Logic Programming
by Enrico Pontelli (New Mexico State University, USA), and
- Constraints and the 4th Industrial Revolution
by Mark Wallace (Monash University and Opturion, Australia).

The joint program also featured tutorials organized to enable participants to engage in the program of the other co-located conferences:

- Introduction to Constraint Programming - If You Already Know SAT or Logic Programming
by Guido Tack (Monash University, Australia),
- An Introduction to Satisfiability
by Armin Biere (Johannes Kepler University Linz, Austria),
- Introduction to Machine Learning and Data Science
by Tias Guns (Vrije Universiteit Brussel, Belgium), and
- Mixed Integer Nonlinear Programming: An Introduction
by Pietro Belotti (FICO, UK).

All 8 workshops were also affiliated with SAT 2017, CP 2017, and ICLP 2017:

- Workshop on Parallel Methods for Constraint Solving (PaSeO 2017)
organized by Philippe Codognet, Salvador Abreu, and Daniel Diaz,
- Pragmatics of Constraint Reasoning (PoCR 2017)
organized by Daniel Le Berre and Pierre Schaus,
- Workshop on Answer Set Programming and Its Applications
(IWASP/ASPIA 2017)
organized by Kewen Wang and Yan Zhang,

- Workshop on Constraint Solvers in Testing, Verification and Analysis (CSTVA 2017)
organized by Zakaria Chihani, Sébastien Bardin, Nikolai Kosmatov, and Arnaud Gotlieb,
- Workshop on Logic and Search (LaSh 2017)
organized by David Mitchell,
- Progress Towards the Holy Grail (PTHG 2017)
organized by Eugene Freuder, Christian Bessiere, Narendra Jussien, Lars Kotthoff, and Mark Wallace,
- International Workshop on Constraint Modeling and Reformulation (ModRef 2017)
organized by Özgür Akgün, and
- Colloquium on Implementation of Constraint Logic Programming Systems (CICLOPS 2017)
organized by Jose F. Morales and Nataliia Stulova.

As in previous years, the results of several competitive events were announced at SAT 2017:

- the 2017 MaxSAT Evaluation (MSE 2017)
organized by Carlos Ansótegui, Fahiem Bacchus, Matti Järvisalo, and Ruben Martins,
- the 2017 Competitive Evaluation of QBF Solvers (QBF EVAL'17)
organized by Luca Pulina and Martina Seidl, and
- the 2017 SAT Competition
organized by Marijn Heule, Matti Järvisalo, and Tomas Balyo.

SAT 2017 also hosted a Doctoral Program, jointly organized by the three co-located conferences and chaired by Christopher Mears and Neda Saeedloei.

We thank everyone who contributed to making SAT 2017 a success. We are indebted to the Program Committee members and the external reviewers, who dedicated their time to review and evaluate the submissions to the conference. We thank the authors of all submitted papers for their contributions, the SAT association for their guidance and support in organizing the conference, the EasyChair conference management system for facilitating the submission and selection of papers, as well as the assembly of these proceedings. We also thank the SAT 2017 organizing committee for handling the practical aspects of the organization of the conference, and the workshop chair, Stefan Rümmele, for organizing the workshop program in collaboration with the workshop chairs of CP 2017 and ICLP 2017. We also thank IJCAI 2017, held the preceding week at the same location, and anyone else who helped promote the conference. Finally, we thank CP 2017 and ICLP 2017 for a smooth collaboration in the co-organization of the three conferences.

The SAT Association greatly helped with financial support for students attending the conference and Springer sponsored the Best Paper Awards for SAT 2017. SAT, CP, and ICLP 2017 were also sponsored by the Association for Constraint Programming, the Association for Logic Programming, CSIRO Data61, Monash University, the

University of Melbourne, COSYTEC, Satalia, Google, CompSustNet, Cosling, the Artificial Intelligence journal, and EurAI. Thank you!

July 2017

Serge Gaspers
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