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Preface: Selected Extended Papers of CADE 2015

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This special issue of the Journal of Automated Reasoning is dedicated to selected papers presented at the 25th Jubilee Edition of the International Conference on Automated Deduction, held between August 1 and 7 in Berlin, Germany. CADE is the major forum for the presentation of research in all aspects of automated deduction, including foundations, applications, implementations, and practical experience.

The five papers selected for the special issue (out of 36 papers presented at the conference) underwent a new and thorough reviewing and revision process, in accordance with the high standards of JAR. During this process, one paper was withdrawn.

The paper *Combining SAT Solvers with Computer Algebra Systems to Verify Cominatorial Conjectures* by Edward Zulkoski, Curtis Bright, Albert Heinle, Ilias Kotsireas, Krzysztof Czarnecki and Vijay Ganesh integrates a computer algebra system within the inner loop of a CDCL (Conflict-Driving Clause Learning) satisfiability solver. The resulting MATHCHECK tool is illustrated on two graph-theoretic conjectures on hypercubes and the construction of Hadamard matrices.

Andrew Reynolds and Jasmin Christian Blanchette present *A Decision Procedure for (co)datatypes in SMT Solvers*. It decides universal problems involving datatypes and codatatypes by combining rewriting with a theory solver. The usefulness of the approach is demonstrated on problems generated from Isabelle/HOL formalizations using Sledgehammer.

In the paper *Abstract Interpretation as Automated Deduction*, Vijay D'Silva and Caterina Urban show how several lattices that are commonly used and studied in abstract interpretation can be generated as fragments of a first-order theory of arithmetic, thereby advancing the

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logical understanding of the internals of abstract interpreters. The conference version of this paper was awarded the CADE-25 Best Paper Award.

The paper *Relative Termination via Dependency Pairs* by José Iborra, Naoki Nishida, Germán Vidal and Akihisa Yamada introduces a novel technique to prove relative termination with dependency pairs. Dependency pairs form the backbone of virtually all tools that aim to (dis)prove termination of rewrite systems automatically. Relative termination is a generalization of termination with important applications. The authors reduce relative termination to dependency pair problems, thereby making the many existing techniques and tools for proving (non)termination by dependency pairs reusable for relative termination.

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