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Editorial

Reduction strategies in rewriting and programming

Reduction strategies in rewriting and programming have attracted increasing attention within the last few years. New types of reduction strategy have been invented and investigated, and new results on rewriting/computation under particular strategies have been obtained. Research in this field ranges from primarily theoretical questions about reduction strategies to very practical application and implementation issues. The need for a deeper understanding of reduction strategies in rewriting and programming, both in theory and practice, is obvious, since they bridge the gap between unrestricted general rewriting (computation) and (more deterministic) rewriting with particular strategies (programming). Moreover, reduction strategies provide a natural way to go from operational principles (e.g., graph and term rewriting, narrowing, lambda-calculus) and semantics (e.g., normalization, computation of values, infinitary normalization, head-normalization) to implementations of programming languages. Therefore any progress in this area is likely to be of interest not only to the rewriting community, but also to neighbouring fields like functional programming, functional-logic programming, and termination proofs of algorithms.

The series of *Workshops on Reduction Strategies in Rewriting and Programming* (WRS) attempts to stimulate and promote research and progress in this important field. It provides a forum for the presentation and discussion of new ideas and results, recent developments, and new research directions, and aims at fostering interaction and exchange between researchers and students actively working on such topics. More information about this series of workshops (history, topics of interest, proceedings, etc.) can be found at the following URL:

<http://www.dsic.upv.es/~wrs>

This Issue of the *Journal of Symbolic Computation* contains revised and extended versions of a selection of papers that appeared in the first two editions of the workshop:

- WRS 2001 (1st Int. Workshop on Reduction Strategies in Rewriting and Programming), Utrecht, The Netherlands, May 26, 2001.
- WRS 2002 (2nd Int. Workshop on Reduction Strategies in Rewriting and Programming), Copenhagen, Denmark, July 21, 2002.

The four papers that, after a thorough and rigorous reviewing process according to the usual JSC standards of scholarship and quality, have finally been accepted for this Special Issue nicely reflect the dynamism, interactions, and impact of reduction strategies in different fields of Computer Science:

- (1) *Tree Automata for Rewrite Strategies*, by Pierre Réty and Julie Vuotto, studies a fundamental problem: the characterization of the set of descendants of regular sets of ground terms by rewriting according to some given reduction strategy. This work extends the research in a well-known field of term rewriting, which has been proved very useful both for properly understanding rewriting computations and also for deriving interesting results, e.g. in program analysis, to the field of rewriting under strategies.
- (2) *Operational Semantics for Declarative Multi-Paradigm Languages*, by Elvira Albert, Michael Hanus, Frank Huch, Francisco J. Oliver, and Germán Vidal, describes new small step and big step operational semantics for multi-paradigm declarative languages including advanced features and an explicit consideration of the computational strategy. Again, this amounts to an important contribution in modeling advanced programming languages and analyzing the corresponding programs in practice.
- (3) *A Survey of Rewriting Strategies in Program Transformation Systems*, by Eelco Visser, provides an overview of issues in rule-based program transformation systems, focusing on the expressivity of rule-based program transformation systems and in particular on transformation strategies available in various approaches.
- (4) *Evaluation Strategies for Functional Logic Programming*, by Sergio Antoy, discusses the elements that play a relevant role in evaluation strategies for functional logic computations, describes some important classes of rewrite systems that model functional logic programs, shows examples of the differences in expressiveness provided by these classes, and reviews the characteristics of narrowing strategies proposed for each class of rewrite systems.

Acknowledgements

Regarding the reviewing process we are very grateful to the program committee members of WRS 2001 and WRS 2002 whose evaluations and comments provided the basis for the initial selection of the best papers to be invited for submission to this Special Issue of JSC. After this first selection, all revised and extended submissions received underwent a second standard reviewing process for JSC. We are very grateful to all reviewers involved in this long process for their careful and thorough work. Finally, we would also like to thank all authors that accepted the invitation for their submissions to this special issue, no matter whether their submission could finally be accepted or not. Last, but not least, we are grateful to Hoon Hong, Editor-in-Chief of JSC, and Tetsuo Ida, editorial board member, for their support, advice, and technical assistance during the preparation of this issue.

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