Application and Theory of Petri Nets and Concurrency, 2012

Preface

This special issue is dedicated to selected papers from the 33rd International Conference on Application and Theory of Petri Nets and Concurrency (PETRI NETS 2012), which took place in June 2012 in Hamburg, Germany. In a careful reviewing process, 18 regular papers have been accepted for presentation at the conference among 55 submissions. Then, after the conference, a collection of papers published in the proceedings was selected with the help of the Program Committee members, and the authors were invited to revise and extend their contributions for this special issue. Next, the extended submissions have been examined in another independent reviewing process involving two review rounds to meet the standards of FUNDAMENTA INFORMATICAE. Finally, six contributions have been accepted for publication. The accepted papers give a good overview of some recent developments in the area of Petri nets and concurrency.

In the article "Old and New Algorithms for Minimal Coverability Sets" by Antti Valmari and Henri Hansen it is presented and proven correct a simple algorithm for computing minimal coverability sets for Petri nets. The features and performance of this algorithm, which is not based on future pruning, are discussed and compared with other approaches based on pruning. It is shown, using examples, that neither approach is systematically better than the other. This paper received the "Outstanding Paper" award at the conference. The paper "A Sweep-Line Method for Büchi Automata-based Model Checking" by Sami Evangelista and Lars Michael Kristensen proposes and experimentally evaluates an algorithm for Büchi automata-based model checking compatible with the search order and with the on-the-fly deletion of states as performed by the sweep-line method. In the paper "Safety and soundness for Priced Resource-Constrained Workflow nets" María Martos-Salgado and Fernando Rosa-Velardo extend workflow Petri nets with discrete prices, by associating a price with the execution of a transition and to the storage of tokens. They develop a framework in which to study safety and soundness for price resource-constrained workflow nets and study the decidability and the complexity of these properties. In the paper "Complexity of the Soundness Problem of Workflow Nets" by GuanJun Liu, Jun Sun, Yang Liu, and JinSong Dong, it is proven that the soundness problem is PSPACE-hard for workflow nets and PSPACE-complete for bounded workflow nets and then also for bounded workflow nets with reset or inhibitor arcs. Additionally, it is proven that the soundness problem is co-NP-hard for asymmetric-choice workflow nets, a larger class than free-choice workflow nets. The paper "Process Discovery and Conformance Checking Using Passages" by W.M.P. van der Aalst and H.M.W. Verbeek proposes an approach to decompose process

mining problems into smaller problems using the new notion of passages. In particular, it shows how process discovery and conformance checking can be done more efficiently using such decompositions. The paper "Modelling Search Engines Performance using Coloured Petri Nets" by Veronica Gil-Costa, Mauricio Marin, Alonso Inostrosa-Psijas, and Carolina Bonacic introduces the use of stochastic and hybrid coloured Petri nets to model the performance of search engines. This proposal is validated with an experimental study and is supported by a C++ class library for model construction and simulation.

We would like to thank the authors of the papers of this issue for their efforts to extend and revise their contributions. We are also grateful to all the reviewers who have given numerous valuable suggestions to the authors. Finally, we would like to thank Damian Niwinski for giving us the opportunity to publish this issue.

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List of papers

1. *Old and New Algorithms for Minimal Coverability Sets*: Antti Valmari and Henri Hansen

2. *A Sweep-Line Method for Büchi Automata-based Model Checking*: Sami Evangelista and Lars Michael Kristensen

3. *Safety and Soundness for Priced Resource-Constrained Workflow Nets*: María Martos-Salgado and Fernando Rosa-Velardo

4. *Complexity of the Soundness Problem of Workflow Nets*: GuanJun Liu, Jun Sun, Yang Liu, and JinSong Dong

5. *Process Discovery and Conformance Checking Using Passages*: W.M.P. van der Aalst and H.M.W. Verbeek

6. *Modelling Search Engines Performance using Coloured Petri Nets*: Veronica Gil-Costa, Mauricio Marin, Alonso Inostrosa-Psijas, and Carolina Bonacic