Preface to the Special Issue on the 2022 Conference on Logic Programming and Nonmonotonic Reasoning

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This issue of Theory and Practice of Logic Programming contains thoroughly revised and significantly extended versions of selected papers presented at the 16th International Conference on Logic Programming and Nonmonotonic Reasoning (LPNMR 2022),[1] which was held in Genoa (Italy), on September 5–9, 2022.

The LPNMR conference series, established in 1991, is driven by key researchers in the field of logic programming and nonmonotonic reasoning. It is a forum for exchanging ideas on declarative logic programming, nonmonotonic reasoning, and knowledge representation. LPNMR attracts a substantial number of highly visible submissions. The aim of the conference is to facilitate interactions between researchers and practitioners interested in the design and implementation of logic-based programming languages and database systems, and those working in knowledge representation and nonmonotonic reasoning. LPNMR strives to encompass theoretical and experimental studies that have led or will lead to advances in these areas, as well as their use in practical applications. LPNMR 2022 aimed to bring together researchers from LPNMR core areas and application areas of the aforementioned kind in order to share research experiences, promote collaboration, and identify directions for joint future research.

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[1] https://sites.google.com/view/lpnmr2022

LPNMR 2022 received 57 submissions. Almost all submissions were reviewed by at least three program committee members. As a result, 34 papers were accepted as regular long papers and 5 as short papers. Among the best accepted long papers with a logic programming focus, six papers were selected, and their authors were encouraged to submit a long version of their work for a Rapid Publication in the journal of Theory and Practice of Logic Programming. All these submissions were subject to a rigorous reviewing process. This special issue is the result of these efforts and nicely reflects the wide range of topics covered by LPNMR 2022, ranging from fundamental theoretical contributions to systems and real-world applications. We give a short summary of these papers next.

In the paper "Metric Temporal Answer Set Programming over Timed Traces," Arvid Becker, Pedro Cabalar, Martín Diéguez, Torsten Schaub, and Anna Schuhmann address the need for reasoning about quantitative timing constraints in dynamic systems. Timing constraints are especially important to solve tasks that require both planning and scheduling. To solve this problem, the authors introduce Metric Equilibrium Logic, a metric extension of linear-time temporal equilibrium logic in which temporal operators are constrained by intervals over natural numbers. The authors envision an Answer Set Programming (ASP) implementation of their logic by leveraging existing temporal ASP systems like *telingo*, which would result in a very useful reasoning tool.

In their paper "ASP for Flexible Payroll Management," Benjamin Callewaert and Joost Vennekens present an application of event calculus and ASP to the problem of payroll management. The paper stresses the importance of selecting a language that is suitable for end-users without software engineering expertise, while being expressive enough and satisfying the computation constraints of the real-world domain. The authors' interesting solution employs several ideas and formalisms, including ASP, event calculus, temporal logics, and Decision Model and Notation (DMN) tables. Its multi-shot implementation reaches a performance that satisfies requirements imposed by practice.

Stefania Costantini and Andrea Formisano's paper titled "Epistemic Logic Programs: a study of some properties" discusses important properties of Epistemic Logic Programs, which are an extension of ASP with epistemic operators. In particular, the paper focuses on the Epistemic Splitting Property and proposes an alternative, called the Top-Down Epistemic Splitting Property, which enables meta-reasoning that is not only aimed at observing lower layers but also at trying to influence them. A main finding of the paper is that epistemically stratified programs satisfy both the original and the Top-Down Epistemic Splitting Property, thus confirming intuitions behind both properties.

In their paper "IASCAR: Incremental Answer Set Counting by Anytime Refinement", Johannes Klaus Fichte, Sarah Alice Gaggl, Markus Hecher, and Dominik Rusovac propose a novel approach to the problem of counting answer sets of a logic program that combines ideas from knowledge compilation and combinatorial solving. Experimental results with a prototypical implementation demonstrate the advantages of this innovative approach. The conference version of this paper was selected by the LPNMR 2022PC and General Chairs to be awarded an Honorable Mention.

The paper "clingraph: ASP-based Visualization" by Susana Hahn, Orkunt Sabuncu, Torsten Schaub, and Tobias Stolzmann introduces a valuable contribution to an ASP

toolset and development environment: a tool called *clingraph* for the visualization of ASP output. What makes *clingraph* especially appealing to researchers in the ASP community is that the tool accepts visualization specifications written in ASP. Such specifications describe graphs and are then processed by the graph visualization system *graphviz*. The LPNMR Chairs selected the conference version of this paper for the Best Student Paper Award.

Finally, the paper "Knowledge-Based Support for Adhesive Selection" by Simon Vandevelde, Jeroen Jordens, Bart Van Doninck, Maarten Witters, and Joost Vennekens presents yet another modern real-world application domain. An expert tool called *Adhesive Selector* is introduced, which recommends the most appropriate adhesive for an intended use, by accounting for characteristics including strength, temperature resistances, and adhesive durability. The tool is implemented using the IDP-Z3 reasoning system, which leverages the FO(.) logic and DMN tables. This application illustrates the importance of logic-based tools in facilitating otherwise time-consuming and labor-intensive tasks.

We would like to thank all authors for preparing, submitting, and revising their contributions to this special issue. We also thank all members of the LPNMR 2022 Program Committee for their valuable work in reviewing the submissions, all conference participants for fruitful discussions, and the local organization team under the lead of Marco Maratea for being our hosts. To make this special issue possible, we are particularly grateful to Mirek Truszczyński for his encouragement and guidance through the whole process. Last but not least, we are deeply indebted to all reviewers of this special issue for their timely expertise in carefully reviewing the contributions.