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Preface

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This special issue of the Annals of Mathematics and Artificial Intelligence contains thoroughly revised and significantly extended versions of selected papers presented at the Eighth International Symposium on Foundations of Information and Knowledge Systems (FoIKS 2014), which was held in Bordeaux, France, March 3–7, 2014.

The FoIKS symposia provide a biennial forum for presenting and discussing theoretical and applied research on information and knowledge systems. The goal is to bring together researchers with an interest in this subject, share research experiences, promote collaboration, and identify new issues and directions for future research. FoIKS 2014 solicited original contributions on foundational aspects of information and knowledge systems. This included submissions that apply ideas, theories or methods from specific disciplines to information and knowledge systems. Examples of such disciplines are discrete mathematics, logic and algebra, model theory, information theory, complexity theory, algorithmics and computation, statistics, and optimization.

Previous FoIKS symposia were held Kiel (Germany) in 2012, in Sofia (Bulgaria) in 2010, Pisa (Italy) in 2008, Budapest (Hungary) in 2006, Vienna (Austria) in 2004, Schloss Salzau near Kiel (Germany) in 2002, and Burg/Spreewald near Berlin (Germany) in 2000. FoIKS took up the tradition of the conference series Mathematical Fundamentals of Database Systems (MFDBS), which initiated East-West collaboration in the field of database theory. Former MFDBS conferences were held in Rostock (Germany) in 1991, Visegrad (Hungary) in 1989, and Dresden (Germany) in 1987.

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The call for papers for FoIKS 2014 resulted in the submission of 52 full articles. In a rigorous reviewing process, each submitted article was reviewed by at least three international experts. The 14 articles judged best by the Program Committee were accepted for long presentation. In addition, five articles were accepted for short presentation. The conference programme was completed by three invited talks kindly presented by Dov Gabbay, Cyril Gavoille, and Jeff Wijsen.

The FoIKS symposia are a forum for intensive discussions. Speakers are given suffcient time to present their results, expound relevant background information and put their research into context. Furthermore, participants are asked in advance to prepare a first response to a contribution of another author in order to initiate discussion.

After the symposium the authors of the papers judged best by the Programme Committee were invited to prepare thoroughly revised and significantly extended versions of their conference contributions to be considered for inclusion into this special issue. This resulted in five submissions, and based on a rigourous reviewing process, all five papers listed below have been selected.

- In *Implication and Axiomatization of Functional and Constant Constraints*, Jelle Hellings, Marc Gyssens, Jan Paredaens, and Yuqing Wu provide sound and complete axiomatizations for functional and constant constraints, both separately and combined, in the general setting of relations with arbitrary arity. These axiomatizations are derived using the chase algorithm for equality-generating constraints. For derivations of constant constraints, the authors show how every chase step can be simulated by a bounded number of applications of inference rules. For derivations of functional constraints, they show that the chase algorithm can be normalized to a more specialized symmetry-preserving chase algorithm performing symmetry-preserving steps, each of which can be simulated by a bounded number of applications of inference rules. The axiomatization for functional constraints is in particular applicable to the RDF data model, solving a major open problem.
- In *Constraint-Preserving Snapshot Isolation*, Stephen Hegner presents a method for detecting potential violations of integrity constraints of concurrent transactions running under snapshot isolation. Current implementations of snapshot isolation enforce all internal integrity constraints, however they fail to enforce constraints implemented via triggers. To solve this problem, Stephen Hegner develops a method, called constraint-preserving snapshot isolation (CPSI). Unlike serializable snapshot isolation, CPSI does not guarantee full serializability, but does guarantee that all constraints, including those enforced via triggers, are satisfied, while requiring testing concurrent transactions for conflict only pairwise. To address false positives, the author develops a hybrid approach which combines CPSI with a special version of serializable snapshot isolation, resulting in substantially fewer false positives than would occur using either approach alone.
- In *Efficient editing and data abstraction by finding Homogeneous Clusters,* Stefanos Ougiaroglou and Georgios Evangelidis propose an editing algorithm, called Editing through Homogeneous Clusters (EHC), to remove noise and mislabeled data from large datasets on which k-Nearest Neighbour classification is computed. They subsequently extend the algorithm with a prototype abstraction algorithm that creates a small noise-free representative set of the initial training data. The resulting algorithm is called Editing and Reduction through Homogeneous Clusters (ERHC). EHC and ERHC are tested on several datasets. The results show that both run very fast and achieve high accuracy. In addition, ERHC achieves high reduction rates.

– In *Structures of Opposition Induced by Relations. The Boolean and the Gradual Cases*, Davide Ciucci, Didier Dubois, and Henri Prade show that a cube of opposition, a structure that generalizes the square of opposition invented in ancient logic, can be generated from the composition of a binary relation with a subset, by the effect of set complementation on the subset, on the relation, or on the result of the composition. The authors argue that since the composition of relations is encountered in many areas, the structures of opposition exhibited by the cube of opposition has a universal flavor, applying in particular to information processing-oriented settings such as rough set theory, possibility theory, or formal concept analysis. They discuss how this structure extends with a fuzzy relation and a fuzzy subset, and how the graded cube of opposition thus obtained provides an organized view of the different existing compositions of fuzzy relations.
– In *A Quantitative Approach to Belief Revision in Structured Probabilistic Argumentation*, Gerardo I. Simari, Paulo Shakarian, and Marcelo A. Falappa continue their work on an argumentation-based framework that extends the Defeasible Logic Programming (DeLP) language with probabilistic uncertainty, giving rise to the Defeasible Logic Programming with Presumptions and Probabilistic Environments (DeLP3E) model. The authors extend a study of a non-prioritized class of revision operators and argue that in some cases it may be desirable to define revision operators that take quantitative aspects into account. They address the complexity of several problems related to the corresponding revision of knowledge bases, and present an algorithm for computing the probability that a literal is warranted in a DeLP3E knowledge base.

We would like to thank all authors for preparing and submitting their contributions to this special issue. We thank all members of the FoIKS 2014 Programme Committee, and we are deeply indebted to all referees of this special iusse for their timely expertise in carefully reviewing the contributions.

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List of Referees

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