

# Preface

This volume contains the articles that were presented at the 9th International Symposium on Foundations of Information and Knowledge Systems (FoIKS 2016) held in Linz, Austria, during March 7–11, 2016.

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. Speakers are given sufficient time to present their ideas and results within the larger context of their research. Furthermore, participants are asked in advance to prepare a first response to a contribution of another author in order to initiate discussion.

Previous FoIKS symposia were held in Bordeaux (France) in 2014, Kiel (Germany) in 2012, 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, Visegrád (Hungary) in 1989, and Dresden (Germany) in 1987.

FoIKS 2016 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. Suggested topics included, but were not limited to the following:

- Big data: models for data in the cloud, programming languages for big data, query processing
- Database design: formal models, dependencies and independencies
- Dynamics of information: models of transactions, concurrency control, updates, consistency preservation, belief revision
- Information fusion: heterogeneity, views, schema dominance, multiple source information merging, reasoning under inconsistency
- Integrity and constraint management: verification, validation, consistent query answering, information cleaning
- Intelligent agents: multi-agent systems, autonomous agents, foundations of software agents, cooperative agents, formal models of interactions, logical models of emotions
- Knowledge discovery and information retrieval: machine learning, data mining, formal concept analysis and association rules, text mining, information extraction

- Knowledge representation, reasoning and planning: non-monotonic formalisms, probabilistic and non-probabilistic models of uncertainty, graphical models and independence, similarity-based reasoning, preference modeling and handling, argumentation systems
- Logics in databases and AI: classic and non-classic logics, logic programming, description logic, spatial and temporal logics, probability logic, fuzzy logic
- Mathematical foundations: discrete structures and algorithms, automata, abstract machines, graphs, grammars, finite model theory, information theory, coding theory, complexity theory, randomness
- Security in information and knowledge systems: identity theft, privacy, trust, intrusion detection, access control, inference control, secure Web services, secure Semantic Web, risk management
- Semi-structured data and XML: data modelling, data processing, data compression, data exchange
- Social computing: collective intelligence and self-organizing knowledge, collaborative filtering, computational social choice, Boolean games, coalition formation, reputation systems
- The Semantic Web and knowledge management: languages, agents, adaptation, intelligent algorithms, ontologies
- The WWW: models of Web databases, Web dynamics, Web services, Web transactions and negotiations

The call for papers resulted in the submission of 23 articles. Each one was carefully reviewed by at least three international experts. The 12 articles judged best by the Program Committee were accepted for long presentation. In addition, two articles were accepted for short presentation. This volume contains versions of these articles that have been revised by their authors according to the comments provided in the reviews. After the conference, authors of a few selected articles were asked to prepare extended versions of their articles for publication in a special issue of the journal *Annals of Mathematics and Artificial Intelligence*.

We wish to thank all authors who submitted papers and all conference participants for fruitful discussions. We are grateful to our keynote speakers Christoph Beierle, Joachim Biskup, Reinhard Pichler, Henry Prakken, and José Maria Turull-Torres; this volume also contains articles for four of the five invited talks. We would like to thank the Program Committee members and additional reviewers for their timely expertise in carefully reviewing the submissions. We want to thank Maria Vanina Martinez for her work as publicity chair. The support of the conference provided by the European Association for Theoretical Computer Science (EATCS) and by the Software Competence Center Hagenberg is gratefully acknowledged. Last but not least, special thanks go to the local organization chair, Flavio Ferrarotti, and his dedicated team consisting of Andreea Buga, Tania Nemeş, Loredana Tec, and Mircea Boris Vleju for their support and for being our hosts during the wonderful days in Linz.

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