Preface

AIMSA 2014 was the 16th in a biennial series of AI conferences that have been held in Bulgaria since 1984. The series began as a forum for scientists from Eastern Europe to exchange ideas with researchers from other parts of the world, at a time when such meetings were difficult to arrange and attend. The conference has thrived for 30 years, and now functions as a place where AI researchers from all over the world can meet and present their research.

AIMSA continues to attract submissions from all over the world, with submissions from 27 countries. The range of topics is almost equally broad, from traditional areas such as computer vision and natural language processing to emerging areas such as mining the behavior of Web-based communities. It is good to know that the discipline is still broadening the range of areas that it includes at the same time as cementing the work that has already been done in its various established subfields.

The Program Committee selected just over 30% of the submissions as long papers, and further accepted 15 short papers for presentation at the conference. We are extremely grateful to the Program Committee and the additional reviewers, who reviewed the submissions thoroughly, fairly and very quickly.

Special thanks go to our invited speakers, Bernhard Ganter (TU Dresden), Boris G. Mirkin (Higher School of Economics, Moscow) and Diego Calvanese (Free University of Bozen-Bolzano). The invited talks were grouped around ontology design and application, whether using clustering and biclustering approaches (B.G. Mirkin), formal concept analysis, a branch of applied lattice theory (B. Ganter), or being concerned with ontology-based data access (D. Calvanese).

Finally, special thanks go to the AComIn project (Advanced Computing for Innovation, FP7 Capacity grant 316087) for the generous support for AIMSA 2014, as well as Bulgarian Artificial Intelligence Association (BAIA), and Institute of Information and Communication Technologies at Bulgarian Academy of Sciences (IICT-BAS) as sponsoring institutions of AIMSA 2014.

June 2014

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Keynote Presentation Abstracts
Scalable End-User Access to Big Data

Diego Calvanese

Free University of Bozen-Bolzano, Italy

Keynote Abstract

Ontologies allow one to describe complex domains at a high level of abstraction, providing end-users with an integrated coherent view over data sources that maintain the information of interest. In addition, ontologies provide mechanisms for performing automated inference over data taking into account domain knowledge, thus supporting a variety of data management tasks. Ontology-based Data Access (OBDA) is a recent paradigm concerned with providing access to data sources through a mediating ontology, which has gained increased attention both from the knowledge representation and from the database communities. OBDA poses significant challenges in the context of accessing large volumes of data with a complex structure and high dynamicity. It thus requires not only carefully tailored languages for expressing the ontology and the mapping to the data, but also suitably optimized algorithms for efficiently processing queries over the ontology by accessing the underlying data sources. In this talk we present the foundations of OBDA relying on lightweight ontology languages, and discuss novel theoretical and practical results for OBDA that are currently under development in the context of the FP7 IP project Optique. These results make it possible to scale the approach so as to cope with the challenges that arise in real world scenarios, e.g., those of two large European companies that provide use-cases for the Optique project.

About the Speaker

Diego Calvanese is a professor at the KRDB Research Centre for Knowledge and Data, Free University of Bozen-Bolzano, Italy. His research interests include formalisms for knowledge representation and reasoning, ontology languages, description logics, conceptual data modelling, data integration, graph data management, data-aware process verification, and service modelling and synthesis. He is actively involved in several national and international research projects in the above areas, and he is the author of more than 250 refereed publications, including ones in the most prestigious international journals and conferences in Databases and Artificial Intelligence. He is one of the editors of the Description Logic Handbook. In 2012–2013 he has been a visiting researcher at the Technical University of Vienna as Pauli Fellow of the “Wolfgang Pauli Institute”. He will be the program chair of PODS 2015.
Formal Concepts for Learning and Education

Bernhard Ganter

Technical University of Dresden, Germany

Keynote Abstract

Formal Concept Analysis has an elaborate and deep mathematical foundation, which does not rely on numerical data. It is, so to speak, fierce qualitative mathematics, that builds on the algebraic theory of lattices and ordered sets. Since its emergence in the 1980s, not only the mathematical theory is now mature, but also a variety of algorithms and of practical applications in different areas. Conceptual hierarchies play a role e.g., in classification, in reasoning about ontologies, in knowledge acquisition and the theory of learning. Formal Concept Analysis provides not only a solid mathematical theory and effective algorithms; it also offers expressive graphics, which can support the communication of complex issues.

In our lecture we give an introduction to the basic ideas and recent developments of Formal Concept Analysis, a mathematical theory of concepts and concept hierarchies and then demonstrate the potential benefits and applications of this method with examples. We will also review some recent application methods that are currently being worked out. In particular we will present results on a “methodology of learning assignments” and on “conceptual exploration”.

About the Speaker

Bernhard Ganter is a pioneer of formal concept analysis. He received his PhD in 1974 from the University of Darmstadt, Germany, and became Professor in 1978. Currently, he is a Professor of Mathematics and the Dean of Science at the Technical University of Dresden, Germany. His research interests are in discrete mathematics, universal algebra, lattice theory, and formal concept analysis. He is a co-author of the first textbook and editor of several volumes on formal concept analysis.
Ontology as a Tool for Automated Interpretation

Boris G. Mirkin

National Research University, Higher School of Economics,
Moscow, Russia

Keynote Abstract

In the beginning, I am going to outline, in-brief, the current period of developments in the artificial intelligence research. This is of synthesis, in contrast to the sequence of previous periods (romanticism, deduction, and induction). Three more or less matured ontologies, and their use, will be reviewed: ACM CCS, SNOMED CT and GO. The popular strategy of interpretation of sets of finer granularity via the so-called overrepresented concepts will be mentioned. A method for generalization and interpretation of fuzzy/crisp query sets by parsimoniously lifting them to higher ranks of the hierarchy will be presented. Its current and potential applications will be discussed.

About the Speaker

Boris Mirkin holds a PhD in Computer Science and DSc in Systems Analysis degrees from Russian Universities. In 1991–2010, he travelled through long-term visiting appointments in France, Germany, USA, and a teaching appointment as Professor of Computer Science, Birkbeck University of London, UK (2000–2010). He develops methods for clustering and interpretation of complex data within the “data recovery” perspective. Currently these approaches are being extended to automation of text analysis problems including the development and use of hierarchical ontologies. His latest publications: textbook “Core concepts in data analysis” (Springer 2011) and monograph “Clustering: A data recovery approach” (Chapman and Hall/CRC Press, 2012).
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