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Conceptual Modeling

33rd International Conference, ER 2014
Atlanta, GA, USA, October 27-29, 2014
Proceedings
Preface

The 33rd edition of the International Conference on Conceptual Modeling (ER), held this year in Atlanta, Georgia, USA, continued the long tradition of the ER conference series as the leading international forum for presenting research results and discussing emerging trends in conceptual modeling.

Since the seminal work of Peter Chen on the entity relationship (ER) model, the field of conceptual modeling has had profound impact on many areas of computing and information systems, including databases, software, business processes, and Internet systems and services. Conceptual modeling consists of the creation of foundational elements of intended information systems and applications that can serve as communication vehicles among stakeholders, blueprints for developers, as well as long-term preservation of designer intent. Conceptual models, therefore, serve a critical role in the design and deployment of new technologies and applications. As a set of languages, tools and techniques, conceptual models and modeling provide a rich arena for researchers with immediate applications to practice.

This foundational role of conceptual models was evident in this year’s program, which included research papers addressing many contemporary topics such as big data, city informatics, policy compliance, enterprise architecture, data-intensive ecosystems, and open source software strategies. In addition, the research community continues to investigate fundamental concerns of conceptual modeling such as pragmatics, deployment paths, and modeling primitives.

The call for papers this year included a focus on fundamental concerns as well as contemporary application areas. The international research community responded by submitting a total of 123 abstracts, which resulted in 80 full paper submissions. With the use of an online review system, each paper was reviewed by at least three reviewers. On the basis of these reviews, we selected 23 submissions as full papers (an acceptance rate of 28.75%). The authors of a further 15 papers were invited to present their papers based on the contemporary nature of these research efforts and the promise for future impact. These papers are included as short papers in the proceedings.

The technical program at the conference consisted of a number of sessions covering the aforementioned papers. In addition, the program consisted of panels related to modeling for extreme events, conceptual models related to security concerns, and other fundamental concerns. There were two tutorials, one devoted to meta-models and meta-execution models, and a second related to creating new requirements modeling languages.

In addition to these, the conference included a number of workshops related to contemporary application areas. Papers from these workshops and papers describing research software demonstrations are included in a companion volume to these proceedings.
Finally, three highly interesting keynote presentations addressed important current topics in the theory and practice of conceptual modeling. Financial data mining pioneer Vasant Dhar (New York University, USA) pointed out critical issues in predictive modeling in the context of big data and data science, including the quest for an additional set of skills that students and practitioners in the field will need to acquire. Giancarlo Guizzardi (Federal University of Espírito Santo, Brazil, and University of Trento, Italy) emphasized quality control of conceptual modeling using real-world semantics. Antonio Furtado (Pontifical Catholic University of Rio de Janeiro, Brazil) emphasized the advantages of a semiotic perspective as another important foundation of formally supported database design and usage.

We would like to thank all those who helped put this program together. We would especially like to thank the individuals who have spearheaded a number of activities. This includes Workshop Chair Marta Indulska; Doctoral Consortium Chair Carson Woo; Tutorial Chair Cecil Chua; Panel Chair Sham Navathe; Demonstrations Chair Akhilesh Bajaj; and Educational Symposium Chair Lois Delcambre. In addition, Matti Rossi helped us in publicizing the conference; Jon Becker kept the website updated regularly. Antoni Olivé, ER Steering Committee Chair, and Veda Storey, ER Steering Committee Liaison, were always generous with their time in answering questions and providing guidance. We also thank Stuart Madnick and Colette Rolland, who provided valuable guidance as honorary chairs. Finally, Richard Welke was instrumental in ensuring that the logistics ran smoothly, as the local arrangements chair. Special thanks to Greg O’Dillon, who made a major contribution to making everything happen in and around the conference venue.

We are grateful for the support from all the sponsors of the conference. Major support for the conference was provided by Penn State University and Singapore Management University. We wish to express our appreciation for Georgia State University as the local organizing partner.

We sincerely thank the members of the Program Committee and external reviewers who provided thoughtful reviews on time. Their reviews provided feedback as well as suggestions that have significantly improved the technical program as well as each individual paper.

Most importantly, we thank the authors for submitting their work and for participating in the conference.

July 2014

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Keynotes (Abstracts)
Abstract. Data Science is the study of the generalizable extraction of knowledge from data. A common epistemic requirement in assessing whether new knowledge is actionable for decision making is its predictive power, not just its ability to explain the past. The heterogeneity and scale of data and diversity of analytical methods require data scientists to have an integrated skill set, as well as a deep understanding of the craft of problem formulation and the science required to engineer effective solutions. I shall talk about the key issues that arise in industrial strength predictive modeling, including the implications for education in this fast emerging field.
A Semiotic Approach to Conceptual Modelling

Antonio L. Furtado, Marco A. Casanova, and Simone D.J. Barbosa

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Abstract. The work on Conceptual Modelling performed by our group at PUC-Rio is surveyed, covering four mutually dependent research topics. Regarding databases as a component of information systems, we extended the scope of the Entity-Relationship model, so as to encompass facts, events and agents in a three-schemata specification method employing a logic programming formalism. Next we proceeded to render the specifications executable, by utilizing backward-chaining planners to satisfy the agents’ goals through sequences of fact-modification events. Thanks to the adoption of this plan-recognition / plan-generation paradigm, it became possible to treat both business-oriented and fictional narrative genres. To guide our conceptual modelling approach, we identified four semiotic relations, associated with the four master tropes that have been claimed to provide a system to fully grasp the world conceptually.

Keywords: Entity-Relationship Model, Information Systems, Planning, Logic Programming, Narrative Genres, Semiotics.
Ontological Patterns, Anti-Patterns and Pattern Languages for Next-Generation Conceptual Modeling

Giancarlo Guizzardi

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Computer Science Department,
Federal University of Espírito Santo (UFES), Vitória - ES, Brazil

Abstract. This paper addresses the complexity of conceptual modeling in a scenario in which semantic interoperability requirements are increasingly present. It elaborates on the need for developing sound ontological foundations for conceptual modeling but also for developing complexity management tools derived from these foundations. In particular, the paper discusses three of these tools, namely, ontological patterns, ontological anti-patterns and pattern languages.

Keywords: Conceptual Modeling, Formal Ontology, Patterns, Anti-Patterns and Pattern Languages
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