Canadian Semantic Web

Weichang Du • Faezeh Ensan
Editors

Canadian Semantic Web

Technologies and Applications

Springer

Editors
Weichang Du
Faculty of Computer Science
University of New Brunswick
E3B 5A3 Fredericton
Canada
wdu@unb.ca

Faezeh Ensan
Faculty of Computer Science
University of New Brunswick
E3B 5A3 Fredericton
Canada
faezeh_ensan@yahoo.com

ISBN 978-1-4419-7334-4 e-ISBN 978-1-4419-7335-1
DOI 10.1007/978-1-4419-7335-1
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2010933844

Preface

The emergence of Web technologies for the distribution of an immense amount of data and knowledge has given rise to the need for supportive frameworks for knowledge management. Semantic Web technologies aim at providing shared semantic spaces for Web contents, such that people, applications and communities can use a common platform to share information.

Canadian Semantic Web: Technologies and Applications aims at contributing to the advancement of the Semantic Web by providing the most recent significant research on Semantic Web theory, techniques and applications in academia, industry and government in Canada and all over the world. It also enlightens possible Semantic Web research directions in future by reporting some works in-progress that present on-going research on principles and applications of the Semantic Web, while their implementation or deployment may have not been completed.

This book consists of ten chapters. The chapters are extended versions of a selected set of papers from the second Canadian Semantic Web Working Symposium (CSWWS 2009) and the twenty-first international Conference on Software Engineering and Knowledge Engineering (SEKE 2009). CSWWS 2009 was held in Kelowna, British Columbia in May 2009. Since many of the challenging aspects of the research problems tackled in the Semantic Web area fall in the realm of Artificial Intelligence or employ of AI techniques, CSWWS 2009 was organized in association with the 22^{nd} Canadian Conference on Artificial Intelligence. SEKE 2009 was held in Boston, July 2009, aiming at bridging the two domains of Software Engineering and Knowledge Engineering together. Hence, the content of this book covers the theory and applications of Semantic Web techniques from both important perspectives of Artificial Intelligence and Software Engineering.

Canadian Semantic Web: Technologies and Applications covers a combination of theory-based and application-based topics. Three chapters: 'Incremental Query Rewriting with Resolution' by Alexandre Riazanov and Marcelo A. T. Aragão (Chapter 1), 'Knowledge Representation and Reasoning in Norm-Parameterized Fuzzy Description Logics' by Jidi Zhao and Harold Boley (Chapter 2) , and 'A Generic Evaluation Model for Semantic Web Services' by Omair Shafiq (Chapter 3) focus on theoretical aspects of the Semantic Web. Chapter 1 provides meth-

ods for computing *schematic* answers to deductive queries and transforming these schematic answers into standard SQL queries. Further, this chapter discusses the completeness and soundness of the presented techniques. Chapter 2 provides an extension to standard Description Logics in order to enrich them with capability of representing imprecise, uncertain and fuzzy knowledge. It also provides a procedure for reasoning over these extended Description Logics and proves its soundness, completeness, and termination. Chapter 3 discusses the requirement for evaluating Semantic Web Services and provides a generic evaluation model for this purpose.

The remaining seven chapters present implementation support for existing Semantic Web techniques or investigate applications of the Semantic Web in different domains. 'A Modular Approach to Scalable Ontology Development' by Faezeh Ensan and Weichang Du (Chapter 4) provides an extension to the OWL ontology language and also introduces an ontology editor and browser for creating modular ontologies. It also proposes a set of metrics for evaluating modular ontologies and investigates four developed modular ontologies with regards to these metrics. 'Corporate Semantic Web: Towards the Deployment of Semantic Technologies in Enterprises' by Adrian Paschke, et al. (Chapter 5) investigates the Corporate Semantic Web idea for applying semantic technologies in enterprises. It also discusses the main challenges and research areas with regards to this idea. 'Semantic Service Matchmaking in the ATM Domain Considering Infrastructure Capability Constraints' by Thomas Moser et al. (Chapter 6) analyzes the application of Semantic Web techniques in the Air Traffic Management (ATM) domain. It introduces a framework for semi-automatic semantic matchmaking for software services in this domain. These chapters (Chapters 1 to 6) present accomplished research in the area of the Semantic Web, while the following four chapters (Chapter 7 to 10) are the shorter ones, presenting on-going research.

'Developing Knowledge Representation in Emergency Medical Assistance by Using Semantic Web Techniques' by Heloise Manica, et al. (Chapter 7) introduces an architecture for utilizing ontologies in mobile emergency medical assistance systems. The authors discuss that the proposed architecture can improve query processing and reduce network traffic in mobile environments. 'Semantically Enriching the Search System of a Music Digital Library' by Paloma de Juan and Carlos Iglesias (Chapter 8) describes two search systems over digital music libraries: a traditional key-word search and a semantic-based search system, evaluates and compares them and concludes how a semantic-based representation of information can lead to more flexibility in search systems. Chapter 9, 'Application of an Intelligent System Framework and the Semantic Web for the CO_2 Capture Process' by Chuansan Luo, Qing Zhou, and Christine W. Chan, describes the application of Semantic Web techniques in the domain of carbon dioxide capture process. Finally, Chapter 10, 'Information Pre-Processing using Domain Meta-Ontology and Rule Learning System' by Girish R Ranganathan and Yevgen Biletskiy, provides a solution for semi-automatic population of meta-ontologies, when a meta-ontology conceptualizes a domain of interest from huge amounts of source documents.

Semantic Web is an emerging research topic in the Canadian research community. Several important universities have started large projects and have dedicated

specific laboratories to the Semantic Web. Reasoning engines for different Description Logics and ontologies, application of Semantic Web in healthcare and bioinformatics, applying Semantic Web techniques in business domain and business document management and semantic interoperability are among current research directions on Semantic technologies in the Canadian community. Based on the current status, we would expect to see more comprehensive Semantic Web research in Canadian organizations and also in collaboration with the international research community.

Weichang Du
June 2010 *Faezeh Ensan*

Program Committee

Program Committee of The Second Canadian Semantic Web Working Symposium 2009

Abdolreza Abhari (Ryerson University, Canada)

Christopher Baker (University of New Brunswick, Canada)

Virendra C Bhavsar (University of New Brunswick, Canada)

Yevgen Biletskiy (University of New Brunswick, Canada)

Harold Boley (NRC Institute for Information Technology, Canada)

Greg Butler (Concordia University, Canada)

Stephen Downes (National Research Council of Canada, Canada)

Michel Dumontier (Carlton University, Canada)

Jinan Fiaidhi (Lakehead University, Canada)

Dragan Gasevic (Athabasca University, Canada)

Pankaj Kamthan (Concordia University, Canada)

Bernard Lefebvre (University of Quebec, Montreal, Canada)

Olga Marino (University of Quebec, Canada)

Sheila McIlraith (University of Toronto, Canada)

Alan Meech (CGI, Canada)

Sehl Mellouli (Laval University, Canada)

Sabah Mohammed (Lakehead University, Canada)

Vale H. Nasser (University of Calgary)

Roger Nkambou (University of Quebec, Montreal, Canada)

Fred Popowich (Simon Fraser University, Canada)

Arash Shaban-Nejad (Concordia University, Canada)

Weiming Shen (National Research Council of Canada, Canada)

Nematollaah Shiri (Concordia University, Canada)

Bruce Spencer (National Research Council of Canada, Canada)

Jose Leomar Todesco (Federal University of Santa Catarina)

Andre Trudel (Acadia University, Canada)

Ren Witte (Concordia University, Canada)

Contents