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Rules and Reasoning

Second International Joint Conference, RuleML+RR 2018
Luxembourg, Luxembourg, September 18–21, 2018
Proceedings

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Preface

These are the proceedings of the Second International Joint Conference on Rules and Reasoning (RuleML+RR). RuleML+RR joined the efforts of two well-established conference series: the International Web Rule symposia (RuleML) and the Web Reasoning and Rule Systems (RR) conferences.

The RuleML symposia and RR conferences have been held since 2002 and 2007, respectively. The RR conferences have been a forum for discussion and dissemination of new results on Web reasoning and rule systems, with an emphasis on rule-based approaches and languages. The RuleML symposia were devoted to disseminating research, applications, languages, and standards for rule technologies, with attention to both theoretical and practical developments, to challenging new ideas, and to industrial applications. Building on the tradition of both, RuleML and RR, the joint conference series RuleML+RR aims at bridging academia and industry in the field of rules, and at fostering the cross-fertilization between the different communities focused on the research, development, and applications of rule-based systems. RuleML+RR aims at being the leading conference series for all subjects concerning theoretical advances, novel technologies, and innovative applications about knowledge representation and reasoning with rules.

To leverage these ambitions, RuleML+RR 2018 was organized as part of the Luxembourg Logic for AI Summit (LuxLogAI 2018). This summit was hosted by the University of Luxembourg on the Campus Belval in Esch-sur-Alzette, Luxembourg. With its special focus theme on “Methods and Tools for Responsible AI,” a core objective of LuxLogAI 2018 was to present and discuss the latest developments and progress made concerning the crucial question of how to make AI more transparent, responsible, and accountable. To this end, LuxLogAI 2018 brought together a range of events with related interests. In addition to RuleML+RR, this included the 4th Global Conference on Artificial Intelligence (GCAI 2018), the DecisionCAMP 2018, the Reasoning Web Summer School (RW 2018), the workshop on Mining and Reasoning with Legal Texts (MIREL 2018), and the Annual Meeting of the German National Interest Group in Deduction Systems (Deduktionstreffen 2018).

The RuleML+RR conference, moreover, included several subevents:

1. Doctoral Consortium, organized by Kia Teymourian (Boston University, US) and Paul Fodor (Stony Brook University, USA). The doctoral consortium is an initiative to attract and promote student research in rules and reasoning, with the opportunity for students to present and discuss their ideas and benefit from close contact with leading experts in the field.
2. Industry Track, organized by Silvie Spreeuwenberg (LibRT, The Netherlands) and Sven Mühlenbrock (KPMG, Luxembourg): The industry track provides a forum for all sectors of industry and business (as well as public sectors) to present, discuss, and propose existing or potential rule-based applications.

3. International Rule Challenge, organized by Giovanni De Gasperis (University of L'Aquila, Italy), Wolfgang Faber (Alpen-Adria-Universität Klagenfurt, Austria), and Adrian Giurca (BTU Cottbus-Senftenberg, Germany): The aim of this initiative is to provide competition among work in progress and new visionary ideas concerning innovative rule-oriented applications, aimed at both research and industry.

The technical program of the main track of RuleML+RR 2018 included the presentation of ten full research papers, five long technical communications, and seven short papers including technical communications and system demonstrations. These contributions were carefully selected by the Program Committee among 33 high-quality submissions to the event. Each paper was reviewed by at least three reviewers; most papers additionally received meta-reviews. The technical program also included papers from the Doctoral Consortium and the Rule Challenge.

At RuleML+RR 2018 the following invited keynotes and tutorials were presented by experts in the field:

- Keynote by Hanna Bast (Universität Freiburg, Germany): “Efficient and Convenient Search on Very Large Knowledge Bases”
- Keynote by Georg Gottlob (University of Oxford, UK, and TU Wien, Austria): “Vadalog: A Language and System for Knowledge Graphs”
- Keynote by Guido Governatori (CSIRO/Data61, Australia): “Modal Rules: Extending Defeasible Logic with Modal Operators”
- Tutorial by Bob Kowalski, Migual Calejo, and Fariba Sadri (all Imperial College, London, UK): “Logic and Smart Contracts”
- Tutorial by Monica Palmirani (University of Bologna, Italy) and Guido Governatori (CSIRO/Data61, Australia): “LegalRuleML”

The chairs sincerely thank the keynote and tutorial speakers for their contribution to the success of the event. The chairs also thank the Program Committee members and the additional reviewers for their hard work in the careful assessment of the submitted papers. Further thanks go to all authors of contributed papers, in particular, for their efforts in the preparation of their submissions and the camera-ready versions within the established schedule. Sincere thanks are due to the chairs of the additional tracks and subevents, namely, the Doctoral Consortium, the Rule Challenge and the Industry Track, and to the chairs of all co-located LuxLogAI events. The chairs finally thank the entire organization team including the publicity, sponsorship, financial, and proceedings chairs, who actively contributed to the organization and the success of the event.

A special thanks goes to all the sponsors of RuleML+RR 2018 and LuxLogAI 2018: Binarypark; the Computer Science and Communications (CSC) Research Unit at the University of Luxembourg; the Department of Mathematics and Computer Science at the University of Calabria; the Interdisciplinary Centre for Security, Reliability and Trust (SnT) and the Interdisciplinary Lab for Intelligent and Adaptive Systems (ILIAS) at the University of Luxembourg; LogicalContracts; the Luxembourg National

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July 2018

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Keynote Talks

Efficient and Convenient Search on Very Large Knowledge Bases

Hannah Bast

Department of Computer Science, University of Freiburg, 79110 Freiburg,
Germany

`bast@cs.uni-freiburg.de`

Abstract. Knowledge bases like Freebase or Wikidata have hundreds of millions of entities and billions of triples. Searching such knowledge bases is challenging in many ways. First, already importing the data dumps from such knowledge bases into standard triples stores is hard: it can take forever or does not work at all without preprocessing. Second, even relatively simple queries can take a very long time to process, in particular queries with large result sets. Third, formulating queries in SPARQL is hard even for experts, since it requires knowledge of the exact names or ids of the involved predicates and entities. Fourth, it is often desirable to combine knowledge base search with keyword search, but basic SPARQL provides little support for this. We will present ideas and solutions for all four of these challenges, as well as various demos based on these ideas and solutions.

Logic and Smart Contracts

Robert Kowalski¹, Miguel Calejo², and Fariba Sadri³

¹ Imperial College, London, UK

{r.kowalski,f.sadri}@imperial.ac.uk

² logicalcontracts.com

mc@logicalcontracts.com

³ Imperial College, London, UK

Abstract. The idea of using logic to improve the analysis and drafting of legal documents was advocated most notably already in the 1950s by the legal theorist Layman Allen [1]. It was given a boost in the 1980s with the use of logic programming (LP) to implement a large portion of the British Nationality Act [7]. Arguably, since then, LP in one form or another has been the dominant approach in the field of AI and Law.

In the meanwhile, a new, related field has emerged with the development of blockchains and smart contracts. However, the main programming languages being used in this new field, such as Solidity and Serpent, have been developed without attention to AI approaches. As a result, there is a large gap between smart contracts in these programming languages and their specifications in the natural language of the law. The resulting systems are hard to verify and difficult for non-programmers to understand.

The gap between conventional programming languages for smart contracts and logic-based languages for AI and Law has inspired several recent applications of AI approaches to the implementation of smart contracts and other legal documents. In this tutorial, we will survey these recent developments, focusing on three main examples: the simplified loan agreement developed by Flood and Goodenough [3], the rock, paper scissors example used in a blockchain lecture course at the University of Maryland [2], and the delayed delivery example of the Accord Project [6], <https://www.accordproject.org/>.

We will discuss alternative implementations of these examples, and show how they can be implemented in the logic and computer language LPS [4, 5], with an open source implementation over SWISH [8], the online version of SWI Prolog. Attendees can experiment with the examples, using their own laptops or tablets during the tutorial. A brief introduction to LPS and a link to the online implementation can be found at <http://lps.doc.ic.ac.uk/>.

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Contents

Invited Papers

Vadalog: A Language and System for Knowledge Graphs	3
<i>Luigi Bellomarini, Georg Gottlob, Andreas Pieris, and Emanuel Sallinger</i>	
Modal Rules: Extending Defeasible Logic with Modal Operators	9
<i>Guido Governatori</i>	

Full Papers

Mixing Logic Programming and Neural Networks to Support Neurological Disorders Analysis	33
<i>Francesco Calimeri, Francesco Cauteruccio, Aldo Marzullo, Claudio Stamile, and Giorgio Terracina</i>	
On the k -Boundedness for Existential Rules	48
<i>Stathis Delivorias, Michel Leclère, Marie-Laure Mugnier, and Federico Ulliana</i>	
Cardinality Restrictions Within Description Logic Connection Calculi	65
<i>Fred Freitas and Ivan Varzinczak</i>	
A First Order Logic Benchmark for Defeasible Reasoning Tool Profiling. . . .	81
<i>Abdelraouf Hecham, Madalina Croitoru, and Pierre Bisquert</i>	
Restricted Chase Termination: A Hierarchical Approach and Experimentation	98
<i>Arash Karimi, Heng Zhang, and Jia-Huai You</i>	
On Horn Conjunctive Queries.	115
<i>Enrique Matos Alfonso and Giorgos Stamou</i>	
CHR.js: A CHR Implementation in JavaScript	131
<i>Falco Nogatz, Thom Frühwirth, and Dietmar Seipel</i>	
Complex Event Processing Under Uncertainty Using Markov Chains, Constraints, and Sampling	147
<i>Romain Rincé, Romain Kervarc, and Philippe Leray</i>	
On the Impact and Proper Use of Heuristics in Test-Driven Ontology Debugging	164
<i>Patrick Rodler and Wolfgang Schmid</i>	

Justifications for Description Logic Knowledge Bases Under the Fixed-Domain Semantics	185
<i>Sebastian Rudolph, Lukas Schweizer, and Satyadharma Tirtarasa</i>	

Technical Communication Papers

Computational Regulation of Medical Devices in PSOA RuleML	203
<i>Sofia Almpani, Petros Stefaneas, Harold Boley, Theodoros Mitsikas, and Panayiotis Frangos</i>	
Faceted Answer-Set Navigation.	211
<i>Christian Alrabbaa, Sebastian Rudolph, and Lukas Schweizer</i>	
Clinical Decision Support Based on OWL Queries in a Knowledge-as-a-Service Architecture	226
<i>Renan Gomes Barreto, Lucas Oliveira Costa Aversari, Cecília Neta Alves Pegado Gomes, and Natasha Correia Queiroz Lino</i>	
An Optimized KE-Tableau-Based System for Reasoning in the Description Logic $\mathcal{DL}_{\mathbf{D}}^{4,\times}$	239
<i>Domenico Cantone, Marianna Nicolosi-Asmundo, and Daniele Francesco Santamaria</i>	
A Case-Based Inquiry into the Decision Model and Notation (DMN) and the Knowledge Base (KB) Paradigm	248
<i>Marjolein Deryck, Faruk Hasić, Jan Vanthienen, and Joost Vennekens</i>	
Rule-Based Drawing, Analysis and Generation of Graphs Applied to Mason's Mark Design	264
<i>Thom Frühwirth</i>	
The MET: The Art of Flexible Reasoning with Modalities	274
<i>Tobias Gleißner and Alexander Steen</i>	
Nuance Reasoning Framework: A Rule-Based System for Semantic Query Rewriting	285
<i>Prateek Jain, Peter Z. Yeh, William Jarrold, Ezra Story, Julien Villemure, and David Martin</i>	
Learning Condition–Action Rules for Personalised Journey Recommendations	293
<i>Matthew R. Karlsen and Sotiris Moschoyiannis</i>	
A Rule-Based eCommerce Methodology for the IoT Using Trustworthy Intelligent Agents and Microservices	302
<i>Kalliopi Kravari and Nick Bassiliades</i>	

Integrating Rule-Based AI Tools into Mainstream Game Development	310
<i>Francesco Calimeri, Stefano Germano, Giovambattista Ianni,</i> <i>Francesco Pacenza, Simona Perri, and Jessica Zangari</i>	
Answer Set Programming Modulo ‘Space-Time’	318
<i>Carl Schultz, Mehul Bhatt, Jakob Suchan,</i> <i>and Przemysław Andrzej Wałęga</i>	
Author Index	327