

## Preface

This volume collects the four selected contributions of the RuleML2012 Doctoral Consortium and the twelve demo papers accepted for presentation at the RuleML2012 Challenge.

The RuleML Doctoral Consortium is part of the RuleML International Symposium on Rules, and is intended to attract Ph.D. researchers in the area of Rules and Markup Languages, from different backgrounds (e.g. theoretical, application, vertical domain-specific), to encourage a constructive and fruitful interdisciplinary approach. The doctoral symposium provides two benefits to students. Firstly, the students can interact with academics and commercial experts in the field, who can evaluate their research projects from both theoretical and application points of view. Secondly, they have the opportunity to present and discuss their ideas in a dynamic and friendly setting.

The first RuleML Doctoral Consortium was included in the first part of the RuleML 5th International Symposium on Rules (RuleML 2011@IJCAI) held on July 19th, 2011 in Barcelona. We have organized this second Doctoral Consortium as part of the RuleML 6<sup>th</sup> International Symposium on Rules, held jointly with ECAI2012, the biennial European Conference on Artificial Intelligence. We include here the four papers of the doctoral consortium, selected from two different backgrounds: Computer Science, for the first two papers, and Law, for the other two. All contributions stressed their attention to temporal reasoning and complex event modelling; application is mostly in the legal domain.

Teymourian's work, supervised by Adrian Paschke, formalizes the combination of vocabularies/ontologies and declarative rules in the field of event processing, allowing to create more intelligent event processors capable of understanding the semantics of events.

Ramakrishna's work, supervised by Adrian Paschke, focuses on shedding light on the imminent need for an effective system for extraction, representation and specification of legal rules, especially in national Patent Law regulation.

Ceci's work, supervised by Monica Palmirani, defines an integrated methodology for modelling judgments, starting from legal texts and capturing both structural parts and arguments used by judges

to reach conclusions using ontologies and rules modelled in a tentative preliminary version of LegalRuleML.

Distinto's work, supervised by Monica Palmirani, describes a hybrid approach for combining a legal ontology on the EU Public Procurement Directives, developed in OWL 2.0, with the related rules modelled using the emerging LegalRuleML standard. The goal is to present a semantic and conceptual framework to support checking of compliance of European tenders with EU Directives.

The 6<sup>th</sup> RuleML International Symposium on Rules (RuleML2012@ECAI), took place on August 27th, 2012 in Montpellier, France. The RuleML Challenge was included in the symposium for the 6<sup>th</sup> time. The Rule Challenge is devoted to disseminating the most advanced practical experiences with rule-based applications, where state-of-the-art solutions and recent research proposals meet the concrete needs of the market.

The Challenge session features two invited demo papers. The first demo, from Governatori and Shek, reports on the development and evaluation of a business process compliance checker (BPCC), based on the compliance-by-design methodology proposed by Governatori and Sadiq in 2009. BPCC is implemented on top of the Eclipse Activity BPMN 2.0 plug-in for the representation of process models and has been extended with features to allow users to add semantic annotations to the tasks in the process model. The second invited demo, from Zou, Peter-Paul, Boley, and Riazanov, presents an online Positional-Slotted, Objective-Applicative (PSOA) RuleML reasoning service, PSOATransRun, consisting of a translator and an execution engine. The translator, PSOAT2TPTP, maps knowledge bases and queries in the PSOA RuleML presentation syntax to the popular TPTP interchange language, which is supported by many first-order logic theorem provers.

This year, five main topics have emerged from the other contributions to the Challenge:

- 1) Legal rule modelling and tools enabling the integration between legal textual sources, metadata, ontologies and rules, including temporal reasoning and compliance checking.
- 2) Combination of rules, objects and ontologies, to support the development of integrated systems able to deal with knowledge-

intensive domains and hybrid reasoning, especially when applied in business processing environments.

- 3) Graphic tools for creating, visualizing, debugging, and modelling rules, and for presenting the outcomes of the reasoning.
- 4) Improvement of tools related to RuleML as a standardization effort with particular regard to complex event management using the Reaction Rules dialect.
- 5) Combining rules with adaptive user experience for improving the Semantic Web and providing personalized online services.

In particular, Palmirani, Ognibene, Cervone present an integrated prototype platform composed of several modules (web based rule editor and rule viewer, XML database, Drools reasoner) that are able to capture all the levels of legal document modelling simultaneously (text, metadata, and rules) and to manage legal changes over time. An application based on a simple fragment of the US copyright normative rules is presented. Ceci and Gordon present the application of the Carneades Argumentation System to case-law to demonstrate its abilities to: reconstruct the legal interpretations performed by the judge; present its reasoning path; suggest possible different or divergent interpretations in the light of relevant code- and case-law.

Cosentino, Didonet Del Fabro and El Ghali present an implementation based on a Model Driven approach for bridging the gap between JRules (part of IBM's WODM – WebSphere Operational Decision Management) to the W3C's RIF standard, to improve interoperability and reusability of the rules in a business process environment. Chniti, Albert and Charlet present two prototypes based on the Business Rule Management System (BRMS) in IBM's WODM: an OWL plug-in and a change-management plug-in able to detect inconsistencies that could be caused by ontology evolution and propose solutions (called *repairs*) to resolve them. Miranker, Depena, Jung, Sequeda, and Reyna present Diamond, a Rete-based rule system that evaluates SPARQL queries on Linked Data using a graphical rule debugging environment. Hotz, von Riegen, Braubach, Pokahr and Schwinghammer demonstrate an application of rules in a business process scenario using Business Process Model and Notation (BPMN) and using declarative rules to monitor the process execution in a distributed environment.

Zhao, Teymourian, Paschke, Boley and Athan present a recent instantiation of Rule Responder, a rule-based inference agent middleware, integrated with the event-messaging features of Reaction RuleML, which supports interaction based on a loosely-coupled interface using rule signatures and decoupled communication via event messages.

Nowak, Bak and Jedrzejek present a prototype implementation of a graphical tool for creating rules; it is also used to visualize data and results of reasoning.

Giurca, Tylkowski and Müller present RuleTheWeb!, an application using JSON-Rules to enrich the user navigation experience on the web. RuleTheWeb! uses adaptive user experience based on semantic data and reaction rules aiming to enable Social Web rules designed and shared by web users.

Viktoratos, Tsadiras and Bassiliades present Personalized Location Information System (PLIS+), a system able to provide personalized, location-based information services via rule-based policies. PLIS+ proves that combining contextual data coming from the end-user and policy rules of the online service can lead to powerful personalized information services.

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