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## **Studies on the Semantic Web, ISSN 1868-1158**

### Aims and Scope

Semantic Web has grown into a mature field of research. Its methods find innovative applications on and off the World Wide Web. Its underlying technologies have significant impact on adjacent fields of research and on industrial applications.

This new book series reports on the state of the art in foundations, methods, and applications of Semantic Web and its underlying technologies. It is a central forum for the communication of recent developments and comprises research monographs, textbooks and edited volumes on all topics related to the Semantic Web.

Volumes in this series are co-published by IOS Press Amsterdam and AKA Verlag Heidelberg ensuring a short publication time and world-wide distribution. Proposals for publishing excellent PhD thesis in this series are welcome. Publications in German language are possible.

SSW 030 NEW Hassan Saif: **Semantic Sentiment Analysis in Social Streams**. 2017. xxiv, 286 pp. Softcover. 60,00 €. ISBN 978-3-89838-726-2

This book is one of the first attempts to investigate the role of words' semantics in sentiment analysis of microblogs. Specifically, this book research several novel models for extracting and employing two types of word semantics for sentiment analysis: contextual semantics (i.e., semantics captured from words' co-occurrences) and conceptual semantics (i.e., semantics extracted from external knowledge sources).

The findings from this body of work demonstrate the value of using semantics in sentiment analysis on Twitter. The proposed models, which consider words' semantics for sentiment analysis surpass non-semantic approaches in most use case scenarios.

SSW 029 NEW Agnieszka Ławrynowicz: **Semantic Data Mining: An Ontology-Based Approach**. 2017. xvi, 194 pp. Softcover. 60,00 €. ISBN 978-3-89838-724-8

The book is devoted to semantic data mining — a data mining approach where domain ontologies are used as background knowledge, and where the new challenge is to mine knowledge encoded in domain ontologies and knowledge graphs, rather than only purely empirical data. Taking a unified perspective, the book covers several methods for semantic data mining, addressing tasks such as pattern mining, classification and similarity-based approaches. It also contains several examples of applications of semantic data mining, including an intelligent knowledge discovery assistant.

SSW 028 Riccardo Zese: **Probabilistic Semantic Web: Reasoning and Learnig**. 2017. xx, 173 pp. Softcover. 60,00 €. ISBN 978-3-89838-722-4

The book introduces a complete framework for managing uncertainty in the Semantic Web. It describes a probabilistic semantics, DISPONTE, three reasoners for computing the probability of queries and two learning algorithms, together with their distributed versions, for learning the parameters and the structure of DISPONTE KBs.

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- SSW 027      Mayank Kejriwal: **Populating a Linked Data Entity Name System: A Big Data Solution to Unsupervised Instance Matching.** 2017. xii, 178 pp. Softcover. 60,00 €. ISBN 978-3-89838-717-0
- Many machine learning and data mining problems require the underlying system to know which entities refer to the same underlying entity. At Web scale, this difficult problem additionally becomes a Big Data problem due to issues of scale, noise and heterogeneity. Unlike previous work, this book synthesizes the Entity Resolution challenge from both the Big Data and Semantic Web perspectives, and presents state-of-the-art research to tackle it.
- SSW 026      in preparation
- SSW 025      Pascal Hitzler, Aldo Gangemi, Krzysztof Janowicz, Adila Krisnadhi, Valentina Presutti (Eds.): **Ontology Engineering with Ontology Design Patterns: Foundations and Applications.** 2016. xvi, 372 pp. Hardcover. 79,00 €. ISBN 978-3-89838-715-6
- This is the very first book which provides a comprehensive overview of the use of ontology design patterns for modular ontology engineering. It contains introductory tutorials, reports on the state of the art, application chapters and many examples. The editors and chapter authors include the leading researchers on ontology design patterns. The book is accessible with only a minimal background in ontology modeling.
- SSW 024      Olaf Hartig: **Querying a Web of Linked Data. Foundations and Query Execution.** 2016. xiv, 248 pp. Softcover. 60,00 €. ISBN 978-3-89838-713-2
- This book presents a first rigorous investigation of fundamental properties and limitations of queries and query execution over Linked Data on the WWW. The specific focus of this investigation are approaches to use the SPARQL query language and execute queries by traversing Linked Data live during the query execution process
- SSW 023      Natalia Díaz Rodríguez: **Semantic and Fuzzy Modelling for Human Behaviour Recognition in Smart Spaces.** 2016. xxxiv, 194 pp. Softcover. 60,00 €. ISBN 978-3-89838-712-5
- This Thesis advances the state of the art in ambient intelligence by providing convincing evidence that a suitable combination of data-driven techniques and higher-level knowledge modeling and automated reasoning can provide added value to smart spaces. It provides a concrete realization based on a fundamental analysis of requirements, and works out detailed rationales for modeling choices. It is sometimes argued that convincing combinations of data-driven methods such as data mining and machine learning will have to be combined with conceptual modeling and automated reasoning techniques in order to advance towards solutions for the more complex issues which need to be addressed in our data-intensive age. Ms. Diaz Rodriguez' thesis provides a convincing proposal for such a combination, worked out in detail in her concrete application setting. She shows convincingly that uncertainty reasoning can play the role of a bridge technology between the low-level data-driven realm, and the high-level conceptual models.
- SSW 022      Juan Federico: **Integrating Relational Databases with the Semantic Web.** 2016. xviii, 193 pp. Softcover. 60,00 €. ISBN 978-3-89838-711-8
- An early vision in Computer Science was to create intelligent systems capable of reasoning on large amounts of data. Independent results in the areas of Semantic Web and Relational Databases have advanced us towards this vision. Despite the independent advances, the interface between Relational Databases and Semantic Web is poorly understood. This dissertation revisits this early vision with respect to current technology and addresses the following question: How

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and to what extent can Relational Databases be integrated with the Semantic Web? The thesis is that much of the existing Relational Database infrastructure can be reused to support the Semantic Web.

SSW 021

Lauren Rietveld: **Publishing and Consuming Linked Data. Optimizing for the Unknown.** 2016. viii, 156 pp. Softcover. 60,00 €. ISBN 978-3-89838-707-1

Despite the benefits of Linked Data, the process for publishing and consuming Linked Data can be hard: A Linked Data provider is faced with impractical data re-use and costly Linked Data hosting solutions. Linked Data developers face difficulties in finding, navigating and using Linked Datasets. Linked Data scientists lack the resources and methods to evaluate their work on Linked Data at large. This thesis presents a number of novel approaches that address these issues, such as a relevance based sampling algorithm, a re-published and cleaned version of the LOD Cloud, a SPARQL query editor, and an evaluation paradigm to increase the breadth and scale of Linked Data Evaluations.

SSW 020

Tom Narock and Peter Fox (Eds.): **The Semantic Web in Earth and Space Science. Current Status and Future Directions.** 2015. vi, 203 pp. Hardcover. 60,00 €. ISBN 978-3-89838-702-6

The geosciences are one of the fields leading the way in advancing semantic technologies. The barriers to free and open science data have been lowered and the need for semantics has been heightened. This book continues the dialogue and feedback between the geoscience and semantic web communities. We present mature semantic applications within the geosciences and stimulate discussion on emerging challenges and new research directions.

SSW 019

Aidan Hogan: **Reasoning Techniques for the Web of Data.** 2014. xiv, 330 pp. Softcover. 60,00 €. ISBN 978-3-89838-695-1

Given the growing popularity of Linked Data publishing, there is now a wealth of rich, structured RDF data on the Web. In theory, RDFS/OWL reasoning should allow for integrating diverse Linked Data, but standard inference techniques are ill-suited for large-scale, unreliable Web data. Herein, we discuss distributed, large-scale, robust, inferencing techniques that enable reasoning over the Web of Data.

SSW 018

Jens Lehmann and Johanna Völker: **Perspectives on Ontology Learning.** 2014. xviii, 281 pp. Hardcover. 70,00 €. ISBN 978-3-89838-694-4

Perspectives on Ontology Learning brings together researchers and practitioners from different communities - natural language processing, machine learning, and the semantic web - in order to give an interdisciplinary overview of recent advances in ontology learning.

SSW 017

Jeff Z. Pan and Yuting Zhao (Eds.): **Semantic Web Enabled Software Engineering** 2014. xii, 274 pp. Hardcover. 70,00 €. ISBN 978-3-89838-692-0

Integrates in one volume a unified perspective on concepts and theories of connecting Software Engineering and Semantic Web.  
Presents state-of-the-art techniques on how to use Semantic Web technologies in Software Engineering.  
Introduces techniques on how to design ontologies for Software Engineering.

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SSW 016 Gianluca Demartini: **From People to Entities: New Semantic Search Paradigms for the Web**  
2014. vi, 162 pp. Softcover. 50,00 €. ISBN 978-3-89838-687-6

Today, entities are the main entry point to digital content both in the Web as well as in enterprise data. In this book, we present methods to find entities that satisfy user information needs by aggregating knowledge from different data sources and we study how entity relevance and opinions evolve over time. We study such problem over a variety of data types including enterprise data, Wikipedia, news sources, and blogs

SSW 015 Carlos Buil-Aranda: **Federated Query Processing for the Semantic Web**  
2014. xiv, 185 pp. Softcover. 50,00 €. ISBN 978-3-89838-689-0

Federated SPARQL query processing allows to query several RDF databases as if they were a single one, integrating the results from all of them. This is a key concept and hot topic in the Web of Data, and it is also a hot topic in the community. Besides of that, the W3C SPARQL-WG has standardized it in the new SPARQL 1.1 Recommendation. This books is the first that formally studies that specification and proposes optimization rules for federated queries.

SSW 014 Sebastian Rohjans: **Semantic Service Integration for Smart Grids**  
out of stock 2013. vi, 469 pp. Softcover. 60,00 €. ISBN 978-3-89838-677-7

The Ph.D. thesis addresses the semantic integration of data services in smart grids. Based on design science, an innovative ICT-architecture compliant to the SOA-paradigm has been developed that meets the architectural and non-functional requirements of future power systems. Meta data is used to semantically enrich descriptions of services and service providers. The evaluation is based on representative use and test cases for smart grids.

SSW 013 Tudor Groza: **Advances in Semantic Authoring and Publishing**  
2012. xii, 260 pp. Softcover. 55,00 €. ISBN 978-3-89838-672-2

Dissemination represents a communication process between scientists. Over the course of several publications, they expose and support their findings, while discussing stated claims. Such discourse structures are trapped within the content of the publications, thus making the semantics discoverable only by humans. This thesis provides a solution to crystallising the knowledge captured within these discourse structures via taking advantage of the current Semantic Web technologies.

SSW 012 Boris Villazón-Terrazas: **A Method for Reusing and Re-engineering Non-ontological Resources for Building Ontologies**  
2012. xviii, 275 pp. Softcover. 50,00 €. ISBN 978-3-89838-666-1

The general objective of the thesis is to provide domain independent, and resource independent methods and tools for speeding up the ontology development process and is achieved by reusing and re-engineering as much as possible available non-ontological resources (NORs). To fulfil this overall goal, we have decomposed it into the following methodological and technological objectives:

- The definition of methodological aspects related to the reuse of non-ontological resources for building ontologies.
- The definition of methodological aspects related to the re-engineering of non-ontological resources for building ontologies.
- The creation of a library of patterns for re-engineering non-ontological resources into ontologies.
- The development of a software library, NOR2O, that implements the suggestions given by the re-engineering patterns

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- SSW 011      Christoph Lange: **Enabling Collaboration on Semiformal Mathematical Knowledge by Semantic Web Integration** 2011. xviii, 592 pp., Softcover. 70,00 €. ISBN 978-3-89838-657-9
- Mathematical research is becoming increasingly collaborative. Individual research tasks (authoring, publishing, peer-review, or verification) are supported by software, but complete workflows are not. This work enables semantic service integration by bridging different perspectives on knowledge (document- vs. network-oriented), and thus contributes the building blocks for effectively supporting collaboration in mathematics.
- SSW 010      Tran Duc Thanh: **Process-oriented Semantic Web Search**  
out of stock      2011. xxii, 221 pp., Hardcover. 64,00 €. ISBN 978-3-89838-648-7
- Besides a principled study of the state-of-the-art, this book offers a novel process-oriented point of view. It combines work targeting different aspects to present the big picture of process-oriented Semantic Web search. For demonstrating this big picture, a particular compilation of work called SemSearchPro is presented. Unlike the Semantic Web Search approaches known so far, where Semantic Web resources are used only for processing the query, SemSearchPro exploits the semantics captured by the underlying resources throughout the process, i.e., from query construction, to query processing, to result presentation and to query refinement.
- SSW 009      A. Passant: **Semantic Web Technologies for Enterprise 2.0**  
2011. xx, 328 pp., Softcover. 50,00 €, ISBN 978-3-89838-646-3
- This book is a translated (and updated) version of the Ph.D. thesis „Technologies du Web Sémantique pour l'Entreprise 2.0“, defended on the 9th of June 2009 at Université Paris-IV Sorbonne. It presents techniques for data integration and knowledge management using Social Software in enterprises. More than a theoretical framework, it provides practical examples and implementation details in an industrial context.
- SSW 008      M. Krötzsch: **Description Logic Rules.**  
2010. xii, 263 pp. Softcover. 50,00 €, ISBN 978-3-89838-643-2
- This book provides new perspectives on combining description logics and rules, the technologies on which today's most important Semantic Web knowledge representation standards – OWL and RIF – are based. Extensive introductory chapters explain the goals and challenges of this field, while advanced chapters focus on ways of extending description logics with rules without sacrificing good computational properties, including a detailed treatment of the light-weight rule language ELP.
- SSW 007      J. M. Gómez-Pérez: **Acquisition and Understanding of Process Knowledge using Problem Solving Methods.** 2010, x, 144 pp., Softcover 50,00 €, ISBN 978-3-89838-639-5
- This book deals with process knowledge and how it can be possible to enable users without any kind of IT skills to i) model and reason about processes and ii) analyze the provenance of process executions, without the intervention of software or knowledge engineers. We propose the utilization of Problem Solving Methods (PSMs) as key enablers for the accomplishment of such objectives and demonstrate the solutions developed, evaluated in the contexts of Project Halo and the Provenance Challenge, respectively. The book concludes with a process-centric overview on the challenges raised by the new web-driven computing paradigm, where large amounts of data are contributed and exploited by users on the web, requiring scalable, non-monotonic reasoning techniques as well as stimulating collaboration while preserving trust.
- SSW 006      J. Lehmann: **Learning OWL Class Expressions.**  
March 2010, xiv, 265 pp., Softcover 50,00 €, ISBN 978-3-89838-336-3

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With the advent of the Semantic Web and Semantic Technologies, ontologies have become one of the most prominent paradigms for knowledge representation and reasoning. However, recent progress in the field faces a lack of well-structured ontologies with large amounts of instance data due to the fact that engineering such ontologies requires a considerable investment of resources. Nowadays, knowledge bases often provide large volumes of data without sophisticated schemata. Hence, methods for automated schema acquisition and maintenance are sought. Schema acquisition is closely related to solving typical classification problems in machine learning, e.g. the detection of chemical compounds causing cancer. In this work, we investigate both, the underlying machine learning techniques and their application to knowledge acquisition in the Semantic Web.

SSW 005

R. Zhang: **Relation Based Access Control.**

2010, viii, 114 pp., Softcover 50,00 €, ISBN 978-3-89838-626-5

The book addresses the problem of access control of Web 2.0. It provides a novel access control model called ReIBAC and a domain specific Description Logic which allows to represent and reason about the model. The formal representation of the model brings unambiguous semantics for the access control and reasoning. Description Logic provers are used to provide efficient reasoning ability for the access control problems. ReIBAC provides a novel approach to access control which exploits state of the art semantic web technology. Furthermore ReIBAC is designed for and suited for semantic Web and web 2.0 applications

SSW 004

D. Sonntag: **Ontologies and Adaptivity in Dialogue for Question Answering.**

2010, xii, 410 pp., Hardcover, 69,00 €, ISBN 978-3-89838-623-4

Daniel Sonntag's work within the SmartWeb project has laid important foundations for Theseus's efforts towards semantic web technologies for the Web 3.0. Theseus is the German flagship project on the Internet of Services, where the user can delegate complex tasks to dynamically composed semantic web services by utilizing multimodal interaction combining speech and multi-touch input on advanced smartphones.

Wolfgang Wahlster and Randy GoebelR.

SSW 003

García Castro: **Benchmarking Semantic Web Technology.**

2010. x, 338 pp., Softcover, 50,00 €, ISBN 978-3-89838-622-7

This thesis addresses the problem of benchmarking Semantic Web technologies, providing methodological and practical guidelines that cover the whole life cycle of Semantic Web technology benchmarking. The book also presents two practical examples with the organization and definition of two international benchmarking activities that involved benchmarking the interoperability of Semantic Web technologies using RDF(S) and OWL as interchange languages.

SSW 002

J. Völker: **Learning Expressive Ontologies.**

2009, 274 pp., Softcover, 50,00 €, ISBN 978-3-89838-621-0

This thesis advances the state-of-the-art in ontology learning by presenting a set of novel approaches to the semi-automatic acquisition, refinement and evaluation of logically complex axiomatizations. It has been motivated by the fact that the realization of the semantic web as envisioned by Tim Berners-Lee is still hampered by the lack of ontological resources, while at the same time more and more applications of semantic technologies emerge from fast-growing areas such as e-business or life sciences. Such knowledge-intensive applications, requiring large scale reasoning over complex domains of interest, even more than the semantic web depend on the availability of expressive, high-quality axiomatizations. This knowledge acquisition bottleneck could be overcome by approaches to the automatic or semi-automatic construction of ontologies. Hence a huge number of ontology learning tools and frameworks have been developed in recent years, all of them aiming for the automatic or semi-automatic generation of ontologies from various kinds of data. However, both the quality and the expressivity of ontologies that can be acquired by the current state-of-the-art in ontology learning so far have failed to meet the expectations of people who argue in favor of

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powerful, knowledge-intensive applications based on logical inference. This thesis therefore takes a first, yet important, step towards the semi-automatic generation and maintenance of expressive ontologies.

SSW 001

S. Grimm: **Semantic Matchmaking with Nonmonotonic Description Logics.**

2009. 278 pp., Softcover, 50,00 €, ISBN 978-3-89838-620-3

In this thesis, we establish an ontology-based matchmaking framework for semantic resource descriptions formulated in OWL and description logics (DLs) that uses various DL inferences to judge about resource compatibility. We incorporate several nonmonotonic extensions to DLs into this matchmaking framework that extend standard DL inference mechanisms by forms of closed-world and default reasoning associated to common-sense features, thus improving the matchmaking behaviour. Moreover, we apply the technique of matchmaking to the problem of service discovery in the Semantic Web with services annotated by OWL descriptions formulated in terms of domain ontologies.

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