Semantic Web Reloaded: An Update on the Progress of Semantic Web technologies

Ubbo Visser¹

Published online: 4 April 2016
© Springer-Verlag Berlin Heidelberg 2016

Dear readers,

Our *Künstliche Intelligenz* edition from July 2003 focussed on a few novel technologies that can be subsumed by two words: “Semantic Web”. Now, 13 years thereafter we would like to feature an update. Semantic Web—reloaded if you wish.

The first edition came out a few years after the development of important technologies in this area such as OWL or DL reasoning engines. OWL resulted from a quasi merger between OIL (Ontology Inference Layer, a European proposal) and DAML (DARPA Agent Markup Language, the American counterpart). Examples for DL-reasoning engines are FaCT or RACER, just to name a few. SPARQL, the important query language that is used nowadays to query ontologies wasn’t even around until later, emerging in 2008.

The 03/2003 special issue also featured two interviews with key figures from the community: James Hendler, at that time Computer Science Professor and Head of Semantic Web and Agents Research at the University of Maryland and Patrick Hayes, a Senior Research Scientist at IHMC in Pensacola, FL. I re-read the independently created interviews remembering asking them about the future of Semantic Web technologies. One of the questions was:

“What can we expect in the next 2, 5, and 10 years and what are the steps to fulfill these goals?” Here is a rundown from what the two experts answered with regard to the expectations in 10 years: James Hendler: “In ten years we will see this (Semantic Web, editorial office) as a technology that is pervasive, it is just part of the Web.” Patrick Hayes answered this question more reluctantly, mentioning that ten years is a long way to think ahead. Nevertheless he said: “I think, the Semantic Web will be integrated into, a part of, the Web; most people won’t see a difference. Looking back, people will wonder how anyone managed to live without intelligent software agents”. It is up to you—the reader—to find out whether those predictions became reality. The *Künstliche Intelligenz* delivers new material in form of this special issue.

I think it is fair to say that our guest editors Profs Birte Glimm and Heiner Stuckenschmidt started to work in the areas of Semantic Web technologies around the time of the publication of the first Semantic Web special issue in our journal. Heiner Stuckenschmidt even contributed with an article. One could even argue that they built their career on Semantic Web technologies. We couldn’t think of better Guest-Editors for this special issue.

And now it is time to wish you a pleasant reading with the new issue of *Künstliche Intelligenz*—Semantic Web Reloaded!

Kind regards,

✉ Ubbo Visser
visser@cs.miami.edu

¹ Department of Computer Science, University of Miami,
Coral Gables, FL 33146, USA

Forthcoming special issues

1 20 Years of RoboCup

The interaction of interdisciplinary topics is always a scientific goal. This applies in particular to AI and robotics. For decades research more or less happened side by side, each discipline on their own. With the RoboCup introduction in 1997 a new type of collaboration between the two research directions was born.

RoboCup promotes joint research in the field of AI and robotics, while also providing even “hands-on science”. The annual competitions and symposium attracts approximately 1500 researchers and 1000 high school students from >40 countries. Latest developments are presented in the areas of “soccer, rescue scenarios, home and junior” during competitions.

The *Künstliche Intelligenz* Journal is publishing a Special Issue on the topic “20 Years of RoboCup”. RoboCup clearly is a success story. 10 years after the first German RoboCup in Bremen, it is coming back to Germany again. With some 30 years to go until 2050, it is a good point in time to have a look at the technical achievements but also the impact of RoboCup, to the research community, education, and industry.

The topics of interest include, but are not limited to:

- **Perception and Action:** 3D perception, distributed sensor integration, sensor noise filtering, real-time image processing and pattern recognition, motion and sensor models, sensory-motor control, robot kinematics and dynamics, high-dimensional motion control.
- **Robot Cognition and Learning:** world modeling and knowledge representation, learning from demonstration and imitation, localization, navigation, and mapping, planning and reasoning, decision making under uncertainty, reinforcement learning, complex motor skill acquisition, motion and sensor model learning.
- **Multi-Robot Systems:** team coordination methods, communication protocols, learning and adaptive systems, teamwork and heterogeneous agents, dynamic resource allocation, adjustable autonomy.
- **Human-Robot Interaction:** human-robot interfaces, speech synthesis and natural language generation, visualization, emotion recognition, understanding human intent, affect detection and synthesis, robot response to external disturbances, safety and dependability.
- **Education and Edutainment:** robotics and artificial intelligence education, educational robotics, robot kits and programming tools, robotic entertainment.

- **Applications and Benchmarking:** search and rescue robots, robotic surveillance, service and social robots, robots at home, performance metrics.
- **Robot Hardware and Software:** mobile robotics, humanoid robotics, sensors and actuators, embedded and mobile devices, robot construction and new materials, robotic system integration, robot software architectures, robot programming environments and languages, real-time and concurrent programming, robot simulators.

Important dates:

Submission of papers:	April 30, 2016.
Notification to authors:	May 15, 2016.
Submission of camera-ready copies:	May 31, 2016.

The *Künstliche Intelligenz* journal, which is published and indexed by Springer, supports the following lists of formats for this special issue: technical contributions (6–10 pages), research projects (4 pages), discussions, dissertation abstracts, conference reports and book reviews. If you are interested in contributing to this special issue, please contact one of the guest editors. Please signal your interest in submitting a paper by sending a working title of your manuscript to the guest editors in advance.

Dr. Gerald Steinbauer

Institute for Software Technology
Technische Universität Graz
Inffeldgasse 16b/2, A-8010 Graz, Austria
E-mail: steinbauer@ist.tugraz.at

Prof. Dr. Alexander Ferrein

Fachhochschule Aachen
Mobile Autonomous Systems & Cognitive Robotics
Institute
Eupener Strasse 70
52066 Aachen
E-mail: ferrein@fh-aachen.de

2 Challenges for Reasoning under Uncertainty, Inconsistency, Vagueness, and Preferences

Managing uncertainty, inconsistency, vagueness, and preferences has been extensively explored in Artificial Intelligence. During the recent years, especially with the emerging of smart services and devices, technologies for managing uncertainty, inconsistency, vagueness, and preferences to tackle the problems of dynamic, real-world scenarios have started to play a key role also in other areas, such as information systems and the (Social or Semantic) Web. These application areas have sparked another wave of strong interest into formalisms and logics for dealing with uncertainty, inconsistency, vagueness, and preferences. Important examples are fuzzy and

probabilistic approaches for description logics, or rule systems for handling vagueness and uncertainty in the Semantic Web, or formalisms for handling user preferences in the context of ontological knowledge in the Social Semantic Web. While scalability of these approaches is an important issue to be addressed, also the need for combining various of these approaches with each other or more classical ways of reasoning have become obvious (hybrid reasoning under uncertainty). The aim of the special issue is to collect overview articles on important state-of-the-art formalisms and methodologies, as well as articles on emerging trends for the future.

Submissions are solicited in all areas of uncertainty, inconsistency, vagueness, and preferences handling, including (but not restricted to) the topics listed below:

- Logics of uncertain and vague reasoning, such as probability logic, possibilistic logic, and fuzzy logic.
- Reasoning with inconsistent knowledge, para-consistent logics.
- Rough sets and similarity measures.
- Formal models and semantics of uncertain data.
- Spatio-temporal uncertainty management.
- Uncertainty and inconsistency in the (Semantic) Web.
- Changes and merging of ontologies.
- Preference formalisms and user preferences.
- Data sharing and uncertainty.
- Recommender systems.
- Connections to information retrieval, data mining, and machine learning.
- Applications, in particular to mobile systems and social networks.

The special issue welcomes especially submissions that combine different approaches of uncertain reasoning, or that elaborate on connections of uncertain reasoning to other fields.

The *Künstliche Intelligenz* journal, which is published and indexed by Springer, supports the following lists of formats: technical contributions, research projects, discussions, dissertation abstracts, conference reports and book reviews. If you are interested in contributing to this special issue, please contact one of the guest editors:

Prof. Dr. Gabriele Kern-Isberner

TU Dortmund
Fakultät für Informatik
Otto-Hahn-Str. 16
44221 Dortmund
E-mail: gabriele.kern-isberner@cs.uni-dortmund.de

Prof. Thomas Lukasiewicz

Professor of Computer Science
University of Oxford
Room 366, Wolfson Building
Parks Road, Oxford OX1 3QD
E-mail: thomas.lukasiewicz@cs.ox.ac.uk

3 Landmark-Based Navigation in Cognitive Systems

The importance of landmarks in human navigation has long been recognized in multiple fields. These include areas involved in the understanding, modelling and supporting wayfinding, spatial knowledge acquisition, and place recognition. From the Psychological, Linguistic and Cognitive Neuroscience viewpoint, the perceived landmarkness of discrete objects vary among individuals. Thus, the key challenge lies in identifying those properties, which remain relevant across a wide range of individual differences, experiences, and behavioural patterns. From the Computer Science, Artificial Intelligence and Cognitive Modelling perspective, formalising these relations in a manner successfully matching the landmarks relevance for humans has proven difficult. Most recently, the increasing volume and accessibility of semantically rich geospatial data has opened new avenues for further progress in this area. The continuing collaboration between these fields is exemplified by the regular conference series on spatial information theory and geospatial science as well as multiple on-going interdisciplinary research projects.

In spite of that, technologies used to support human navigation struggle to incorporate the type of landmark information relevant for the human user. The gap between the humans and the computers understanding of what constitutes a landmark remains one of the major challenges in the development of spatial systems intuitive in use as well as in modelling navigational behaviour similar to this of a human.

This special issue integrates theoretical, experimental and computational contributions from disciplines involved in the study of landmark-based navigation in cognitive systems. The aim of the issue is to identify new areas for potential interdisciplinary collaboration and we invite applications focusing on, but not limited to, the following topics:

- Automatic, semi-automatic, and crowd-sourced detection of landmarks.
- Modelling of landmark-based navigation.
- Landmark knowledge acquisition and use.
- Communication of landmarkness.
- Landmark-based approaches for indoor navigation.
- Human-computer interaction with landmark-based systems.
- Ubiquitous computing applications of the landmark concept.

The *Künstliche Intelligenz* Journal, which is published and indexed by Springer, supports the following lists of formats: Technical contributions, research projects, discussions, dissertation abstracts, conference reports,

software, and book reviews. If you are interested in contributing to this special issue, please contact one of the guest editors as soon as possible:

Prof. Dr. Angela Schwering

Dr. Jakub Krukar

Vanessa Joy Anacta

Institute for Geoinformatics

University of Münster

48149 Münster

E-mail: {schwering,krukar,v.anacta}@uni-muenster.de

4 Smart Environments—Artificial Intelligence—Human-Machine-Interaction

Smart Environments aim to provide installations that support and enhance the abilities of humans in their regular life and possibly improve the environments themselves too, e.g., in terms of energy efficiency. Smart Environments are based on complex and distributed technical systems but they bear more challenges than the seamless composition of its components addressed in current research in technical disciplines. Setting technical challenges aside, providing intuitive interfaces to a system hidden in the environment and identifying means that allow the system automatically to provide suitable assistance for a wide range of every-day tasks involves several research questions.

Smart Environments are best described as an active field of research spanning several disciplines, but particularly related to Artificial Intelligence and Human-Machine Interaction. Since all applications penetrate our daily life with sensors, privacy becomes a central issue, too. This special issue aims at presenting a survey of the manifold AI-related research currently being performed, along with presentations of the projects and labs in which new ideas are conceived. Among the various disciplines involved, this issue addresses AI-related aspects and the interplay of AI and human-machine interaction, in particular AI techniques fostering new kinds of interaction, shedding some light onto questions such as:

- How can a ubiquitous system communicate its state of believe to a human?
- How can smart environments quickly comprehend a situation and user needs?
- How can a system adapt to users and how adaptive should it be?

- Which forms of knowledge representation help to form a shared mental model of system and user?
- How can user acceptance be measured efficiently and reliably?
- How can user acceptance be measured efficiently and reliably?
- What are social and ethical implications of Smart Environments?
- Which are the most pressing use cases? What are their specific requirements?

We welcome submissions for all kinds of articles published by KI, but especially (1) genuine research articles (max. 7 pages in print incl. authors' vita), (2) project presentations to highlight an important research question (4–6 pages), and (3) lab presentations to showcasing smart environment research installations and associated research (4–6 pages).

Please send your submissions via email directly to one of the guest editors listed below, please do not use the online submission system of the journal as otherwise submissions will not be associated with this special issue. Formatting guidelines (LaTeX and Word) can be found on the journal homepage, see “author instructions” on <http://www.kuenstliche-intelligenz.de>.

Important dates:

June 30, 2016:	submission deadline
May 2017:	journal publication

Please signal your interest in submitting a paper by sending a working title of your manuscript to the guest editors in advance.

Junior Prof. Dr. Diedrich Wolter

University of Bamberg

WIAI/Smart Environments

96045 Bamberg

E-mail: diedrich.wolter@uni-bamberg.de

Junior Prof. Dr. Alexandra Kirsch

University of Tübingen

Media Informatics (Human-Computer Interaction)

Sand 14

72076 Tübingen

E-mail: alexandra.kirsch@uni-tuebingen.de