AAAI-05 Sister Conference Presentation

ISWC 2004

3rd International Semantic Web Conference
http://iswc2004.semanticweb.org/

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University of Toronto, Canada
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Acknowledgements

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Outline

- Brief Introduction to Semantic Web Research
- ISWC 2004
What is the Semantic Web?

Today's Web was designed for human interpretation.

The Semantic Web (SW) aims to make the Web similarly interpretable by computers.

✓ Not only parsable (e.g., XML), but also understandable (in some sense) by computers.

✓ Without prior agreements between humans (as is the case for XML).
Where Are We Now?

• Computers do the presentation (easy)
• People do the linking and interpreting (hard)

Idea: get computers to do more of the hard work!
What is the Problem?

Consider a typical web page:

- Markup consists of:
  - rendering information (e.g., font size and colour)
  - Hyper-links to related content
- Semantic content is accessible to humans but not (easily) to computers…
What information we can see…

WWW2002
The eleventh international world wide web conference
Sheraton waikiki hotel
Honolulu, hawaii, USA
7-11 may 2002
1 location 5 days learn interact
Registered participants coming from
australia, canada, chile denmark, france, germany, ghana, hong kong, india,
ireland, italy, japan, malta, new zealand, the netherlands, norway,
singapore, switzerland, the united kingdom, the united states, vietnam,
zaire
Register now
On the 7th May Honolulu will provide the backdrop of the eleventh
international world wide web conference. This prestigious event …
Speakers confirmed
Tim berners-lee
Tim is the well known inventor of the Web, …
Ian Foster
Ian is the pioneer of the Grid, the next generation internet …
What a machine sees...
Solution: XML + “meaningful” tags?

<nname>XML + “meaningful” tags?</nname>

<location>XML + “meaningful” tags?</location>

<date>XML + “meaningful” tags?</date>

<slogan>XML + “meaningful” tags?</slogan>

<participants>XML + “meaningful” tags?</participants>

<introduction>XML + “meaningful” tags?</introduction>

<speaker>XML + “meaningful” tags?</speaker>

<bio>XML + “meaningful” tags?</bio>
But what about…

<conf>

<place>

<date>

<slogan>

<participants>

<introduction>

<speaker>

<bio>
Machine sees...
Need to Add “Semantics”

Two very different possible approaches:

1. **External agreement** on meaning of annotations
   - Agree on the meaning of a set of annotation tags.
   - **Drawbacks:**
     - Inflexible
     - Limited number of things can be expressed

2. Use on-line **Ontologies** to specify meaning of annotations
   - Ontologies provide a vocabulary of terms
   - New terms can be formed by combining existing ones
   - Meaning (**semantics**) of such terms is formally specified
   - Can also specify relationships between terms in (multiple)ontologies

**Semantic Web currently takes the second approach**
The Web is not just text data…. 

Data is:
- un-, semi-structured and structured
- multimedia
- genomic
- ...

Besides data there are also:
- programs (e.g., Web services)
- devices
SW Research is Multi-Disciplinary

Aims to **annotate and interpret** aspects of the Web, and to **automate** Web tasks currently performed by humans.

**Entire lifecycle**: tools, languages, automated reasoning, …

Draws on research from a number of different fields within computer science. E.g.,

- AI
- Database
- Systems
- Networking
- HCI
- …
Within AI, SW research draws from areas such as:

- Knowledge representation
- Automated reasoning
- Logic Programming
- Machine Learning
- Information Retrieval
- Natural Language
- Agents
- Planning
- …
The Semantic Web is more than just an application domain.

• Old problems: existing techniques directly applicable.

• Old problems that challenge assumptions inherent in existing techniques, creating
  • new challenges for old techniques, or
  • need for new innovative solutions

• New problems: require new techniques.
SW Challenges to KR&R

Create a KR&R that can deal with
- very large knowledge bases (necessitates tractable reasoning)
- globally inconsistent knowledge bases
- rapidly changing knowledge bases
- distributed knowledge bases
- many different authors - distributed authority
- high variety in quality of data
- diverse, context- and time-dependent data
- diverse uses for the data

Challenge some of the basic assumptions upon which KR&R is based. E.g., we can no longer assume our KBs to be small, consistent, constant and local.
A number of researchers have proposed using planning technology to compose Web services, but

- “actions” (programs) are not primitive – they are programs with complex internal structure often composing sensing & world-altering actions.
- 10,000’s of actions. 1000’s of actions that do the same/similar thing.
- (often) vastly incomplete information about the initial state
- closed-world assumption (which we use to solve the frame problem) no longer holds
- ...

Again...some of the basic assumptions underlying many existing techniques are challenged by the SW.
Funding has Fueled Advances

US: DARPA’s DAML program (2000-2005)
   No apparent follow-on program.

Europe: Immense funding
6th Framework (2001-2006) - significant SW funding
7th framework" (2007-2011) - continued support for SW topics
My soap box:

- The field suffers from a proliferation of (IMO) 2nd rate workshops, conferences on “Semantic Web X.”
- The result is (IMO) a lot of poor or preliminary papers. Even “good” papers sometimes represent overly incremental work. The noise-signal ratio is high when looking for important work in the field.
- Researchers are overworked reviewing and attending events, rather than doing research.

The better research can be found (not exclusively) at:
- ISWC – International Semantic Web Conference
- WWW – World Wide Web Conference (SW track)
  …and more recently at reputable mainstream AI conferences

Also in
- Elsevier’s Journal of Web Semantics
- IEEE Intelligent Systems
  …and again in reputable mainstream journals
ISWC 2004

Third International Semantic Web Conference
November 7-11, 2004
Hiroshima, Japan

Hiroshima Prince Hotel
Gratefully Sponsored By
...And By

Knowledge Web

Knowledge Synergy

NEC
NEC System Technologies, Ltd.

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Gakken

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  Stefan Decker, DERI, National University of Ireland

Meta-data Chair
  Steffen Staab, Univ. of Karlsruhe (TH) & Ontoprise Gmb
Conference Events

There was a lot going on!

48 Research Track Papers
7 Industrial Track Papers (new in 2004)
48 Posters

3 Invited Speakers

42 Demos
8 Workshops
6 Tutorials
18 Semantic Web Challenge (up 80% from 2003)
<table>
<thead>
<tr>
<th>Track</th>
<th>Submitted</th>
<th>Accepted</th>
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<tr>
<td>Research Track</td>
<td>205</td>
<td>48 (23%)</td>
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<td>Industrial Track</td>
<td>22</td>
<td>7</td>
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<tr>
<td>Poster Track</td>
<td>68</td>
<td>48</td>
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**Attendance**

<table>
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<th>Attendance</th>
<th>Count</th>
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<tr>
<td>Conference</td>
<td>430 (150 from Japan)</td>
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<tr>
<td>Workshops</td>
<td>426</td>
</tr>
<tr>
<td>Tutorials</td>
<td>278</td>
</tr>
</tbody>
</table>
Research Track Papers

Top areas of submission:

- Languages, tools, methodologies for SW data
- Ontologies (creating, merging, linking, …)
- Semantic integration and interoperability
- Semantic Web Services
- …
Example Research Track Papers

- Information Retrieval Support for Ontology Construction and Use
- Structure-Based Partitioning of Large Concept Hierarchies
- Inferring Data Transformation Rules to Integrate Web Services
- Using Vampire to Reason with OWL
- Knowledge-Intensive Induction of Terminologies from Metadata
- ASSAM: A Tool for Semi-Automatically Annotating Web Services
- Automated Composition of SW Services into Executable Processes
- Query Answering for Description Logic with Rules
- Top-k Query Evaluation for Schema-Based Peer-to-Peer Networks
- Information Gathering During Planning for Web Service Composition
Abstract:
In this paper, we present an evaluation of four knowledge base systems (KBS) with respect to use in large OWL applications. To our knowledge, no experiment has been done with the scale of data used here. The smallest dataset used consists of 15 OWL files totaling 8MB, while the largest dataset consists of 999 files totaling 583MB. We evaluated two memory-based systems (OWLJessKB and memory-based Sesame) and two systems with persistent storage (database-based Sesame and DLDB-OWL). We describe how we have performed the evaluation and what factors we have considered in it. We show the results of the experiment and discuss the performance of each system. In particular, we have concluded that existing systems need to place a greater emphasis on scalability.
Invited Speakers

Ed Feigenbaum, Stanford University, USA
*The Semantic Web Story – It’s already 2004. Where are we?*

Wolfgang Nejdl, University of Hannover, Germany
*How to build Google2Google – An Incomplete Recipe*

Marie-Christine Rousset, LRI, France
*Small Can be Beautiful in the Semantic Web*
Recall…Conference Events

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The Semantic Web Challenge

http://challenge.semanticweb.org

- “Robocup for the Semantic Web”
- Show the possibilities of the Semantic Web
  - integrated applications instead of partial solutions
- Stimulate research and applications
- Provide a form of “benchmark” to compare results
Goal

“Apply ‘Semantic Web techniques’ in order to build an online application that integrates, combines, and deduces information needed to assist users in performing tasks.”

No defined data set or defined tasks

- intentionally: SW application area is very broad
- instead: minimal criteria and desires
2004 SW Challenge Winner: Flink

A directory of Semantic Web researchers: a web application that extracts, analyzes and visualizes social network information from a variety of sources

- Peter Mika (VU)

Features

- Browse the network of all authors at ISWC ‘01-’04
- Carry out analysis, view statistics
- Download profiles in FOAF format
- Input for network analysis
Technology Highlights

- Social network mining from the Web and other legacy sources (emails, publications)
- Social networks based ontology extraction
- Collection of FOAF data from the SW (“scuttering”)
- Aggregation and identity reasoning (“smushing”)
- OWL use (sameAs)
- Web Service integration
- WML interface
- …
Social Network extraction

Motivation

• Bootstrapping the FOAF Web
• Input for Social Network Analysis

Community: Semantic Web Researchers

• Chairs, PC members and authors of the international Semantic Web conference series: SWWS, ISWC02, ISWC03, ISWC04 (N=607)

Sources: the Web, emails, publications, FOAF profiles
Tip: If the graph looks messy, reload the page!
Tip: If the graph looks messy, reload the page!

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Longtitude: 4.916666

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chair or organizer at (2) ISWC2004

Transferring data from prauw.cs.vu.nl...
The Sun never sets under the Semantic Web: the network across the globe
And for fun...

Many made a trip to Miyajima

The Banquet included

a trio of Shamisen

and amazing Wadaiko!
Semantic Web Research

- Interesting and very active field.
- Great “drosophila” for some existing techniques.
- Lots of new problems and twists on old problems.
- Engaging and accessible to student.
- Opportunity for broad impact with your research.

Results applicable beyond SW (e.g., ubiquitous computing, grid computing, etc.).
Interested?

Check out http://iswc2004.semanticweb.org/

Hear what Jim Hendler has to say in his talk.

Attend ISWC 2005 in Galway, Ireland
November 6-10, 2005
http://iswc2005.semanticweb.org/

Submit to ISWC 2006 !