International Workshop on Emergent Semantics and Ontology Evolution

Preliminary Program

Session 1: Emergent Semantics

9:00 - 9:15 Opening

9:15 - 10:00
Invited Talk by Karl Aberer

10:00 - 10:30
Extreme Tagging: Emerging Semantics through the Tagging of Tags
Vlad Tanasescu and Olga Streibel

-- Coffee Break --

11:00 - 11:30
Understanding the Semantics of Ambiguous Tags in Folksonomies
Ching Man Au Yeung, Nick Gibbins and Nigel Shadbolt

11:30 - 12:00
Vocabulary Patterns in Free-for-all Collaborative Indexing Systems
Wolfgang Maass, Tobias Kowatsch and Timo Münster

12:00 - 12:30
A Framework for Cooperative Ontology Construction Based on Dependency Management of Modules
Kouji Kozaki, Eiichi Sunagawa, Yoshinobu Kitamura and Riichiro Mizoguchi

-- Lunch --

Session 2: Ontology Evolution

14:00 - 15:00

Invited Talk by Paul Buitelaar

15:00 - 15:30

Dynamic Ontology Co-Evolution from Texts: Principles and Case Study

Kévin Ottens, Nathalie Aussenac-Gilles, Marie-Pierre Gleizes and Valérie camps

-- Coffee Break --

16:00 – 16:30

Understanding and Supporting Ontology Evolution by Observing the WWW Conference
Nicolas Guelfi, Cédric Pruski and Chantal Reynaud

16:30 - 17:00

Ontology Revision as Non-Prioritized Belief Revision

Mauro Mazzieri and Aldo Franco Dragoni

17:00 - 17:30

The HCOME-3O Framework for Supporting the Collaborative Engineering of Evolving Ontologies

Konstantinos Kotis, George Vouros, Christos Chalkiopoulos and Nikoleta Lelli

17:30 - 18:00

Collaborative and Work Integrated Ontology Development: Evaluation Results and Future Directions
Simone Braun, Andreas Schmidt, Andreas Walter and Valentin Zacharias

18:00

Discussion and closing

Each presenter will have 20 minutes for presentation and 10 minutes for questions.

Emergent Semantics Systems

Karl Aberer

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Abstract

Until recently, most data interoperability techniques involved central components, e.g., global schemas or ontologies, to overcome semantic heterogeneity for enabling transparent access to heterogeneous data sources. Today, however, with the democratization of tools facilitating knowledge elicitation in machine-processable formats, one cannot rely on global, centralized schemas anymore as knowledge creation and consumption are getting more and more dynamic and decentralized. Peer Data Management Systems (PDMS) implementing semantic overlay networks are a good example of this new breed of systems eliminating the central semantic component and replacing it through decentralized processes of local schema alignment and query processing. As a result semantic interoperability becomes an emergent property of the system.

In this talk we provide examples of both structural and dynamic aspects of such emergent semantics systems based on semantic overlay networks. ¿From the structural perspective we can show that the typical properties of self-organizing networks also appear in semantic overlay networks. They form directed, scale-free graphs. We present both analytical models for characterizing those graphs and empirical results providing insight on their quantitative properties. Then we present semantic gossiping, a model for the dynamic reorganization of semantic overlay networks resulting from information propagation through the network and local realignment of semantic relationships. The techniques we apply in that context are based on belief propagation, a distributed probabilistic reasoning technique frequently encountered in self-organizing systems. Finally we will give a quick glance on how this techniques can be implemented at the systems level, based on a peer-to-peer systems approach.

Biographical Sketch

Karl Aberer is a Professor for Distributed Information Systems at EPFL Lausanne, Switzerland, and director of the Swiss National Centre for Mobile Information and Communication Systems (NCCR-MICS). His research interests are on decentralization and self-organization in information systems with applications in peer-to-peer search, overlay networks, trust management and mobile and sensor networks. Before joining EPFL in 2000 he was leading the research division of open adaptive information systems at the Integrated Publication and Information Systems Institute (IPSI) of GMD in Germany, which

he joined in 1992. There his work concentrated on XML data management and cross-organizational workflows. He studied mathematics at ETH Zrich where he also completed his Ph.D. in theoretical computer science in 1991. From 1991 to 1992 he was postdoctoral fellow at the International Computer Science Institute (ICSI) at the University of California, Berkeley. He is member of several journal editorial boards, including VLDB Journal, and conference steering committees. Recently he served as PC co-chair of ICDE 2005, MDM 2006 and ISWC 2007.

Ontology Learning: Where are we? And where are we going?

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Ontology learning concerns the development of automatic methods for the extraction of a domain model from a relevant, i.e. domain-specific data set. In the context of ontology evolution, a specific domain model is already given and the task of ontology learning reduces to the extension or adaptation of this domain model on the basis of a changing underlying data set.

Ontology learning largely builds on methods previously developed in knowledge acquisi- tion, natural language processing and machine learning although with the specific purpose of automatically deriving an ontology, i.e. an explicit, shared and formally defined logical model. Unfortunately, the current state-of-the-art in ontology learning cannot be said to have reached this goal yet, although progress is made on various levels over the last couple of years.

Ontology learning is in fact not really one task but rather a collection of tightly connected subtasks that can be organized in a layered representation of increasing complexity, i.e. term extraction, synonym and translation detection, concept formation, instantiation, relation extraction, paraphrase and rule derivation, axiomatization. On each of these levels, methods and tools have been developed that address one or more subtasks. Methodologies are still needed however that address all subtasks in a coherent way and provide benchmarks for evaluation of methods on all levels, separately and in combination.

Ontology learning tools need to perform well on all levels of analysis, but even this is no ultimate guarantee for being actually useful. In addition to performance considerations, ontology learning tools need to be fully integrated into the knowledge engineering life-cycle, working in the background and providing the human domain expert with relevant input for ontology construction or evolution. Usability of ontology learning tools will thus be measured in terms of productivity of the human domain expert.

Ontology learning until recently has been based mostly on knowledge extraction from textual data, although some work has been done on extraction from tables and other structured data. Currently however, more and more semi-structured data becomes available in the form of Wikis and User Tags that shows a number of advantages for ontology learning as these data sets carry a lot of implicit knowledge (i.e. relations by linking or by social grouping) that can be more easily extracted than similarly implicit knowledge available in textual data. Additionally, more and more ontologies become publicly available that may be used as input by ontology learning tools, possibly in combination with knowledge derived from Wikis and User Tags and from more traditional textual data sets.

Ontology learning is a relatively new field of research, although building on long-standing methods in AI. In the developing context of the Semantic Web it is and will remain a central field of attention as ontologies form the semantic backbone of the Semantic Web, whereas their construction is complex and therefore knowledge- and cost-intensive. Automating this process through ontology learning thus remains an attractive proposition.