Practical Knowledge Representation and Reasoning in Ergo

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Abstract: This talk covers the latest progress in Ergo, a cutting-edge practical knowledge representation and reasoning (KRR) system. Ergo is the most complete and highly optimized implementation of Rulelog, an expressive yet scalable extension of Datalog and logic programs. Ergo's human-machine logic (humagic) closely relates controlled natural language (NL) with logical syntax/semantics. In case studies, Ergo enables cost-effective, agile development of knowledge bases for automated decisions/analytics support in finance, defense, e-commerce, health, and in domains that utilize complex knowledge such as terminology mappings, policies, regulations, contracts, and science. Ergo features general higher-order formulas, flexible defeasibility via argumentation theories, dynamically evolving knowledge, restraint bounded rationality, object-orientation, probabilistic uncertainty, text interpretation and generation, connectors to external KRR components, such as graph databases, machine learning, and general programming capabilities (including Java). Other important features include full explanations of inferences and run-time debugging/monitoring. At the end of the tutorial we also briefly discuss key frontiers for research, including probabilistic, ML, NL, and multi-processor inferencing.

This tutorial requires no prerequisite knowledge of Ergo nor Rulelog, although familiarity with logic rules, semantic technology, or logic programming is desirable.



Bios:

Michael Kifer is a Professor with the Department of Computer Science, Stony Brook University, and a co-founder of Coherent Knowledge Systems. He was a recipient of the prestigious ACM-SIGMOD "Test of Time" awards (1999 and 2002) for his works on F-logic and object-oriented database languages, the 20-year "Test of Time" award from the Association for Logic Programming for his work on Transaction Logic and a Plumer Fellow at Oxford University's St. Anne's College (2008).

Benjamin Grosof is the CEO of Coherent Knowledge Systems. He led the invention of several fundamental technical advances in knowledge representation including

Rulelog (a major research breakthrough in logic-based artificial intelligence combined with natural language processing), courteous defeasibility (exception-case rules), restraint bounded rationality (scalability in complex reasoning), and rule-based description-logic ontologies. Previously, he was a program director at Vulcan Inc. for Paul G. Allen, an IT professor at MIT Sloan (2000-2007), a research scientist at IBM Research, 2 years in previous software startups, a Stanford PhD, and a Harvard BA in Applied Mathematics.

Theresa Swift has led the development of the XSB Programming system, a major open-source Prolog system. She has over 75 publications in major refereed journals and conferences on the implementation of high-performance logic systems, non-monotonic reasoning and reasoning under uncertainty, knowledge representation, parallel, multi-threaded and distributed programming, and applications in verification of concurrent systems, medical informatics decision and workflow systems and data quality enforcement.