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Computational Logic in Multi-Agent Systems

13th International Workshop, CLIMA XIII
Montpellier, France, August 27-28, 2012
Proceedings

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Preface

These are the proceedings of the 13th International Workshop on Computational Logic in Multi-Agent Systems (CLIMA-XIII), held during August 27–28, 2012 in Montpellier, co-located with ECAI.

The CLIMA workshops provide a forum for discussing techniques, based on computational logic, for representing, programming, and reasoning about agents and multi-agent systems in a formal way. CLIMA has been successful over a number of years, and further details of previous events can be found at <http://centria.di.fct.unl.pt/~clima>.

Multi-Agent Systems contain autonomous computational entities perceiving their environment and acting upon it in order to achieve their goals. They integrate many technologies and concepts from Artificial Intelligence and Computer Science, as well as from other disciplines. The agent paradigm has been used for several domains in which it is crucial to be able to describe, concisely and clearly, the precise behaviours of the agents involved, such as search engines, autonomous vehicles, recommendation systems, educational support, robotics, e-procurement, simulation and routing, electronic commerce and trade.

Computational Logic provides a well-defined, general, and rigorous framework for studying the syntax, semantics, and procedures for the various tasks in individual agents, as well as the interactions between, and integration among, agents in multi-agent systems. It also provides tools, techniques, and standards for implementations and environments, for linking specifications to implementations, and for the verification of properties of individual agents, multi-agent systems, and their implementations.

Thus, it is this combination of *computational logic* approaches to *multi-agent systems* that is the primary focus of the CLIMA workshop series. This particular edition was held as a workshop associated with the European Conference on Artificial Intelligence in Montpellier, France, during August 2012.

We received 27 submissions, each of which was then reviewed by three Program Committee members. These proceedings comprise the 11 regular papers selected, as well as contributions from the three invited speakers:

- Dov Gabbay — “Bipolar Argumentation Frames and Contrary to Duty Obligations, Preliminary Report” (full paper)
- Gerhard Lakemeyer — “Multi-agent Only-Knowing” (abstract only)
- Emiliano Lorini — “Logics for Reasoning About Agents’ Attitudes in Strategic Contexts” (abstract only)

The contribution of Isaac Pinyol, entitled “A Time-Situated Meta-Logic for Characterizing Goal-Processing Bounded Agents,” provides a logical framework for characterising the reasoning of goal-processing bounded agents, based on a “time-situated meta-logic,” in which goals and beliefs are primitive attitudes evaluated at specific moments in time.

In “Distributed Defeasible Speculative Reasoning in Ambient Environment,” Ho-Pun Lam, Guido Governatori, Ken Satoh, and Hiroshi Hosobe describe how “speculative computation” can allow agents to postulate solutions in unknown environments and provide a formal semantics for such an approach. This is particularly useful in complex, open, and error-prone environments where communications delay, or even failure, is common.

In their paper “A Formal Semantics for Agent (Re)Organization,” Frank Dignum and Virginia Dignum tackle the complex problem of large-scale agent interactions. Agent organizations are multi-agent systems that are adaptable and dynamic, and that can place restrictions on the agents involved through social order mechanisms. This work provides a “Logic for Agent Organization” that can be used to reason about a range of properties within such systems.

Work by Dimitar Guelev and Catalin Dima, described in “Epistemic ATL with Perfect Recall, Past and Strategy Contexts,” involves an extension to epistemic ATL with perfect recall, past, and distributed knowledge by strategy contexts and demonstrate the strong completeness of a Hilbert-style proof system for a fragment.

Matei Popovici describes a new modeling method in “Using Evolution Graphs for Describing Topology-Aware Prediction Models in Large Clusters.” The author defines and studies the complexity of the model checking problem for the language, and the relation between the language and Computation Tree Logic.

The contribution of Isabelle Mirbel and Serena Villata, with title “Enhancing Goal-Based Requirements Consistency: An Argumentation-Based Approach,” proposes an approach to detecting consistent sets of goal-based requirements and to maintaining their consistency over time. Their approach relies on meta-argumentation, allowing one to detect the conflicts among elements called arguments.

In “A Game Theoretic Approach for Optimal Network Topologies in Opportunistic Networks,” Nils Bulling, Michael Koester, and Matei Popovici introduce a formal description of an opportunistic network and of optimal communication topologies. They determine the complexity of associated verification and synthesis problems of network topologies.

The work of Martin Homola, Matthias Knorr, Joao Leite, and Martin Slota, described in “MKNF Knowledge Bases in Multi-Context Systems,” investigates the relationship between Multi-Context Systems and Hybrid MKNF Knowledge Bases. It is shown that Hybrid MKNF Knowledge Bases can be used as particular contexts in Multi-Context Systems, and transformations from the former into the latter are provided.

The contribution of Ben Wright, Enrico Pontelli, and Tran Cao Son, entitled “Implementing Reversible Processes in Multi-agent Action Languages Using Answer Set Planning,” presents an implementation of an action language in answer set programming. Processes are used to execute delayed effects for actions, and processes can be reversed or canceled.

In “Full Hybrid mu-Calculus, Its Bisimulation Invariance and Application to Argumentation,” Cristian Gratie, Adina Magda Florea, and John-Jules Meyer show that full hybrid mu-calculus cannot describe the preferred argumentation semantics.

Finally, in “A Numerical Approach to the Merging of Argumentation Networks,” Dov Gabbay and Odinaldo Rodrigues consider an augmented network containing the arguments and attacks of all networks to be merged. The combined weighted network is then used to define a system of equations from which the overall strength of the arguments is calculated.

We thank all the authors of submissions for CLIMA-XIII for sending their papers and the authors of accepted papers for revising their contributions to be included in these proceedings. We are very grateful to the members of the CLIMA-XIII Program Committee and the additional reviewers. Their service ensured the high quality of the accepted papers.

June 2012

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