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Guest Editorial

Principles and Practice of Multi-Agent Systems

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This special issue presents four revised and extended papers from PRIMA 2010: the 13th International Conference on Principles and Practice of Multi-Agent Systems, which was held in November 12–15, 2010, in Kolkata, India.

Agent computing and technology is an exciting emerging paradigm that is expected to play a key role in many society-changing practices, from disaster response to manufacturing, and from energy management to healthcare. Agent systems are expected to operate in real-world environments, with all the challenges that such environments present.

This special issue contains revised and extended versions of four papers that were originally presented at the conference on Principles and Practice of Multi-Agent Systems (PRIMA). PRIMA has been held since 2007, and is successor to a workshop series (also called PRIMA, Pacific Rim International Workshop on Multi-Agents) which has been running since 1998.

Each of the four papers in this special issue received high scores from reviewers, and they were given awards at the conference (best paper, two best paper runner-ups, and an IBM Research best paper award for a paper in the area of agents and services). Each of the four papers was invited to be extended, and was then reviewed by the original reviewers, and then checked by the chairs.

The four papers cover a wide range of topics, and we hope that they capture the diversity and richness of work in the area, and specifically, of the work that was presented at PRIMA 2010.

Effect of DisCSP Variable-Ordering Heuristics in Scale-free Networks, by Tenda Okimoto, Atsushi Iwasaki and Makoto Yokoo.

This paper considers the long-standing problem of distributed constraint satisfaction in the case where the network structure of the problem has a particular structure, in this case being scale-free. The authors find that for scale-free networks the choice of variable-ordering heuristic is more significant than in random networks. The authors then develop a heuristic for ordering variables that is especially designed for scale-free networks, and that exhibits improved performance in such networks.

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Tag Recommendation for Social Bookmarking: Probabilistic Approaches, by Oly Mistry and Sandip Sen.

This paper considers the practice of applying keywords (known as "tags") to user-created web content, and specifically, how to recommend tags when a user creates a new bookmark using a social bookmarking website, such as Del.icio.us. The authors propose a probabilistic mechanism for recommending tags. They evaluate a number of approaches using a dataset from del.icio.us and find that the collaborative approaches outperform the content-based approach.

Improving the Privacy of the Asynchronous Partial Overlay Protocol, by Roger Mailler.

Like the first paper, this paper also considers the long-standing problem of distributed constraint satisfaction. However, instead of considering a fully distributed setting, it considers a hybrid approach in which parts of the problem are dynamically centralized. The author proposes a new algorithm for hybrid distributed constraint satisfaction. A key feature of the new algorithm is that it reduces the amount of information that needs to be shared, thus allowing for a more direct comparison with non-hybrid approaches. The new algorithm outperforms the Asynchronous Weak Commitment protocol, while providing more privacy than existing approaches.

An Empirical Study of Cognitive Agent Programs, by M. Birna van Riemsdijk, Koen V. Hindriks, and Catholijn M. Jonker.

This paper considers how agent-oriented programming languages are used in practice. The aim of this empirical investigation is to inform the design and evolution of agent-oriented programming languages. The authors consider two case studies in which agents were developed using the GOAL language. The first case study involved a number of subjects, of varying experience, developing a solution to the dynamic blocks world problem. The second case study involved a larger number of first year students developing teams of agents for the Unreal Tournament 2004 environment. A range of interesting observations and recommendations were made for future enhancements to the GOAL language.

We hope that these four papers give a taste of the work presented at PRIMA 2010. The PRIMA 2010 post-proceedings are published by Springer in their Lecture Notes series as LNAI 7057. These post-proceedings include not just the conference papers, but also the papers presented at the three associated workshops, and a paper that arose out of the panel discussion ("What can agent-based computing offer service-oriented architectures, and vice versa?").

We thank Rainer Unland for his support in hosting this special issue, the authors for extending and enhancing their work for journal publication, and the reviewers for extra effort in completing the review process. As program chairs, once again we sincerely thank the organizers, SPC and PC members, and all contributors at PRIMA 2010.