Available at www.ComputerScienceWeb.com
POWERED BY SCIENCE DIRECT®

Cognitive Systems Research 4 (2003) 167–168

Cognitive Systems RESEARCH

www.elsevier.com/locate/cogsys

Editorial

Cognitive agents and multiagent interaction

Action editor: Ron Sun

Jean-Luc Koning[a,*], Charles X. Ling[b]

[a] *Inpg-CoSy, 50 rue Laffemas – BP 54, 26902 Valence cedex 9, France*
[b] *Department of Computer Science, University of Western Ontario, London, Ontario N6A 5B7, Canada*

Abstract

Firstly insight on the essence of cognitive distributed systems is presented, which relies upon agent interaction. Then, a brief overview is given upon the papers that are included in the special issue.

Keywords: Cognitive agents; Multiagent interaction

1. Agent-based cognitive systems

Artificial intelligence, in its early days, started out with the goal of designing intelligent agents. However, faced with the enormous complexity of the task, the focus soon shifted to modeling specific aspects of intelligence, often in highly restricted domains. In recent years, some researchers have begun to focus on putting the pieces together with the goal of designing intelligent agents. There is also a growing interest in multiagent systems that address aspects of coordination and communication among groups of agents.

On the other hand, the main focus of research in Cognitive Science has historically been on specific components of cognition (e.g., perception, memory, learning, language). Recent developments in computational modeling of cognitive agents and multiagent systems provide new avenues for addressing foundational questions in Cognitive Science.

Computational models of cognitive agents that incorporate aspects of reactive, deliberative, goal-driven, adaptive, autonomous, learning, communicative, competitive, and collaborative behaviors provide an attractive paradigm for addressing foundational questions in Cognitive Science.

Against this background, there are several research problems and recent results that have broad implications for understanding cognition in computational terms at the whole systems level. Some issues related to cognitive agents and multiagent interaction are:

- Cognitive architectures (including alternative formalisms for modeling reactive, deliberative, autonomous, rational, learning, communicating agents).
- Ontologies, knowledge representations, and inference for cognitive agents and multiagent systems (including reasoning about space, time, and behaviors).

*Corresponding author.
E-mail addresses: jean-luc.koning@inpg.fr (J.-L. Koning), ling@csd.uwo.ca (C.X. Ling).

1389-0417/03/$ – see front matter
doi:10.1016/S1389-0417(03)00002-0

- Multiagent organizations (e.g., democracies, economies, cultures, and their coordination structures and mechanisms).
- Learning and adaptation in cognition (including learning in dynamic environments consisting of active, distributed information sources).
- Language and communication (signs, symbols, syntax, semantics, and pragmatics of communication among cognitive agents).
- Multiagent coordination (cooperation, competition etc. in multiagent societies).
- Computational abstractions, languages, and tools for modeling cognitive agents and multiagent interaction.
- Evolution of cognitive behavior.

2. Overview upon the papers in the special issue

Cognitive agents and multiagent interactions play a dominant role when building distributed complex systems, especially because their enabling technologies have increasingly become available and mature. This special issue offers selected papers from active researchers and practitioners, and covers some developments in cognitive agents and multiagent interaction.

2.1. Cognitive agents

The first paper—by A.-V. Pietarinen—explores the connections between epistemic logic and cognitive science. It mainly focuses on the representation of knowledge by cognitive agents in multiagent systems as well as the notion of awareness and explicit versus implicit processing.

The second paper—by C.M. Jonker, J. Treur and W.C.A. Wijngaards—studies such cognitive notions as beliefs, desires and intentions from an agents' internal dynamics perspective. A formalization is provided based on a temporal language and ways to specify, simulate and analyze temporal dependencies between mental states are presented.

2.2. Multiagent Interaction

The third paper—by P.S. Dutta and S. Sen—looks at how to promote and sustain cooperation among cognitive learning agents. It suggests how self-interested agents may learn to recognize cooperation possibilities while interacting in an open world. This is made possible through the development of stable and mutually beneficial partnerships between these agents.

The fourth paper—by J.-L. Koning and P.-Y. Oudeyer—also deals with the coordination among cognitive agents. More precisely, it puts forward the design (both syntax and semantics) of dedicated agent communication languages that incorporate different types and granularities of constraints thus enabling the validation of properties.

2.3. Summary

This special issue was initially aimed at authors who participated to the Third International Conference on Cognitive Science (ICCS-2001) held in Beijing, China, on August 2001. Eventually, we broadened the call for paper and offered research scientists in cognitive science and multiagent systems the opportunity to submit papers.

Only 25% of the considered papers have been selected by the reviewers. The present issue contains revised versions of four papers. We believe this issue reflects current research trends in the field, and hope it will stimulate further exciting development.

Acknowledgements

The guest editors would like to thank the reviewers for their careful reviews and critical and constructive comments on the manuscripts. The Editor-in-Chief of the Journal, Professor Dr. Ron Sun, is highly appreciated for his interest in the theme of the special issue and his effort in making it a success.