PREFACE

Special section on
Agents in Intelligent Computing and Simulation Systems

Intelligent agents as well as systems that they compose are two concepts which have been around for over thirty years, and have been popular among scientists from various disciplines, even unrelated directly to computer science or artificial intelligence. This is because of unusual expression power and strong technical support that come from computers, computerized devices and networks.

In short, a multi-agent system is defined as a network of entities that work together to meet a mutual goal that is beyond their individual capabilities or knowledge. They can plan and execute tasks in cooperation. Agents are intelligent in the sense that they are relatively autonomous and possess a reasoning capability. Based on individual observation, they also learn in the process and dynamically adapt to changes in the environment. Coordination, communication, and negotiation are inherent phenomena in multi-agent systems.

The general field of application for such concepts includes studies on physical or biological processes, social phenomena, and organizations of the real world that are analyzed as multitudes of interconnected entities, cooperating in a relatively independent manner. Very often, the corresponding agent-based models are built and software systems programmed. Moreover, computer science creates virtual multi-agent systems that become canvas for a wide spectrum of utilitarian computer systems, from desktop applications and to distributed network ones.

Thousands of papers devoted to multi-agent systems discuss their characteristic aspects and try to identify detailed mechanisms that dictate their behavior. The most significant issues are cognitive—how the agents build their internal model of the environment (including other agents), organizational—the way and structure of how individual autonomous activities are put together to attain a goal the system is built for or realizes, communicational—the way and structure of information exchange and conditions for mutual understanding, and reasoning—how the agents process the possessed information and decide on that basis about their activities. An equivalent amount of works deals with the question of how to build such systems as software artifacts. Methodologies and techniques of multi-agent systems design and implementation are rich and mature enough to be efficiently used.

The scope of the present special section covers a great variety of topics. The reported recent research developments are as follows. The first two articles discuss problems with effective communication, their knowledge basis and how it ought to be carried out in the cases of misunderstandings and negotiation. The next one, also of theoretical kind, presents a new idea of the agents learning mechanism. An example of how agent inspiration can fruitfully influence the organization of complex technical calculation is described in the fourth paper. The fifth paper focuses on intrinsic features of a computing system that implicitly uses the notion of agency. The last contribution, of a fully utilitarian character, shows an agent-based architecture for a recommendation system.

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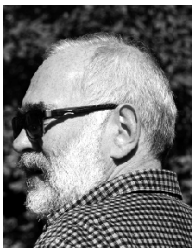

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