Chapter IV

Intelligence in MAS-Based Distributed Learning Environments

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Abstract

This chapter first addresses the issue of the importance of intelligence in MAS-based DLEs. Then, it stresses that there are three main intelligent competencies in MAS-based DLEs: intelligent decision-making support, coordination and collaboration of the agents in MAS, and student modeling for personalization and adaptation in learning systems. It also describes in detail how to apply relevant AI techniques, including the introduction of AI techniques and their state-of-the-art application in the e-learning domain. Finally, future trends in the research and development of intelligence for MAS-based DLEs are discussed.
Introduction

With the rapid development of broadband-based communication networks such as wireless networks and optical networks, the multiple agent system (MAS), an effective and feasible infrastructure for distributed-learning environments (DLEs), has been widely used to facilitate advanced leaning environments and solve many current problems of existing education systems. Over the past few years, many universities and colleges have made substantial progress in using MAS-based distributed-learning systems such as Web-based learning tools and systems, designed for teaching and learning, and for distance-learning applications.

Today, it is desirable for MAS-based distributed-learning environments to provide more smart or intelligent learning functions that offer personalized services with capabilities to learn, reason, have autonomy, and be totally dynamic (Jafari, 2002). With intelligent learning environments, students can study their chosen subjects at any time and from anywhere, and their teachers can instruct them from any location at any time. Further, with intelligent learning environments, different educational institutions can collaborate to share education resources and manage them effectively. To this end, it is critical to embed intelligence in MAS-based DLEs, in other words, to develop human-like intelligent agents by applying artificial intelligence (AI) techniques such as case-based reasoning, symbolic machine learning, rule-based reasoning, and so on. An intelligent agent that performs teaching, learning, or administration tasks on behalf of teachers, learners, or administrators is a set of independent software tools or applications that communicates with other applications or agents within one or several computer environments (Jafari, 2002). Like human agents, the intelligent agents can be given the autonomy to make decisions and perform certain tasks for human beings. Fortunately, such demands can be satisfied with mature and prosperous research results from the AI society.

In the past decades, a great deal of research effort has been devoted to the intelligence (Jafari, 2002; Yang et al., 2001; Guven et al., 1998, 2000; Giampapa et al., 2001) in MAS-based DLEs. Such efforts have yielded significant accomplishments in creating intelligence by applying AI techniques to MAS-based DLEs. These findings illustrated that the intelligence in MAS mainly contains intelligent support for DLEs, collaboration and coordination in MASs, and symbolic machine learning for student modeling. In this chapter, the objective is to discuss the main issues and research results of the intelligence in MAS-based DLEs by addressing the following issues:
Personal Learning Environments: Concept or Technology?
www.igi-global.com/article/personal-learning-environments/60124?camid=4v1a