

Preface

Over the years, the usage of e-learning and online tutoring systems has proven to bring numerous benefits and advantages over the traditional teaching methods. Recent scientific research has been focused on improving the overall performance of these systems even further. That is, the research focus has been on designing e-learning architectures that exhibit a higher level of adaptability to students personal needs, architectures that offer content personalization, improved motivational aspects, and, in the end, better learning outcomes. During this quest, the increased usage of software agents has shown to be of great importance and challenge. Many concepts of the agent technology, such as intelligence, autonomy, and cooperation, have had a direct positive impact on many of the aforementioned requests imposed on modern e-learning systems.

This book presents the state of the art of e-learning and tutoring systems, and discusses their capabilities and benefits that stem from integrating software agents. We hope that the presented work will be of great use to our colleagues and researchers interested in the e-learning and agent technology.

Synopsis of Book Chapters

The book comprises nine chapters. In [Chap. 1](#), Burkhard, H.-D. and Domańska, M. present their RoboNewbie framework, which simplifies programming of virtual soccer playing robots. The goal of RoboCup soccer leagues is to foster the development of various AI techniques, by providing a formidable challenge in a fun environment. However, the programming of real robots can represent a very complex task. RoboNewbie consists of several easy-to-use APIs that hide these complexities and enable students with no previous knowledge of robotics to quickly start developing their own agents.

[Chapter 2](#) by Kuk, K. et al. takes the similar approach of using games to improve the quality of the learning process. The authors have developed a system of game-based modules for teaching computer science courses. To evaluate the students performance and allow him/her to advance to the next gaming/learning level, their system utilizes a fuzzy logic-based intelligent agent. It has been shown that the developed agent model can be successfully used to assess the students

knowledge level, not only in this, but also in various other game-based e-learning scenarios.

Chapter 3 by Gheorgiul, D. et al. presents an e-learning system that aims to preserve cultural identities and heritage of villages in Southeast Europe. As in the previous two chapters, it utilizes the learning-by-playing method. The system combines mobile devices and augmented reality to deliver educational content in the form of virtual reconstructions of environments and objects. Software agents, on the other hand, are employed for the development of narrative e-learning tools, and for the evaluation of acquired knowledge.

In **Chap. 4**, Tibaut, A. et al. have recognized that, although the virtual learning environments have a significant positive impact on teaching and learning, there is an overall lack of inter-university cooperation. This situation exists mostly due to the lack of interoperability of heterogeneous learning environments. In order to overcome this problem, the authors present a use case of ITC-Euromaster, and propose taxonomy, ontology, and an agent-based software system that enables dynamic interuniversity cooperation.

The next chapter (**Chap. 5**, by Roy, S. et al.) discusses how agents can be used to manage a grid-based e-learning framework. The proposed system utilizes a number of autonomous, cooperative agents, each with a predefined functionality and responsibility. A concrete implementation of an e-learning architecture as grid services is presented, with the overall conclusion that the usage of agents results in a flexible, convenient, cost-effective, and adaptable framework.

In **Chap. 6**, Mabanza, N. and de Wett, L. acknowledge that the computer illiteracy represents a major issue in developing countries. Their goal is to evaluate the efficiency of using pedagogical agent in assisting learners to acquire basic computer skills. In the experiment, 103 adult learners undertook a computer literacy training course, with some of them being introduced to pedagogical agent, while others were thought using traditional teaching methods only. The end results have shown that the learners who used pedagogical agents acquired more knowledge and performed better during testing.

The process of finding high-quality learning resources that would satisfy the users needs in a particular context represents a difficult task for any e-learning system. In order help both instructors and learners, Moise, G. et al. (**Chap. 7**) propose a multi-agent system capable of evaluating and classifying learning material available in open educational repositories. The system relies on the authors socio-constructivist quality model in order to evaluate the quality and relevance of collected material.

In **Chap. 8**, Gusev, M. presents a novel approach of designing an e-learning system as a cloud service, with an SOA-based architecture. The system operates as an assessment tool, leading the student toward new knowledge by systematically asking questions. To achieve adaptive testing, it employs a number of software agents, each with a different behavior. Evaluation results have shown that the behavior three correct answers in the row results in the best outcome.

In the final **Chap. 9**, Mušić, D. discusses the importance of emotions, personality, and mood in business-oriented group decision-making processes. The end

goal is to develop agents that will be able to successfully assist, or even replace their human users in these domains. The chapter presents research results of implementing emotional agents in e-learning environments. The emotional feature of an agent is constructed using mechanisms and algorithms that simulate experience and patience.

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Agent-based Approach

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