Chapter 13
How to Build up Recommender Agents, Step by Step

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ABSTRACT

This chapter proposes a novel educational approach to agents, emphasizing the hand-on practical application of agents, the direct implementation of agency features without any strict methodology, boost the students' excitement through competition while enhancing the necessary students' cooperative skills through the development of auction market places. This chapter introduces, step by step, the agency features necessary to construct a recommender agent: user profiling and recommender systems, trust, aggregation-consensus, and negotiation-auctions. Following the aim of hands-on priority, other more advanced topics, such as e-Institutions, multi-agent architectures, and agent programming languages, are intentionally not covered in this chapter, though covered for more specialized courses. The contents of this chapter were developed for the "Tecnologia Agent (TA)" master course in the years 2005-2010 with post-graduate students at the University of Girona, who demonstrated high levels of achievement by grasping a way of building up agents, less concerned of methodologies and more focused on mastering the agent features necessary to build up agents that autonomously work on behalf of users.

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INTRODUCTION

Old definitions of *agents* tell that they are autonomous entities that can interact in the real world (Wooldridge and Jennings, 1995), (Jennings, 1996), "An agent is a computer system that is capable of flexible autonomous action in dynamic, open, unpredictable and typically multi-agent domains". The most recent definition of agent is as a design metaphor (Luck, 2005). All of these interpretations are considered in this course, from the perspective that intelligent agents are often criticized as representing a technology that is actively pursued in research labs but that rarely appears in deployed applications (Hendler, 2008) (Nwana and Divine, 1999) (Lorini and Verdicchio, 2009). Our hypothesis is that many of the technologies underlying intelligent agents have migrated into mainstream applications, at which point they are no longer referred to as agents. Many university departments will revisit the evolution and application of intelligent agents and consider how they are shaping emergent technologies or becoming embedded within applications. We plan to look at the pros and cons of intelligent agents, relating them to other technologies and exploring successful potential deployments in the real world, such as recommender agents.

The problem of the lack of applicability of agents comes from the field of Artificial intelligence itself (AI), which has come in and out of vogue many times in the past 25 years: it has been widely publicized and then, having failed to live up to expectations, has been discredited until it was revived again. In the late 1990s, an observer at a World Wide Web technology conference reported that a majority of the proposals had been brought up, several years earlier,, and were being considered again in the late 2000's —good technology solutions looking for real business problems to solve. Even the business world, which has not always been as favorable to AI as it should be, seems to be using the term in a positive way. This is due to not just the consumer success of iRobot's Roomba (a robotic vacuum cleaner) but also significant successes related to other consumer products, financial institutions, medical applications, Web search, data mining, spam filtering, and a host of other areas. AI's (and intelligent agents) biggest enemy may be the promises made by its proponents—ambitious entrepreneurs looking for venture capital or academics who underestimate the challenge of meeting the needs of business users.. In this context, in the scenarios envisioned by the pioneers of the fields of agents and multi agent systems (MAS) (Wooldridge, Jennings, Hendler, Maes, Newell, to name but a few), whose hopes were boosted by the unprecedented success of Internet technologies, agents were viewed as a further development of the object-oriented paradigm, leading to the implementation of goal-driven, mobile programs that could cooperate with each other autonomously to reach a common objective. In a broader interpretation, going beyond the strictly technological aspects to include social, economic, and legal ones, MASs would be seen as computational models of any group of interacting entities. From this perspective, agents are programs that simulate a real-life complex system whose features are to be analyzed by means of a computer system. The lack, so far, of a so-called "killer application" of MAS technology does not necessarily entail the corollary that the latter interpretation traces the only viable path for agent researchers, who thus should focus on simulation. Not at all! However, in our opinion, significant achievements not only in the simulation-oriented MAS research but also in the use of recommender agents on the internet or the automation of QA (Question-Answer) sites by means of agents, are a necessary step toward a definitive breakthrough in software development. We agree with (DeLoach, 2008) and (Lorini and Verdicchio, 2009) that MAS researchers have not yet demonstrated that the agent approach can yield competitive or even better solutions than other programming paradigms by providing reliable, complex, distributed systems.