Chapter 7

Sociable Behaviors in Virtual Worlds

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ABSTRACT

When simulating three-dimensional environments populated by virtual humanoids, immersion requires the simulation of consistent social behaviors to keep the attention of the users while displaying realistic scenes. However, intelligent virtual actors still lack a kind of collective or social intelligence necessary to reinforce the roles they are playing in the simulated environment (e.g., a waiter, a guide, etc.). Decision making for virtual agents has been traditionally modeled under self-interested assumptions, which are not suitable for social multi-agent domains. Instead, artificial society models should be introduced to provide virtual actors with socially acceptable decisions, which are needed to cover the user expectations about the roles played in the simulated scenes. This chapter reviews the sociability models oriented to simulate the ability of the agents that are part of an artificial society and, thus, interact among its members. Furthermore, it also includes a full description of a social model for multi-agent systems that allows the actors to evaluate the social impact of their actions, and then to decide how to act in accordance with the simulated society. Finally, the authors show the social outcomes obtained from the simulation of a particular 3D social scenario.

INTRODUCTION

Three-dimensional environments have significantly evolved since their beginning in the late sixties. The continuous increase of the available hardware as well as the improvement of the graphic software, in parallel with the evolution of computer networks, have brought virtual environments closer to the physical world; as science fiction already envisioned (Stephenson, 1992). 3D virtual
worlds are at the cutting edge of the evolution of the Internet towards the new Web 2.0. Some well-known examples of such kind of applications are Massively Multiuser Virtual Environments (e.g. World of Warcraft (Blizzard Entertainment, 2009), SecondLife® (Linden Lab, 2009)...). The aim of these applications is the immersion of the users within a fictitious world. However, apart from the classical goal of immersive technologies (achieved by means of virtual reality devices such as data gloves or head-mounted displays) these 3D worlds aim at achieving the user’s mental immersion by populating virtual worlds with synthetic actors, whose animated behavior resembles their equivalent in reality.

The simulation of virtual worlds is a current research topic with a great number of problems to be tackled. One of them is the challenge of populating virtual worlds with autonomous agents emulating human behaviors. Besides showing a good graphical appearance, these virtual actors must perform like-life behaviors. The behavioral animation requires the development of intelligent systems that can simulate believable behaviors for the 3D characters. This challenge involves dealing with perception, motor or animation control, goal selection, action planning and communication skills to interact with other characters or users. Therefore, this complex problem has led to the integration of different artificial intelligence techniques that reproduce intelligent skills such as autonomy, reactivity, pro-activity and sociability (Wooldridge, 1995).

Day after day, virtual worlds are incorporating new services that not only complement the originals located in the real world but also create a hybrid total experience of the physical and virtual reality, also known as interreality (Kokswijk, 2007). Consequently, the incorporation of social skills in the behavioral animation of different kinds of synthetic characters is a keystone in the development of last generation 3D virtual worlds (Williams et al., 2006; Yee et al., 2007). These social synthetic characters could be used to improve the user’s mental immersion in Massively Multiuser Virtual Environments (Rehm & Rosina, 2008). Additionally, they could be used to model different behaviors in crowd simulations, in order to evaluate the overall impact of different policies in critical circumstances such as catastrophic events (Pelechano et al., 2008).

The complexity of the behavioral animation requires splitting the problem and managing each part independently. Since virtual actors should have a reactive nature, which can be easily recognized by the users or other actors, this feature is usually considered crucial for providing credibility. According to this, the literature of virtual humans contains a high number of works focused on reactive skills (Reynolds, 1987). Secondly, proactive behaviors require the use of planning or decision making mechanisms that introduce a new intelligence layer to be integrated. Hence, there is a significative reduction in the number of works covering both behavioral aspects (Funge et al., 1999). Finally, social behaviors are rarely considered, as they add a new complex problem to be integrated (Reilly, 1996). Sociability refers to the ability of agents, which are part of an artificial society, to interact among them. Some works have faced sociability by providing synthetic characters with skills such as navigation (Helbing & Molnar, 1995), emotions or affection (Lim & Aylett, 2009). Nevertheless, intelligent virtual actors still lack a kind of collective or social intelligence beyond these agent-centered skills. As virtual humans usually play a role in the simulated environment (e.g. a waiter, a guide, etc.), they generate certain expectations associated with their activities and their relationships with the rest of agents in the scene, including the user. However, virtual characters’ decision-making has generally been modeled under self interested assumptions, which are not suitable for multi-agent domains. Instead, artificial society models should be introduced to provide virtual actors with socially acceptable decisions. Actors need to evaluate the social impact of their actions to decide how