Chapter 74
Conversational Metabots for Educational Applications in Virtual Worlds

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ABSTRACT

Education is one of the most interesting applications of virtual worlds, as their flexibility can be exploited in order to create heterogeneous groups from all over the world who can collaborate synchronously in different virtual spaces. Additionally, they can create opportunities to offer educative contents with the advantages of online courses, but also the feel of "presence" that only virtual worlds can provide. However, the interaction in social virtual worlds usually takes place in text mode, given that usually only textual and chat facilities are provided to communicate with avatars and bots. This makes it difficult for people without enough technical knowledge, or with visual or motor disabilities, to interact with such systems. To solve this problem, the authors propose a methodology for building bots as intelligent embodied conversational agents that can communicate with the users through oral as well as visual modalities.

INTRODUCTION TO VIRTUAL WORLDS

The stunning increase in the amount of time people are spending socializing online is creating new ways of communication and cooperation. With the advances in the so-called Web 2.0, virtual worlds have grown dramatically over the last decade. These worlds or "metaverses" are computer-simulated graphic environments in which humans, through their avatars cohabit with other users. Traditionally, virtual worlds have had a predefined structure and fixed tasks that the user could carry out. However, social virtual worlds have emerged to emphasize the role of social

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interaction in these environments, allowing the users to determine their own experiences.

Social Networking has been a global consumer phenomenon during the last few years. According to Nielsen (2009), two-thirds of the world's Internet population visit a social network or blogging site and the sector now accounts for almost 10% of all Internet time. Member Communities has overtaken personal Email to become the world's fourth most popular online sector after search, portals, and PC software applications. The staggering increase in the amount of time people are spending on these sites is changing the way people spend their time online and has ramifications for how people behave, share and interact within their normal daily lives. The development of so-called Web 2.0 has also made possible the introduction of a number of applications into many users' lives, which are profoundly changing the roots of society by creating new ways of communication and cooperation.

The advance of social networking has entailed a considerable progress in the development of virtual worlds (Arroyo, et al., 2009; Lucia, et al., 2009), in which humans, through their avatars, "cohabit" with other users. This new model is more humane because it simulates the real environments characteristics in which the human being is and has become. For humans, a 3D world is "more real," a world in which we can feel the distance, color, sunset, the presence of our friends, in which we can use the capabilities of our senses and we can interact with objects and avatars that inhabit it. These virtual worlds or metaverses are in fact true social networks and they are useful for interaction between people in different locations. Likewise, in the three-dimensionality context it is very appropriate to develop virtual robots with the same appearance as that of the human-driven avatars. These new virtual robots are called metabots term coined from the contraction of the terms metaverse and robot. A metabot will therefore be a fully capable software completely able to interact in one or more metaverses through one or more avatars.

Metabots, with the same appearance and capabilities that the avatars for human users, thus intensify the perception of the virtual world, providing gestures, glances, facial expressions, and movements necessary for the communication process. Therefore, these virtual environments are very useful to enhance human-machine interaction. This way, virtual worlds have become real social networks useful for the interaction between people from different places who can socialize, learn, be entertained, etc.

Thanks to the social potential of virtual worlds, they have also become an attraction for institutions, companies, and researchers with the purpose of developing virtual robots with the same look and capabilities of avatars for human users. However, social interaction in virtual worlds are usually carried out using only text communication by means of chat-type services. In order to enhance communication in these environments, we propose the integration of dialog systems to develop intelligent metabots with the ability of oral communication and, at the same time, which benefit from the visual modalities provided by these virtual worlds.

A dialog system (McTear, 2004; López-Cózar & Araki, 2005; Griol, et al., 2008) can be defined as an automatic system that are able of emulating a human being in a dialog with another person, in order to complete a specific task (usually providing information or perform a particular task). Two main objectives are fulfilled thanks to its use. The first objective is to facilitate a more natural human-machine interaction using the voice. The second one allows the accessibility for users with motor disabilities, so that the interface avoids the use of traditional interfaces, such as keyboard and mouse. These systems include Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques.

With the growing maturity of conversational technologies, the possibilities for integrating conversation and discourse in e-learning are receiving greater attention. Dialog systems have