Chapter 12
The Intelligent Agents:
Interactive and Virtual Environments

ABSTRACT

Tools available for enhancing and sharing knowledge include intelligent agents, Augmented Reality (AR), and Virtual Reality (VR), among other solutions and paradigms. Collaborative computing became possible due to the advances in social networking, collaborative virtual environments, multi-touch screen-based technologies, as well as ambient, ubiquitous, and wearable computing. Examples of simulations in various domains include virtual computing machines, transient public displays of the data, mining for patterns in data, and visualizations of past events with the use of immersive technologies, virtual reality, and augmented reality. Further discussion relates to the tools for creating and publishing interactive 3D media and the Second Life culture.

INTRODUCTION

Intelligent agents can recognize changes in their environment and then comprehend and react accordingly to amplify their chances of success. Interacting intelligent agents such as software, computers or robots may form intelligent systems. Applications of multi agent systems involve multiple venues such as managing complex structures, e.g., transportation, traffic, or parking; detection and solving faults in industrial systems; and managing machine-to-machine systems, among many other implementations (Demazeau et al., 2012).

Studies on artificial intelligence, especially machine learning is resulting in constructing systems that can learn from the data they search for and receive. Biology inspired computational intelligence studies pertain to adaptive mechanisms that enable or facilitate intelligent behavior in complex and changing environment (Engelbrecht,

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2003). Paradigms and methods developed in the field of computational intelligence involve the developments in artificial neural networks, fuzzy systems, and evolutionary computing, for example, building algorithms based on swarm intelligence or artificial immune systems. Researchers make the mind models and map them to the corresponding brain parts, thus attempting to unify natural and artificial intelligence (Weng, 2012).

People can create virtual environment in their own minds without any technology. Picture books, theatre, television, and movies extract abstract information of the story into concrete visual scenes to enhance experience and evoke emotions. Readers and listeners convey the words into virtual environment in their own minds. One can achieve simulation with or without immersion in the simulated world. In the desktop-type 3D virtual environment, the real world is not blocked out from the user who can see through a window and communicate by mouse and keyboard. Virtual objects that are not presented in life size do not create the illusion of immersion.

Developing virtual reality, ambient intelligence, multimedia, and robotics becomes crucial for technological development for both corporations and universities. Apart from data graphics displayed in various graphical ways, tools used for work and entertainment include augmented reality and virtual reality; they link science, engineering, technology, and art in service of real-time, immersive, and 3-dimensional interaction with the collaborative and intelligent environments, where people can interact with each other and with artificial agents.

AUGMENTED AND VIRTUAL REALITY

On the spectrum between virtual reality and the real world, augmented reality is closer to the real world. The hardware and software is designed as a desktop type or an immersive one that visually and physically isolates users from the environment and awareness of reality. Avatars, characters created in artificial environment represent the users who may control them with head-mounted displays and gloves. Without a need of any glasses smart interactive 3D content seems to float in space in and outside of the screen. Visual displays, body and head tracking interfaces, aural (acoustic) and haptic (force and touch) feedback, and peripherals such as acoustic and haptic displays provide the illusion of immersion. Data communication goes through the wired, wireless, stand-alone or networked channels.

Augmented reality adds graphics, sounds, haptics (force and touch), and smell to the natural world. Integrated solutions combine the single-sense display types or provide virtual stimuli to several sensory modalities; visual, audio, haptic, or, less frequently, smell and taste (Coquillart, 2012). Augmented reality interfaces build applications with an audio-visual augmentation, realistic object augmentation (e.g., with augmented shadows), image augmentation, textual annotations, and audio augmentation (Liarokapis, White, & Lister, 2004). Gimeno, Morillo, Ordu, & Fernández (2012) developed the software framework, an easy-to-use augmented reality authoring tool for non-programming users, to develop the AR prototypes for industrial applications; the time needed for developing the prototypes was much lower than with computer graphics programming.

Virtual reality links technology and art in service of real-time, immersive, and 3-dimensional interaction with computer-generated environments. Augmented, virtual reality, and Second Life play an increasing role in lives of participants. Projects may refer to various configurations and visual appearances, involving the use of light, sound, such as music and voice including songs, haptic experiences, touch, and gesture. Particular solutions may be also attained