Chapter 11
Scenario Authoring by Domain Trainers

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ABSTRACT

Authoring is a bottleneck in the widespread uptake of technology for training and education as the time and skill needed for domain experts such as trainers and teachers to develop learning modules is prohibitive. In this project the authors are particularly concerned with providing experiential knowledge transfer, where the trainer is able to create scenarios similar to those they have experienced and allow their trainees to consider appropriate responses to such situations. For this the authors need an environment which is immersive for both parties, in which knowledge is acquired, transferred and gained in the context of the scenario. The scenario itself becomes part of the knowledge to be experienced. To this end they have created a simple approach involving synthetic agents within a Virtual Environment who can be changed along with their dialog and behaviour to create and modify scenarios as deemed appropriate by the domain expert in order to improve the learning experiences of the trainee.

INTRODUCTION

In our current project, we are particularly concerned with the creation of experiential simulation-type learning environments in which synthetic agents or characters inhabit a Virtual Environment (VE) and allow the student or trainee to see and hear (and feel) a number of possible situations. In the particular context of the domain we are working in, we are interested in providing a low-cost (in the sense of safe) training experience for custom's and immigrations officers to learn about the detection of suspicious behaviour. Unlike many learning situations, we are interested in providing training experiences for situations where there is not necessarily a right or wrong answer and there is rarely any factual content that would need to be memorised. The goal is to learn by experience and trial and error, seeing if you can detect something that raises suspicion. Trial and error can be

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a costly way to learn (for the trainee, organisation and even society). By providing a computer-based Virtual Environment in which to try out multiple scenarios the trainee becomes exposed to more and more alternative situations.

Major impediments to the use of such systems are the time, effort and skill requirements to develop and maintain these training environments. In this chapter we describe our prototype which demonstrates how trainers can create their own scenarios from scratch and modify existing scenarios to progressively develop an extensive library of scenarios. A key and novel element of our approach is that knowledge regarding those scenarios is acquired through the process of scenario creation. In the next section we consider further the role of computers in training and the use of agents to provide system intelligence. After noting benefits and current shortcomings we offer our approach. An evaluation study to determine how well users are able to use the system to acquire new scenarios is presented. We finish with future work and conclusions.

BACKGROUND

Computer based training environments promised a flexible and cost-effective method for learning new skills. Early prototype systems, such as SCHOLAR (Carbonell, 1970), GUIDON (Clancey, 1987), STEAMER (Hollan, Hutchins and Weitzman, 1984), the LISP Tutor (Anderson and Reiser, 1985) and SHERLOCK (Lajoie and Lesgold,1989), have demonstrated the feasibility of computer based training systems as well as pushing the boundaries of research in the areas of artificial intelligence, natural language processing, planning and user modelling. A more complete overview of the main concepts that have emerged from early intelligent tutoring systems is given in Wenger (1987).

As computers have become cheaper and more powerful, computer-based training systems offer an interactive multimedia experience or possibly a complete immersive Virtual Environment to the user. Today, most large companies use some form of computer-based training system, albeit at a high development cost. The costs in time, technology and human resources associated with developing computer-based training resources are beyond all but the largest organisations. An alternative to custom development is purchase of off-the-shelf software. Commercial simulation environments tend to be expensive (licenses can be around 50K) and they tend to offer minimal user interaction, cannot be used to define complex training scenarios, and use scripted characters that cannot react appropriately to the user or events.

Solutions to these problems are being sought by researchers. One key field of research is the use of intelligent agents and multi-agent systems. It is increasingly common for eLearning environments to include a pedagogical agent to perform one or more roles such as a tutor, peer or teacher. These agents have social ability based on the observation that learner's perception of the learning experience is positively affected when a lifelike character is included in a computer-based interactive learning environment. This has become known as the *persona effect* (Lester et al., 1997). Human qualities such as empathy (McQuiggan and Lester, 2006), enthusiasm and interesting personalities (Elliott, Rickel and Lester, 1999) and expressiveness in terms of communication and levels of advice (Lester et al., 1997) have been perceived by learners and educators to be useful. A study by Moreno et al. (2001) found that participant memory retention and knowledge transfer was better when the learner was assisted by a pedagogic agent compared to a computer-based text environment without the agent.

Training based on a story or scenario has to convey a series of points to the trainee. This is unlike computer games where free-form entertainment is the goal. We have to represent the general story we would like to tell and if we are going to give the user choices we have to allow the