A Robust Interactive Narrative Framework for Edutainment

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ABSTRACT

Over the last decade, interactive edutainment systems have not only moved into the mainstream, they have spread beyond the niche area of interest in the field of artificial intelligence. Edutainment, also known as educational entertainment or entertainment-education, denotes those software applications that are designed to educate, as well as provide fun. Presented is an interactive narrative framework that has been applied to develop the Shimpai Muyou!, an interactive drama in virtual reality. This edutainment application was created to help Japanese school-age children develop anti-bullying skills and practice coping strategies through empathic interactions with intelligent virtual agents. Narrative management was used to ensure that virtual situations led to the desired learning outcomes. A computer agent was employed as a story manager to select appropriate episodes and characters that would potentiate the occurrence of certain events favoring particular authored purposes. Although the situations were pre-designed, the characters autonomously decided their actions while performing their roles. Qualitative data obtained through several small group discussions with twenty 5th and 6th graders are presented.

Keywords: Intelligent Virtual Agents, Interactive Edutainment Systems, Interactive Narrative Design, Story Manager Agent, Virtual Drama

INTRODUCTION

Edutainment has recently become an active research agenda for the field of artificial intelligence, engaging scores of enthusiastic researchers, active working groups, and a growing community (Pan, Cheok, Müller, Zhang, & Wong, 2010). Edutainment, also known as educational entertainment or entertainment-education, denotes all forms of software designed to educate, while at the same time provide fun. This approach is motivated by the increasing demands on individuals for life-long learning as well as the need to integrate effective learning opportunities in a classroom environment. The existence of a satisfying interactive narrative is an essential component of any edutainment system. Without an effective narrative, an edutainment system cannot warrant experiences that would reinforce knowledge acquisition. Interactive edutainment applications help build learning experiences and increase learners’ involvement and, eventually, their motivation.

There has been growing interest in stories as artifacts that can augment interactive entertainment products, such as video games. This interest in storytelling in interactive entertain-
ment has lead to the development of the notion of the interactive narrative (IN), an approach to interactive entertainment in which a system dynamically responds to the user and adapts the narrative content to his or her actions in the virtual world (Riedl, 2010; Riedl, Stern, Dini, & Alderman, 2008; Rowe, Shores, Mott, & Lester, 2010). Unlike other computer-based storytelling media, an interactive narrative system allows users to intervene and make decisions that directly affect the direction or outcome of the story. It implies that an IN system has to balance the seemingly competing requirements of narrative coherence and perceived user self-agency. The former means the events that occur from interactions among characters, environments and users in a narrative are meaningful and relate to each other, as well as to the outcome. The latter refers to a user’s capability of making meaningful decisions, while immersed in a virtual environment (Paracha & Yoshie, 2010b).

Reconciling narrative coherence and user self-agency is nevertheless an open research issue since the existing methods have not matured enough to warrant a balance between the two. The inadequacy of theoretical approaches to authoring interactive stories and the lack of authoring tools have made the interactive narrative medium underutilized (Kriegel & Aylett, 2008). In addition, allowing users to freely interact with the system does not guarantee a meaningful narrative experience. On the contrary, constraining user interactivity produces a system that tells only one and the same story, in which the user quickly loses interest. This is especially true in the classroom context where stories are typically not as appealing to users as they are in video games (Figueiredo, Brisson, Aylett, & Paica, 2008). However, practitioners should be able to bind the scope of the emerging story around a particular educational issue.

One way to tackle this issue is by creating opportunities for improvements in the narrative and incorporating user input through a continuous intervention mechanism. In this regard, the so-called Forum Theatre, developed by the Brazilian dramatist Augusto Boal (1979), offers a relevant technique that both enables an incessant intervention system and balances narrative coherence against audience responses. Boal was interested in using theatre to resolve conflicts, and wanted to enable a greater degree of engagement for the audience. He introduced the character of Joker (i.e., story manager) who facilitated audience interactions and at the same time ensured that the audience would be provided with an overall coherent narrative. Similar interactive dramatic structure, in which advice can be given by intelligent virtual agents (IVAs), has been adopted for the Shimpai Muyou! virtual drama to help Japanese children build anti-bullying and other social skills.

This paper presents a framework that can be applied to the development of interactive edutainment systems that afford users a high level of self-agency in a virtual world, while simultaneously delivering a coherent narrative experience centered on pedagogical goals. It is possible that users may perform actions that can threaten the system’s ability to deliver the intended narrative. When that occurs, the system invokes a special virtual agent, called the story manager (SM), to balance narrative considerations against the participant’s self-agency (Riedl, Saretto, & Young, 2003). The resulting experience is something that is neither entirely dictated by the story manager, nor by the user. In the following pages the authors introduce the Shimpai Muyou! computer-based anti-bullying intervention and describe its robust interactive narrative framework. To establish the research context, the authors first survey relevant approaches to school bullying and review existing interactive narrative systems in edutainment. Next, the composition of the narrative module, the various components built around the story manager computer agent, and different functions performed by the SM are described. Finally, the results of a small-scale qualitative evaluation with the participants are stated and key lessons are drawn highlighting the limitations to be addressed in the future.
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