Normative Echoes: Use and Manipulation of Player Generated Content by Communities of NPCs

Eric Baumer, Bill Tomlinson, Man Lok Yau, and Thomas A. Alspaugh

University of California, Irvine
Informatics Department
127 Computer Science Trailer
Irvine, CA 92697
{ ebaumer, wmt, mlyau, alspaugh } @ ics.uci.edu

Abstract

Normative Echoes is an interactive installation that explores ways to combine player-created content with procedural content. Animated autonomous agents inhabit virtual islands on stationary computers; a tablet PC is used as a virtual raft to transfer agents between the islands. The agents on each island communicate with one another and form scenario-based computational representations of their social interactions. These scenarios represent emergent social patterns and norms within the society. Humans can communicate with the animated autonomous agents through the use of a microphone. Utterances spoken by participants are parsed, repeated, and learned by agents, then used by the agents in communications with their social partners. When transferred between islands, agents bring with themselves the utterances and norms they have learned, thus spreading those norms throughout the various communities in the installation. In this way, agents can meaningfully perform procedural operations on player-created content, allowing for a dynamic and engaging experience.

Introduction

Everyone likes customization. Character creation, level editors, and modding are mainstays of modern games. Such customizations make a game feel more personalized and increase players' emotional investment. However, because it is difficult to predict and plan for the myriad possibilities any given player may pursue, allowing a game to react to specific details of a player's customizations is rather difficult.

After Will Wright's talk at the GDC last year (Wright 2005) the buzz term "procedural content" has become quite popular. Indeed, as Wright argues, generating content for video games is an involved, laborious, and time-consuming process. Procedural content allows the brunt of that work to be shifted to the processor so that content is created on the fly for the player at run time. This eases the load on content developers, but it also places limits on the game.

Certain types of content may be generated procedurally, but other types must still be preprogrammed in. Furthermore, while Wright's demonstration effectively displayed incorporating user input and customization, it was still of a somewhat limited form; users could alter the physical composition of creatures, which would be used to procedurally determine their behavior. There has already been some work done in the area of harnessing procedural methods to guide plot, narrative, and character development (Louchart et al. 2005; Mateas and Stern 2005).

This demonstration takes a more abstract approach to procedural content generation. Drawing from a sociological background (Berger and Luckmann 1966; Garfinkel 1967; Giddens 1979) and building on previous autonomous agents work (Baumer and Tomlinson 2005; Baumer and Tomlinson 2005), this demonstration uses a dialectic framework that allows agents to collaboratively construct the norms of their society. Agents experience their society as an external entity dictating certain behavior norms to which the agents must ascribe. However, agents are members of the society, and thus their individual actions work to affect what becomes normative within the society. In this way, the individual and society are in a dialectic process of mutual definition and redefinition. This demonstration explores how these ideas can be applied to create innovative interactive systems.

Interaction Paradigm

Drawing on research in tangible interfaces (Ishii and Ullmer 1997) and ubiquitous gaming (Bleecker, Ducheneaut and Smith 2005), this installation builds on mobile technology that allow characters to break the plane of the screen in order to come out and interact with people in the physical world (Tomlinson et al. 2005). In this interaction paradigm, not only are the characters lent physicality by their ability to leap off of the screen, accelerometers in the tablet PCs make them subject to the law of gravity. Thus, participants become physically

involved in the act of helping the character balance on the raft, increasing the level of engagement.

Emergent Norms

As mentioned above, this installation draws on sociological concepts such as norms and institutions. One of the aims of this installation is to use a dialectic framework that allows agents to develop their own societal norms and institutions. The methods used here are similar to those described in (Baumer and Tomlinson 2005). Individuals form internal representations of their social interactions using scenarios (Alspaugh 2005), and then those scenarios guide future social action. When one pattern or scenario occurs more frequently, it receives a higher weighting than other scenarios and is thus more likely to be enacted in the future. Furthermore, when an agent observes a known scenario partially enacted, that agent may step in to complete the scenario. However, agents can also act outside of societal norms and not base their interactions on already existing norms. This allows for a dialectic framework, in which the norms of the society dictate individual actions and individual actions simultaneously define the society's norms.

One advantage of using scenarios to represent these norms is that it allows them to be stored in a format that is both machine-readable and human-readable. Many AI methods for controlling behavior, such as Bayesian nets or machine learning, result in a behavioral control structure that effectively produces a given behavior, but a human cannot then examine that control structure to determine how it functions. Since scenarios are described primarily by events and the temporal relationships between them, this representation is much more intelligible. Such intelligibility is important in processes such as debugging, performance analysis, and algorithm optimization.

Aims

Player-created content and procedural content present two promising and exciting directions for game AI. Although some work has already been done in combining the two, this demonstration seeks to propose new methods and approaches to procedurally generated and player-created content. One important aspect to remember is that not all player-created content is in-game. Indeed, players have been creating their own content for years by the development of social structures and institutions surrounding gaming. What the game means *per se* may not be nearly as interesting as what it means *in situ*, seen in light of the social context in which it is situated. The utterances spoken by the characters in the installation carry only the meaning assigned to them by participants. In this way, the demonstration seeks to elicit meaning from participants by not positing any inherent, *a priori* meaning to its components.

References

Alspaugh, T. (2005). Temporally Expressive Scenarios in ScenarioML. *Institute for Software Research Technical Report UCI-ISR-05-06*. University of California, Irvine.

Baumer, E. and Tomlinson, B. (2005). Institutionalization through Reciprocal Habitalization and Typification. *Second NASA Workshop on Radical Agent Concepts (WRAC)*, NASA Goddard Spaceflight Center, Greenbelt, MD, Springer.

Baumer, E. and Tomlinson, B. (2005). Synthetic Social Construction for Autonomous Characters. *AAAI Workshop on Modular Construction of Human-Like Intelligence*, Pittsburgh, PA.

Berger, P. L. and Luckmann, T. (1966). *The Social Construction of Reality: A Treatise on the Sociology of Knowledge*. New York, Irvington Publishers, Inc.

Bleecker, J., Ducheneaut, N. and Smith, I. (2005). Ubiquitous Computing, Entertainment and Games Workshop. The Seventh International Conference on Ubiquitous Computing (Ubicomp 2005).

Garfinkel, H. (1967). *Studies in Ethnomethodology*. Englewood-Cliffs, NJ, Prentice-Hall.

Giddens, A. (1979). Agency, Structure. *Central Problems in Social Theory*. A. Giddens. Berkeley, University of California Press.

Ishii, H. and Ullmer, B. (1997). Tangible bits: towards seamless interfaces between people, bits and atoms. *Proceedings of the SIGCHI conference on Human factors in computing systems*, ACM Press**:** 234--241.

Louchart, S., Aylett, R., Dias, J. and Paiva, A. (2005). Unscripted Narrative for Affectively Driven Characters. *Artificial Intelligence and Interactive Digital Entertainment*, Marina del Rey, CA, AAAI Press.

Mateas, M. and Stern, A. (2005). Structuring Content within the Façade Interactive Drama Architecture. *Artificial Intelligence and Interactive Digital Entertainment (AIIDE 05)*, Marina del Rey, CA, AAAI Press.

Tomlinson, B., Yau, M. L., O'Connell, J., Williams, K. and Yamaoka, S. (2005). The Virtual Raft Project: A Mobile Interface for Interacting with Communities of Autonomous Characters. *CHI '05 extended abstracts on Human factors in computing systems*. Portland, OR, USA, ACM Press.

Wright, W. (2005). The Future of Content. San Francisco, CA, Game Developer's Conference.