

Reporters, Editors and Presenters: Using Embodied Agents to Report on Online Computer Games

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Abstract

We present a multi-agent framework to generate reports of players' activities within multi-player computer games. We describe an initial implementation of our framework as an extension to the Capture the Flag game within Unreal Tournament, and sketch future applications of this work including other genres of games, the emergence of games as a spectator sport, implications for pervasive games as well as non-gaming applications.

1. Introduction

In this paper, we explore a potential role for agents in on-line computer games—automatically generating reports of the action, so that external observers can keep track of the action from a distance.

There are two primary motivations for this idea. First, we recognise that online gaming is a highly social activity and we therefore wish to develop services that support players in maintaining contact with fellow players. Second, emerging massively multi-player games provide persistent experiences that continue around the clock—even when a player is not present. These players may wish to receive news from the game even when they are unable to play, or may wish to be alerted to important new developments that require them to return to the game at short notice. A further motivation for this work is that games are beginning to emerge as a spectator sport, as evidenced by the growth of game tournaments, professional players and early examples of television shows that broadcast multi-player gameplay, which raises requirements for new ways of portraying games to external viewers.

We describe a prototype implementation of a multi-agent framework for reporting, editing and presenting game information to external participants, which aims to support richer forms of participation in online gaming.

2. Framework

The framework is driven by two core principles:

1. agents that capture information about a game should be directly embodied within the game, visible and subject to the same constraints as players; and
2. responsibility for extracting, filtering and reporting of information should be distributed between different types of agent.

While it would be possible to use a single omniscient agent to report on game events, this has implications both for player privacy and for the scalability of the system. With embodied agents, players can tell when they are being watched and react accordingly. Also, although omniscience avoids the need for the agent to position itself to see events as they occur, the quantity of data and the inferences required to produce interesting commentary (e.g., to select the most relevant events) may ultimately limit the scalability of approaches based on a single omniscient agent.

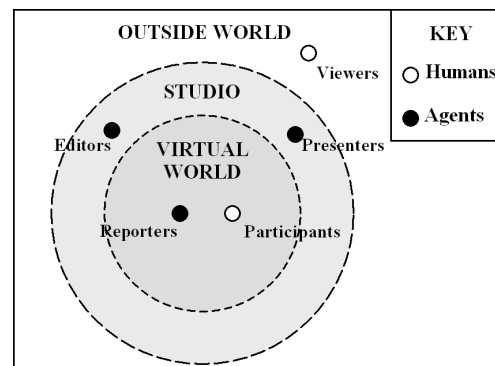


Figure 1. Reporting Framework

Figure 1 summarises our framework in terms of a number of defined roles that have been inspired by conventional

human news-gathering activities. Participants are the players' avatars, capable of directly influencing the game. Reporters also inhabit the game environment, but unlike the participants cannot influence it directly. Reporters provide information about events in the game world to the editors, who in turn process this information and pass on the most relevant parts to the presenters. Editors can also attempt to coordinate the efforts of reporters, e.g., attempting to corroborate single-sourced or conflicting reports of events in the game world. Presenters are responsible for delivering information to the viewers at an appropriate time (e.g., real-time vs post-game commentary) and in an appropriate format (e.g., SMS messages vs animated talking heads).

3. System Implementation

Our prototype system is based on 'Capture the Flag', one of the game types provided by Unreal Tournament¹. The prototype consists of a variable number of embodied reporter agents and a single (non-embodied) editor agent. We use the Gamebots [1] interface to allow agents to communicate with the UT game server. The agents themselves are implemented using the SIM_AGENT [4] toolkit.

Gamebots provides each reporter with data that approximates to that available to a player. A reporter's sensory range is limited, and to obtain information about events in other parts of the map, the reporters must physically move to a different location. The reporters navigate around the UT map using the built-in pathnodes system, which enables bots (and agents) to move around the map without performing calculations on the map geometry itself. By remembering the objects in the game world that they have sensed in the past and the state of objects that they can currently sense, the reporters can attempt to infer which events are taking place within the game, and their significance. Events the reporters judge significant are reported to the editor.

The editor has two main responsibilities. First, the editor passes interesting segments of the output generated by the reporters to the presenter(s). Since reporters are not infallible, this data should be verified as necessary before being passed on, e.g., by clarifying conflicting reports or by requiring multiple reporters to detect the same game event. Second, the editor attempts to maximise the collection of relevant and interesting information by assigning reporters in such a way as to provide good coverage of the events in the game, e.g., by avoiding having reporters standing idle or assigning multiple reporters to the same task unnecessarily.

Preliminary experiments show that embodied reporter agents give varying coverage depending on deployment strategies used, and suggest that dynamic assignment of re-

porters by an editor can provide better coverage than static assignment schemes [2].

4. Future Work

In the short term, we plan to address some of the limitations of the current prototype implementation of our framework. In particular, we intend to develop and extend the current, fairly basic, implementations of reporters and editors. We also intend to create a range of presenter agents targeted at a variety of output devices such as mobile phones, conventional graphical user interfaces and 3D interfaces, to provide queued players with information about events in a game or possibly even to offer an in-game news service.

In the longer term, we intend to extend our approach to a broader range of games and to non-gaming applications such as collaborative virtual environments. This will require the ability to reason about a more diverse range of human activities, e.g., large-scale persistent games may involve many players, many different objects and interactions and a broader range of social situations. We are particularly interested in the emerging area of pervasive and mixed reality gaming in which games reach out into the physical world through devices such as mobile phones, enabling players to access a game while on the move, providing them with location-based experiences, and supporting games in which online players collaborate with those on the streets [3]. Commentating agents offer one way in which online games might reach out to relatively low-powered devices such as mobile phones.

References

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¹ <http://unreal.epicgames.com/> (verified January 2004)