Simulating the Adaptive Behaviour of Storytellers in Computer Video Games

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1 Introduction

When given the opportunity to interact with their audience, human storytellers are adaptive. Simple conversations and performances of improvisational theatre are both examples of situations in which the content or presentation of stories are dynamically adapted, either to facilitate communication or elicit a particular audience reaction. In the case of storytelling for entertainment, audience enjoyment is the storyteller’s primary goal; if immediate feedback from the audience suggests that this goal is not being met, the storyteller may adapt the story’s content to better suit its current audience, using their feedback as a guide.

Although this process of user-adaptive, interactive storytelling has existed for thousands of years, its computational simulation has only recently begun to be explored. In this paper, we present PaSSAGE (Player-Specific Stories via Automatically Generated Events), an Artificial Intelligence system that aims to simulate the adaptive behaviour of human storytellers: automatically learning its current audience’s preferences, and using them to adapt the content of an interactive story. For a review of related work, the reader is encouraged to consult our previous publication [1].

2 PaSSAGE

Our current focus with PaSSAGE lies on adaptive storytelling in the context of interactive entertainment, and in computer video games in particular. Computer video games provide an ideal setting in which to test simulated, user-adaptive storytellers, for the well-established mechanisms of audience (player) interaction with the game environment (which amount to directing a virtual avatar to take various actions or speak certain lines of dialogue) can be automatically monitored as inputs to the adaptation process. For example, if the player chose to deliberately insult a friendly (non-player) character in a story, a human storyteller might reasonably assume that the player is attempting to begin a rivalry with that character, prompting the storyteller to plan a subsequent event in the story that would take advantage of that situation.

Within the context of video games, single-player role-playing games are well suited to story-based play. It often the case, however, that the player’s actions in such games matter extremely little in terms of the progression of the story’s plot. By contrast, our aim with PaSSAGE is to create experiences which afford high player agency; that is, players should ideally have the sense that their actions within the game are influencing the ultimate outcome of the story being told. Given our setting in the domain of entertainment, PaSSAGE’s stories should also be fun.
2.1 Simulating User-Adaptive Storytelling

In PaSSAGE, the adaptive behaviour described above is simulated through two interleaved processes (player preference learning and story decision-making), and both of these processes rely on a set of author-supplied preference annotations. Player preference learning requires annotations on available player actions; these annotations encode how strongly those actions are indicative of each of five styles of play (Fighter, Method Actor, Storyteller, Tactician, Power Gamer), which are borrowed from Laws’ guide for pen-and-paper role-playing games [2]. When the player performs an annotated action, PaSSAGE revises its model of the player, which is maintained as a vector of scalar values, one for each style of play. Story decision-making is guided by annotations on potential story events; these annotations encode the suitability of that event for each of the given five styles of play. For example, an encounter with monsters who guard a powerful sword might be annotated as \((F = 4, M = 0, S = 0, T = 0, P = 4)\), showing that this event would be well-suited to fighters and power gamers, but of neutral value to players who favour the other styles of play. When the next event in the story should occur (as guided by the phases of Campbell’s Monomyth [3]), PaSSAGE calculates the overall suitability of each available event as an inner-product between its annotation and the current values in the model. The details of this calculation and the decision-making mechanism as a whole can be found in our previous work [1].

To test PaSSAGE’s ability to create and adapt interactive stories based on the preferences of its current player, we conducted a human user study comparing players’ ratings of “fun” and “agency” for an adaptive, PaSSAGE-created story, against two stories having predetermined structures. The full results of this study are available in our previous publication [4], but in brief, we found that for players with low prior experience playing video games who rated their story experience as being “easy to follow”, with 91% confidence, PaSSAGE’s stories were more fun, and with 87% confidence, PaSSAGE’s stories afforded better agency.

3 Conclusion

In this paper, we presented PaSSAGE, an Artificial Intelligence system created to simulate the adaptive process of human storytelling. We motivated our work in the context of interactive entertainment, and described how PaSSAGE both learns and uses a model of its current player’s preferences to dynamically select the content of an interactive story.

This paper contains some text from a current demonstration submission to AIIDE’08.

References