Shaping Interactive Stories in 3D Environments

Hui-Yin Wu, Marc Christie, Tsai-Yen Li

Shaping Interactive Stories in 3D Environments

Hui-Yin Wu (INRIA), Marc Christie(IRISA), Tsai-Yen Li (NCCU)

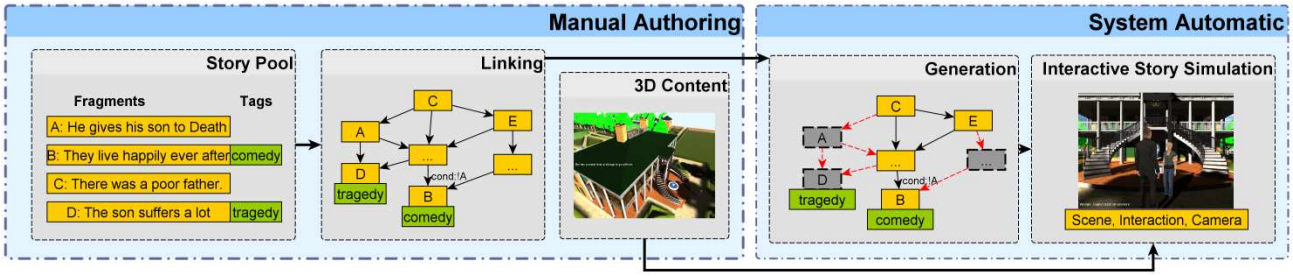

Figure 1. *Our framework includes authoring of the story pool, story graph, 3D content, the story generation, and 3D simulation.*

1. Introduction

The construction of 3D interactive stories with variable storylines, user interactivity, and integration of personalized aspects poses challenges to the generation and simulation of dynamic story content. How to break down a narrative into computable units, provide sufficient independence when linking to its 3D presentational level, and simulating the story in an interactive 3D environment that guarantees a coherent conveying are prevailing topics of interest in the gaming and interactive narrative communities. Well known story structures in previous work make use of story units such as beats [Mateas and Stern 2003] and vignettes [Riedl and León 2008], but generated stories often lack in variability and rarely address the linking between the story structure and the 3D environment.

In this work, we propose a story structure that enables us to explore temporal, thematic, and theatrical variations of an interactive story through the filtering of the *story fragments* (basic units of story) in an authored interactive 3D narrative. The narrative is represented as a branching story graph structure composed of story fragments (represented as nodes in the graph) and edges that logically link the fragments. A graph traversal algorithm we designed then filters and validates the story graph for logic and integrates user preferences such as the length of the story or the presence of a dramatic ending. Finally, and most importantly, the story fragments are presented in a coherent interactive 3D environment including character behaviors, character animation, and camera control.

2. Our Approach

We represent our interactive storytelling framework, as depicted in Figure 1, into two main parts: (1) the authoring, which involves the building of story pool fragments, linking of fragments to form a story graph, and scenario editing of corresponding 3D content, and (2) the dynamic story simulation, including the story generation and simulation in a 3D environment.

Fragments represent a basic computable unit in the interactive narrative, tagged with characteristics conveying characterization (e.g. protagonist, antagonist), theme (e.g. honesty, villainy), or emotion (e.g. sad, happy, boring). The pool of tagged story fragments can then be incorporated into a story graph, linked together with edges that allow precedence conditions, for example, we can specify a condition in the edge B-C given a precedence condition A. The graph and story tags are then used as a basis to filter and generate personalized content, producing a subgraph of the original story graph that fulfills all story conditions. This maintains the variability and interactivity of the interactive narrative. Given a user condition, such as "*tragedy=true and magic=false*" we propose a novel search algorithm on the story graph which consecutively removes unwanted story fragments (in this example, tagged with *magic*) from the graph, pastes and propagates user conditions (*tragedy*) onto the edges to ensure they are fulfilled before reaching the end of a generated storyline, and finally revalidates the graph by removing unreachable nodes and dead ends. Furthermore, the framework we propose is able to execute the filtered story graph in a 3D environment and ensures proper continuity between the fragments whatever their order. The 3D representation is expressed in the form of high-level XML scenario fragments (similar to BML) with animation commands such as:

```
<MeetAtLocation actor1="Woman" actor2="Lover">
        <Location type="actor1"/>
<MeetAtLocation>
```

Our framework takes the dynamic output of the story generation and realizes it in a real-time 3D animation environment with character animations, automated camera, virtual scenes, and simple interaction.

3. Conclusions

The design of our story structure and story generation mechanism, combined with 3D animation platform, provides much capacity for immersive interactive storytelling environments as well as related authoring tools. The flexible narrative structure also allows extension for generation of stories with varying temporal or perspective arrangements (same story from the perspective of different characters), thus extending the dynamicity and variability of the story output. Through the extraction of context related information from story fragments, future work on the 3D platform including smarter camera planning and autonomous character animations poses many exciting challenges and possibilities.

References

MATEAS, M., AND STERN, A. 2003. Façade: An Experiment in Building a Fully-Realized Interactive Drama. *Game Developer's Conference: Game Design Track*.

RIEDL, M. AND LEÓN, C. 2008. Photo Clip Art. Toward Vignette-Based Story Generation for Drama Management Systems. Workshop on *Integrating Technologies for Interactive Stories - 2nd International Conference on INtelligent TEchnologies for interactive enterTAINment.*