

Welcome to MY virtual place

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Abstract. This paper briefly describes our proposal for storytelling in virtual environments from a virtual guide perspective. In our model the guide begins at a particular location and starts to navigate the world telling the user stories related to the places she visits. Our guide tries to emulate a real guide's behaviour in such a situation. In particular, she behaves as a spontaneous real guide who knows stories about the places in the virtual world but has not prepared an exhaustive tour nor a storyline. In addition the paper exposes the concrete scenario where the guide has been successfully tested, as well as the performance obtained by using two guides with different profiles.

1 Introduction

Nowadays, virtual environments are becoming a widely-used technology as the price of the hardware necessary to run them decreases. Current video games show 3D environments unimaginable some years ago. Many recently developed virtual environments recreate real spaces with an impressive degree of realism. In such contexts, however, a lack of information for the user is frequently perceived, which makes him lose his interest in these environments. In the real world, people relate the environments that surround them to the stories they know about the places and objects in the environment. Therefore, in order to obtain more human and useful virtual environments, we need to add a narrative layer to them. We need stories related to the places and objects in the world. And finally, we need a virtual guide able to tell us these stories.

On the other hand, as pointed out in [13], one of the most striking features of historical investigations is the coexistence of multiple interpretations of the same event or process. The same historical events can be told as different stories depending on the storyteller's point of view. The story of the same battle between two cities, for example, will be different depending on the origin of the storyteller. It would be interesting that the virtual guide which tells us stories about the virtual environment she ³ inhabits could tell us these stories from her

³ In order to avoid confusion, in this paper, the virtual guide is supposed to be female, while the human guide is supposed to be male

own perspective. Such a guide would be, in addition, very useful for educational purposes. Children would be more open-minded if they could listen to different versions of the same historical events depending on the profile of the storyteller. In this sense, this paper describes the design and development of a novel proposal for storytelling in virtual environments from a virtual guide perspective. In addition the paper exposes the concrete scenario where the guide has been successfully tested, as well as the performance obtained by using two guides with different profiles.

2 Related Work

Computer based storytelling research is a flourishing area. Different groups are working on different problems and approaching them from different perspectives. Some groups are trying to obtain methods and mechanisms to automatically generate narratives (this is the plot based approach), while others are more concentrated on trying to obtain believable characters [8] (character based approach). A little work tries to reconcile both approaches [9]. From an information point of view, another distinction can be pointed out. Some researchers work with story pieces which are small parts of stories, while other researchers work with simple events. People working with story pieces usually approach the problem by using narrative theories, using prescribed story structures to combine the story pieces. In this sense, the theories of Polti [10], Propp [11], Thompson [12] and Branigan [3] are especially interesting. The granularity of the information used to construct stories is a determinant factor. In general, the larger the granules used to build with, the easier it is to build. The smaller the granule, the more precise and smooth the building can be. As pointed out in [4], from an artificial intelligence point of view, two different approaches have been considered to try to solve the narrative generation problem. The knowledge based approach makes an a priori attempt to capture the rules for successfully solving or navigating a domain, the behaviour based approach instead relies on a set of lower level competences which are each "experts" at solving one small part of the larger problem domain. From a more linguistic point of view, as pointed out in [7], previous work on story generation has generally taken one of two approaches: structuralist and transformationalist. Structuralists use real-world story structures such as canned story sequences and story grammars to generate stories, while transformationalists believe that story-telling expertise can be encoded by rules, or narrative goals that are applied to story elements such as settings and characters.

In general, more predefined stories are obtained by using: plot based approach, story pieces, large granules, knowledge based approach or structuralism. More surprising and emergent stories are obtained by using: character based approach, events, small granules, behaviour based approach or transformationalism.

3 Narrative Construction

In our model the guide begins at a particular location and starts to navigate the world telling the user stories related to the places she visits. Our guide tries to emulate a real guide's behaviour in such a situation. In particular, she behaves as a spontaneous real guide who knows stories about the places in the virtual world but has not prepared an exhaustive tour nor a storyline.

Furthermore, our guide tells stories from her own perspective, that is, she narrates historical facts and events taking into account her own interests and roles. In fact, she extends the stories she tells with comments that show her own point of view. This mixture of neutral information and personal comments is what we can expect from a real guide who, on the one hand, has to tell the information he has learnt, but on the other hand, cannot hide his feelings, opinions, etc about the information he is telling. We have designed a hybrid algorithm that models a virtual guide behaviour taking into account all the aspects described above. The mechanisms involved in the algorithm can be separated in three global processes which are carried out with every step. The next three subsections describe these general phases. For a more detailed description of the processes and information involved see [5].

3.1 Finding a Spot in the Guide's Memory

Given a particular step in the navigation-storytelling process (that is, the virtual guide is at a particular location and she has previously narrated a series of story pieces), the guide should decide where to go and what to tell there. To emulate a real guide's behaviour, the virtual guide evaluates every candidate pair (story element, location) taking into account three different factors: the distance from the current location to location, the already told story elements at the current moment and the affinity between story element and the guide's profile.

A real guide will usually prefer nearer locations, as further away locations involve long displacements which lead to unnatural and boring delays among the narrated story elements. In this sense, our guide prefers nearer locations too, and therefore shorter displacements. When a real guide is telling stories in an improvisational way, the already narrated story elements make him recall, by association, related story elements. In a spontaneous way, a real guide tends to tell these recently remembered stories. In this sense, our guide prefers story elements related (metaphorically remembered) to the ones previously narrated. Finally, a real guide tends to tell stories related to his own interests (hobbies, preferences, etc) or roles (gender, job, religion, etc). In this sense, our guide prefers story elements related to her own profile.

The system evaluates every candidate pair (storyelement, location) such that there is an entry in the knowledge base that relates storyelement to location (note that this means that storyelement can be narrated in location) and such that storyelement has not been narrated yet. In particular three scores corresponding to the previously commented factors are calculated. These three scores are

then combined to calculate an overall score for every candidate pair. Finally the system chooses the pair with the highest overall score value.

3.2 Extending and Contextualising the Information

Figure 1a represents a part of the general memory the guide uses. This memory contains story elements that are interconnected with one another in terms of different relations. In particular, in our case, cause-effect and subject-object relations interconnect the story elements. Figure 1b shows the same part of the memory, where a story element has been selected by obtaining the best overall score described in the previous section. If the granularity provided by the selected story element is not considered to be large enough to generate a little story, then more story elements are selected. The additional story elements are chosen according to a particular criteria or a combination of several criteria (cause-effect and subject-object in our case). This process can be considered as navigating the memory from the original story element. Figure 1c shows the same part of the memory, where three additional story elements have been selected by navigating from the original story element.

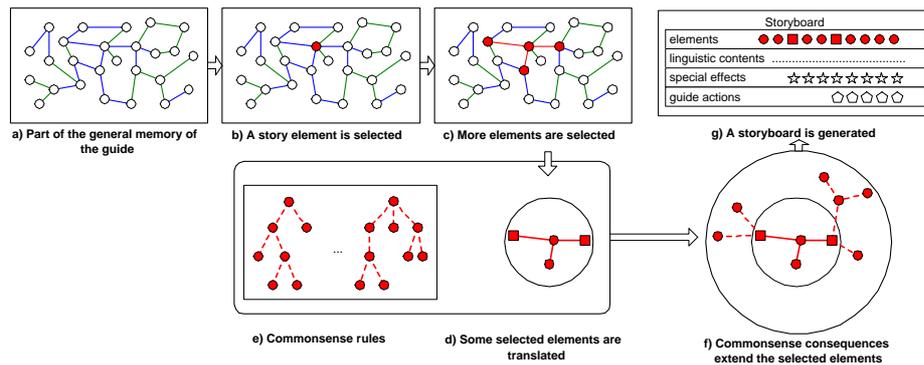


Fig. 1. Storyboard construction

Once the granularity provided by the selected story elements is considered to be large enough, the selected story elements are translated, if possible, from the virtual guide perspective (see figure 1d). For this task the system takes into account the guide profile and the meta-rules stored in the knowledge base that are intended to situate the guide perspective. The translation process also generates guide attitudes that reflect the emotional impact that these story elements cause her.

In addition, the new translated story elements are enhanced by means of new information items generated by inferring simple commonsense rules allowing to add some comments showing her perspective. The guide uses the new

contextualised story elements (figure 1d) as input for the rules that codify commonsense (figure 1e). By inferring these rules the guide obtains consequences that are added to the contextualised story elements (figure 1f), obtaining a new data structure which codifies the information that should be told.

3.3 Generating the Story

As a result of the previous processes, the guide obtains a set of inter-related information items to tell (figure 1f). These elements are stored as a structure that reflects the relations among them, as well as the reasons why each one was selected. Some elements are also related to particular guide attitudes. Now the system generates the text to tell (expressing these elements) as well as special effects and guide's actions to show while telling the story. The phases of this story generation process are as follows:

1. The first step is to order the data elements. To do so we consider three criteria: *cause-effect* (if an element Y was caused by another element X, then X should precede Y), *subject-object* (the elements whose subject/object are similar should be grouped together) and *classic climax* (the first selected story element, i.e. the one that obtained the best overall score, is supposed to be the climax of the narration, and therefore all the rest of the elements are arranged taking it into account).
2. The text corresponding to the ordered set of elements is generated. The complexity of this process depends on the particular generation mechanism (we use a template system) and the degree of granularity employed (we use a sentence per every story element).
3. A process that relies on the guide expression rules (the set of rules that translate abstract guide's attitudes in particular guide's actions) generates a set of guide actions (each one related to a particular story element).
4. Every story element is associated to particular environment conditions or special effects. Thus, finally, a storyboard like the one shown in figure 1g is obtained.

4 Implementation

We have chosen Unreal Tournament (UT) engine as the platform on which our virtual worlds run. As we wished our system to be open and portable, we decided to use Gamebots to connect our virtual guide to UT. Gamebots [6] is a modification to UT that allows characters in the game to be controlled via network sockets connected to other programs. The core of the virtual guide is a Java application which is able to connect to UT worlds through Gamebots. This Java application controls the movement and animations of the guide in the world as well as the presentation of special effects and texts which show the generated narratives. The current version uses a MySQL [2] database to store the knowledge base. The Java application accesses these data through JDBC. The developed system uses Jess [1] to carry out inferences on the information.

The described system has been developed and it works properly with small and medium knowledge bases. We still have to check how the system behaves when dealing with large knowledge bases.

5 Scenario

In order to evaluate the system we have defined a simple scenario. It is a home (see figure 2) inhabited by part of a family: father, mother, son and daughter. In addition, another son and another daughter live on their own. You visit the house invited by one of the latter children.

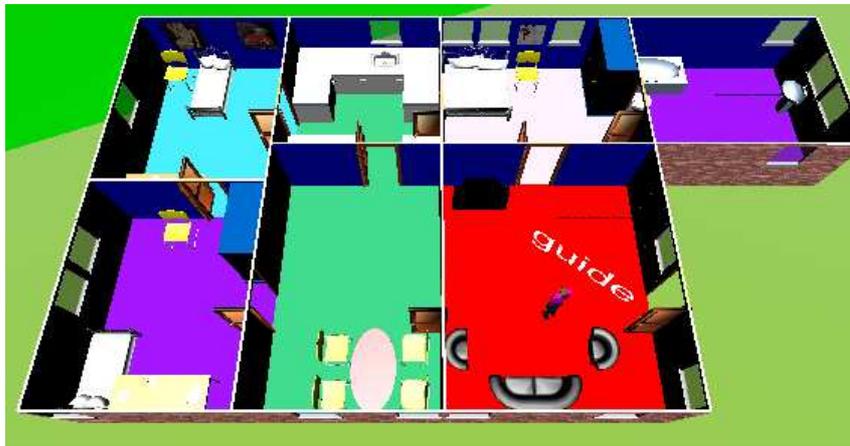


Fig. 2. Snapshot of the scenario with the virtual guide

The house is populated by objects which are associated with memories related to the members of the family. In principle all of the children are supposed to have almost the same shared memories. However, each child has a well-defined profile, different from these of her brothers and sisters.

This is the first time you visit the place, therefore your host shows you the house while speaks to you about its objects and inhabitants from her own perspective.

5.1 Performance

In this section we show the performance of two guides with different profile. We only can show the text the guides tell, though in addition they show their emotional state through animations.

The first performance corresponds to the son, who has the following profile: male, non-romantic and Manchester United supporter. We show the performance indicating the sentences the guide tells in each room of the house.

- [**Salon**] If you come in here in the afternoon you'll see my mother sewing on the sofa. My father and brother usually watch football games on tv. My sister watches love movies on tv when she has a while. How cheesy!! When my parents are off, my brother usually has affairs with girls on this sofa.
- [**Dinning room**] My mother and sister sit usually around this table to talk about neighbours and celebrities. You know, two or more women together... gossip!
- [**Sister's bedroom**] My sister's wardrobe is not only big, but full. Typical!!
- [**Brother's bedroom**] My brother has this page three girl poster on the wall since he was fourteen. This poster shows that my brother is a Man United supporter. The best team on earth, of course.
- [**Kitchen**] My mother spends several hours every day cooking for the family in the kitchen.
- [**Parent's bedroom**] This is my parent's wedding picture. My parents say they are very much in love and after so many years they still kiss each other every day in a lovely way. Love... is so boring, I can't understand how people... My parents' wardrobe contains mainly my mother's dresses. The importance of the look!
- [**Bathroom**] You can easily find my mother and sister in the bathroom at any time, either making them up or combing their hair. Women are so worried about their appearance...

The second performance corresponds to the daughter who has the following profile: female and romantic.

- [**Salon**] If you come in here in the afternoon you'll see my mother sewing on the sofa. Women slave away by sewing! My father and brother usually watch football games on tv. My sister watches love movies on tv when she has a while. Mmmm-mmm...aaaahhhh... love is really beautiful. When my parents are off, my brother usually has affairs with girls on this sofa. Anyway... only love can make you happy.
- [**Dinning room**] My mother and sister sit usually around this table to talk about neighbours and celebrities.
- [**Sister's bedroom**] My sisters wardrobe is not only big, but full.
- [**Brother's bedroom**] My brother has this page three girl poster on the wall since he was fourteen. You know, men are pigs! This poster shows that my brother is a Man United supporter.
- [**Kitchen**] My mother spends several hours every day cooking for the family in the kitchen. It is always the same story, women sacrificing themselves for the family!
- [**Parent's bedroom**] This is my parent's wedding picture. My parents say they are very much in love and after so many years they still kiss each other every day in a lovely way. Ah... love, love! My parents' wardrobe contains mainly my mother's dresses.
- [**Bathroom**] You can easily find my mother and sister in the bathroom at any time, either making them up or combing their hair.

6 Conclusions and Future Work

In this paper we have described an intelligent guide with attitude, who tells stories in a virtual heritage environment from her distinct point of view. This application requires story-telling rather than any other type of narrative, and must link the memory and interests of the guide to her spatial location so that

her stories are relevant to what can be immediately seen. We do not at this stage incorporate user interaction, as this poses a number of new problems and in any case has been more widely studied.

Our generic architecture means that such a guide can be ported to other virtual models, though one should not underestimate the amount of content that has to be created for a particular site. We believe that the growing popularity of virtual heritage produces a growing need for intelligent guides and that this work will therefore find many potential applications.

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