

PastMaster@Storytelling: A Controlled Interface for Interactive Drama

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ABSTRACT

In this paper, we describe a controlled interface for Interactive Drama, *PastMaster@Storytelling*. *PastMaster* is used for interacting with an Interactive Drama engine. The paper discusses the test results regarding the usability of the interface.

Categories and Subject Descriptors

H.5.4 [Information Interfaces and Presentation]: Hypertext/Hypermedia – Navigation, User issues. I.2 [Artificial Intelligence]: *games*.

General Terms

Design, Human Factors.

Keywords

Interactive Drama, Interactive Narrative, Interaction History, Adaptive Interfaces, Usability Study.

1. INTERACTIVE DRAMA

Interactive Drama (ID) is an experience, where the audience acts as a character by making decisions on each character's action in a story. It has become an active and challenging research area involving various branches in humanities and computer sciences.

A prototype has been developed by the authors which allows the user to play a main character in a story by choosing his action [5]. For example, the user can transmit information to other characters, influence them, etc. The narrative engine calculates the actions of non player characters, according to narrative constraints. In the version discussed here actions are textually displayed via a template-based language generation system. Chosen actions for a specific character that the user is controlling are the inputs to the system.

The visible difference between ID and other forms of interactive narrative (hypertext, adventure games, etc.) is the number of narrative actions that the user can undertake. In an adventure video game for example, only a few actions have a significant effect on the story (usually, only one action makes the story go forward, others are “fails”). In our system, through the combination of types of action and parameters, the user ends with dozens of actions to choose from. Having them choose from a mere list is not acceptable, in terms of cognitive load. We denote this usability problem the *Choice Problem* [6]. The “Choice Problem” can be seen as the other side of the coin of agency in ID. Agency requires freedom and freedom means a lot of choices.

2. EXISTING APPROACHES

In the field of Interactive Drama there are two main groups of solutions to allow the user to select an action [6].

In free interfaces, the user interacts with the system by using natural language, via speech or typed text [3]. Free interfaces enable the user to naturally dialog with other characters, with a transparent interface. However it is technically not achievable to fully understand natural speech or text. Furthermore, the narrative engine itself can only interpret a limited number of user's actions. The free interface concept creates false expectations, which must be “solved” by avoiding to interpret the user's sentence.

In controlled interfaces, the user can choose explicitly among a set of actions which contains not more and not less than the total number of available actions, as calculated by the narrative engine. Despite the problems of controlled interfaces (e.g. the risk of a too overwhelming interface detrimental to immersion), this paper suggests an innovative interface of this kind. Three types of controlled interfaces are used in games and ID:

- Selection in a list. The obvious and simplest way to provide a set of actions is to organize them within a choice list. However, when the number of choices exceeds a certain size (typically seven), the classical problem of cognitive overload becomes an issue, considering the short term memory limits of human information processing.
- Sentence building. It consists of following the syntactical structure of each dialog action. An action is built as a sentence, starting with the subject the verbs and the various complements (see the research project *WYSIWYM* [7], the ID project *Erasmatron* [1] and the PC game *Sentient*). The sentence-based interfaces allow the construction of structured action of arbitrary complexity. However they are difficult to use, especially in a game context. The number of clicks or keystrokes is also high.
- Object-based menus. Another way to construct a large set of actions is based on the objects that those actions manipulate. For example, to listen to the radio, the user clicks on the radio and a contextual menu pops up to provide various alternatives, including “listen to” (see for example the game *THE SIMS*). This approach supports the feeling of immersion, but is not suited to dialog acts, which are too complex and involve objects that are not present in the current scene.

Object-based menus are adaptive. The list of actions presented from a given object varies according to the current context. This principle is reused in our approach.

3. PastMaster APPROACH

3.1 Outline

The originality of *PastMaster@Storytelling* is to use the temporal recording of the previously actions as a key element for the organization of the set of possible actions.

PastMaster@Storytelling presents the list of all events that has been executed and displayed so far by the user and the system, from the beginning of the play to the present time.

Making past events accessible in a text form allows the user to click on *pieces of texts* to trigger a list of choices for future actions related to the selected text.

For example, suppose that the action "You inform Mary that you want to steal the key from Bob" has been executed previously. By selecting the text "you want to steal the key from Bob", all possible actions involving this text will be proposed, for example "inform Ann that you want to steal the key from Bob" (see Fig. 1).

PastMaster can be considered as a two level hierarchical menu, which is adaptive in two ways:

- The list of events in *PastMaster* is always growing. This offers more and more selectable texts to the user.
- Following a given piece of text selected by the user, the list of proposed actions depends on the context.

In addition, to limit the number of choices provided at the second level, the user chooses who s/he is interacting with, using a choice list (see Figure 1). The detail of the adaptation mechanisms are provided in Section 3.4.



Figure 1. The user is talking to Rak about Malcolm.

3.2 Advantages and limitations

First, the interaction occurs on a module which is naturally integrated within the ID. A play history, interactive or not, is a useful feature in ID. Many video games use it.

Second, many actions in a narrative refer to what happened just before. For example, in an object-based interface, to answer the question "Do you have the key?", the user would need to find the key in the list of existing objects and then select the appropriate answer. In *PastMaster*, the word "key" has just been pronounced, and is immediately available.

Third, this approach promotes a "narrative way of thinking". Instead of reasoning in terms of goals and states, the user tends to reason in terms of events, i.e. in terms of transformations.

There are two limitations with *PastMaster* approach.

The first limitation is that the breakdown of actions is limited to two levels. While the sentence-based approach can deal with an arbitrary hierarchical complexity of sentences (at the cost of additional clicks), *PastMaster* approach might not solve the Choice Problem in case of very large sets of possible actions.

The second limitation is that the first level of the dynamic navigation system will be large. After a while, the user might find it hard to find a precise event in the past.

3.3 Related approaches

In the general field of HCI, interaction histories has been used and investigated for a long time as a support for the user. However, only a few systems use the interaction history as a tool for the user to enter some data or commands [2][4]. In most systems of this kind, the interaction history is used to redo or undo a sequence of commands.

Our approach differs from existing systems on three points:

- The interface history is used as the "one and only" access point to the various commands in the system, which are not limited to undo/redo commands.
- The interface is adaptive: the set of proposed action from a given item in the interaction history is changing in time, according to the context.
- Interaction occurs *within* each temporal event in the interaction history. This means that the contextual menus are not based on the whole temporal event, but on subparts of this temporal event, that is pieces of text.

3.4 The contextual adaptation

The matching is done automatically by exploiting the logical form of actions which serves as a basis for the generation of text description of actions. Indeed, an action is represented through a predicate form, for example:

Inform(Mary,John, want(Bob,steal,(key,Allan)))

Inside a given action, the elements which the user can select are:

- simple entities such as characters, objects, places, goals, tasks, obstacles
- facts, that are predicates describing the states of characters and objects, such as *want*, *know*, *have-finished*, etc.

The list of possible actions is changing continuously, and the link between the selectable areas and the actions are recalculated at each turn. The following rule is used:

IF a possible action

- (1) contains the element corresponding to a selectable area
- (2) is addressed to the specified addressee, *OR* is a performance, *OR* is addressed to nobody and no addressee is selected

THEN the selectable area is linked to this action.

Note that in the beginning of the narrative there are no past cases of actions executed. To cope with this problem, *PastMaster* is initialized with a clickable back-story.

Interacting with the play history requires being able to select parts of texts, as specified above. The ergonomical difficulty lies in the fact that those parts of texts are possibly embedded in each other.

To make it possible to the user to select the proper zones the following design principles have been taken:

- When a text is rolled over by the cursor the corresponding area gets highlighted (both underlined and italicized)
- When the cursor is in a zone belonging to more than one logical element (embedded elements), only the smallest one is highlighted.
- A click on the highlighted zone triggers the associated list of possible actions.

The list of possible actions is displayed in an overlapping semi-transparent window (see Figure 1).

4. PRELIMINARY EVALUATION

4.1 Goal of the evaluation

The type of interface that is proposed in this paper is a novel approach, both in video games and HCI in general. A preliminary evaluation was needed in order to assess the following issues:

- The global usability of the interface: Do users get blocked at some point, because they do not know how to proceed in the story?
- The cognitive processes: do users would have something to execute in mind prior to the interaction and they use the interface to execute this action or whether they explore the interface in order to see possibilities.

4.2 Protocol

The pilot experiments comprise three phases: (1) Introduction, explanation of the principle of ID and explanation of the user interface (10 min.); (2) Interaction with the system (10 min.); (3) Debriefing and filling out a questionnaire (10 min.).

Four subjects were recruited, two males and two females. None of them was a "gamer", but all were computer literate.

4.3 Results

All subjects managed to interact with Interactive Drama Engine via *PastMaster* for 10 minutes. The rounded average of user actions (or turns) was 18.

According to observation of the interaction, no subject has been lost in navigation by the complexity of the interface. In the questionnaire, all subjects agreed (two strongly agreed and the other two agreed within five choices from strongly agree to strongly disagree) that the interface was easy to use. Both observation and analysis of the questionnaire indicate that subjects quickly understood how to navigate (in less than five turns).

However, when asked more precisely if it was easy to choose an action, results were less positive. Only one subject found it very easy. One subject found it hard.

Regarding the thought of a specific action in mind to execute prior to interacting with the interface, two subjects answered "sometimes", two "seldom". The subjects were most of the time exploring the interface to find actions to play, rather than the other way around.

One of the subjects was spontaneously talking aloud, providing additional information. Some talks confirmed that the subject was sometimes thinking of an action beforehand. In other cases, the subject had an idea of action in mind but this action did not fit exactly with the framework used by the narrative engine.

Analysis of open ended questions revealed that some subjects relied on the engine to provide some interesting happenings and they were disappointed. Typically, one subject would repeat the

same action, which led to an obstacle every time, hoping that the result would be different next time; the subject then complained to be in a loop. Similarly another subject did repeat the same actions several times and then explained that s/he "was expecting something different to happen".

4.4 Discussion

These preliminary tests suggest that accessing actions via an adaptive menu based on the past events in the narrative is a reasonable option for users.

It is difficult however to access the relevant past actions in the history. The fact that in the current interface, those actions are displayed in a flat manner leaves plenty of room for improvement. Several ways of structuring the list of actions can be suggested: temporal clustering (by scenes, days), relevance-based marking, content-based access, etc.

Infrequently users were thinking an action prior to interaction. This is not that surprising, because the subjects were not told about the range of actions handled by the narrative engine. Progressive explanations of the range of possible actions may form a way of improvement (for example, it is possible to inform any other character about what one knows).

5. CONCLUSION

In the context of Interactive Drama, *PastMaster*, a new Graphical User Interface has been proposed based on the interaction history. *PastMaster* aims at solving the issue of having a large number of choices proposed to the user. *PastMaster* is a context-adaptive hierarchical menu which enables a large number of actions with a less overwhelming interface.

Preliminary tests show that the principles of this kind of interface are well accepted by the user. However, in its current stage, *PastMaster* must be improved to make the retrieval of past actions in the history easier.

6. ACKNOWLEDGEMENT

This research is supported by an *Australian Research Council Linkage International Fellowship Grant (#LX560117)*.

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