A New Approach to Interactive Drama: From Intelligent Characters to an Intelligent Virtual Narrator

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Abstract

The limits of current forms of interactive drama have been now clearly identified:

- interactive character based stories are poorly interactive, the plot remaining nearly linear;
- interactive virtual worlds are poorly dramatic, with no plot at all;
- the role of the user is confuse.

This paper will give guidelines on how those problems should be tackled, by putting Artificial Intelligence (AI) in the right place, within an interactive drama system. Our research aims, in the long term, at building deeply interactive drama, with advanced models of narration.

Goal of this research

We aims at building a new genre of artistic expression, called interactive drama. An interactive drama is a drama (a narrative where the story is told by directly showing actions to the audience) where audience can act upon some events in the story. In this research, we are especially interested in the interactive drama where the user acts as a character within the story.

Interactive drama should combine the strong emotional involvement and identification of classical drama (movie, theatre) with the feeling of immersion proper to interactive experience (video games, virtual worlds).

It is admitted that current forms of interactive drama are clearly limited (Stern 1998, Szilas 1999). The existing interactive dramas usually fall into one of the two following drawback:

- either the drama is not really interactive, in the sense that the plot itself remains mostly linear,
- or the interactive system is not really dramatic, consisting of simulated worlds rather than stories

Why is it so difficult to build truly interactive drama?

First, most known and theorized forms of drama are typically non interactive. Bringing interactivity to theatre or movie deeply modifies the essence of these artistic forms, and it is difficult to transfer our knowledge on movie and theatre to interactive experience.

Second, existing forms of interactive narrative, like face to face storytelling, are very different from what interactive drama on a computer could be.

Third, the role of the user, evolving from a "being told" status to an "interactive with" status has not been clearly identified (Portugal 1999, Szilas 1999): how the whole drama could be consistent if the way the author designs his/her characters differs from the way the user behaves with the same characters, by controlling one of the characters?

Thus, interactive drama is a completely new challenge. A new art is emerging, as movie was emerging one hundred years ago, and we are in the early stage consisting in inventing the tools necessary to design interactive drama. The precise goal of our research is to build such tools, as well as related design methods (scripting for interactive pieces).

In the following section, we will describe the basis of the system we are currently building. Our previous paper (Szilas 1999) gives more details on the system. Then, the next two sections concern new findings proper to this paper:

- how the intelligence of a virtual narrator should almost replace the intelligence of characters,
- why adaptive narration is necessary to build effective interactive drama and how to implement this feature.

Overview of the architecture and its foundations

Drama is a copy of life. Therefore, first attempts to build interactive drama naturally consisted in modeling life, that is putting lifelike behaviors inside characters: logical reasoning, reactivity, affective behavior.

This approach has two majors drawbacks:

- it is quite difficult to model life, both theoretically and technically,

- drama is a copy of life, but it is not a completely realistic copy: actions in drama just need to be plausible, as already stated by Aristotle. According to a cognitive view of drama, what really matters is what the user is perceiving and understanding from the course of actions in the drama, and how an author makes this understanding happen.

Focusing on the logic of characters only, that is on the explicit and implicit rules that govern their behavior from a psychological point of view would lead to quite boring drama. User would see very realistic characters, behaving like real people in their everyday life, and that is all: no drama, no plot, no tension, etc.

Several works have tackled this issue.

In (Senger 1998), it is shown that character animation should be user oriented rather than only character oriented. This is a major step in interactive drama: the psychology of character becomes less important than the effect produced on the user by this psychology.

At a higher level, that is at the level of action decision, the logic of characters is associated to a drama manager (Kelso *et al.* 1992), in charge of controlling the dramatic interest of the story.

Such a drama manager usually serves as a corrective module to a character based approach and lacks theoretical foundation. It is also not clearly described how such manager works or should work.

As clearly explained in (Mateas and Stern 2000), combining the drama manager with the logic of characters is not really feasible: the drama manager intervenes punctually in the action decision process, while it should be much more present, what is technically not possible.

We thus proposed in (Szilas 1999) a computer model of interactive drama where a Narrative Logic replaces a logic of characters. The idea is to model a drama as a dynamic system where generative rules are based on narration principles rather than psychological mechanisms.

The Narrative Logic has been inspired by Propp's functions (Propp 1928), Bremond's process (Bremond 1974) and in a lesser extent Todorov's transformations (Todorov 1970). These authors have build logical systems which model stories and describe how successive actions are structured in a typical story.

One of the rules in the Narrative Logic is, for example: if a character has been incited to perform a task (steal something to somebody), he or she can accept or refuse to perform this action (see (Szilas 1999) for details).

At a first glance, a narrative rule looks like a psychological rule; the difference lies in the following:

- being inspired from existing narrative theories, predicates in narrative rules concern only significant actions, from a narrative perspective. In other words, characters behaviors that do not mean something in the narrative are naturally filtered out.
- narrative rules tell that an action is possible while psychological rules tells which action a character will perform: two narrative rules could propose contradictory actions, and which one is finally performed is decided in a further stage, according to a global perspective.
- the Narrative Logic does not take into account any psychological features of characters; such features are managed in a second stage, by a module called the "Virtual Narrator", as it will be discussed in the next section.

Figure 1 shows the global architecture of the system. The *Narrative Logic* provides all the actions that are logically possible to the virtual narrator, given the *World of the Story*, that is the virtual world implied by the story co-constructed by the user. All the possible actions are then examined by the *Virtual Narrator*, and evaluated according to the *User Model*, that is the model of what the user knows from the story at the current time. The most interesting action or set of actions (in case of a multiple choice given to the user) is then sent to the *theatre*, in charge of putting in stage the action and the interaction with the user.

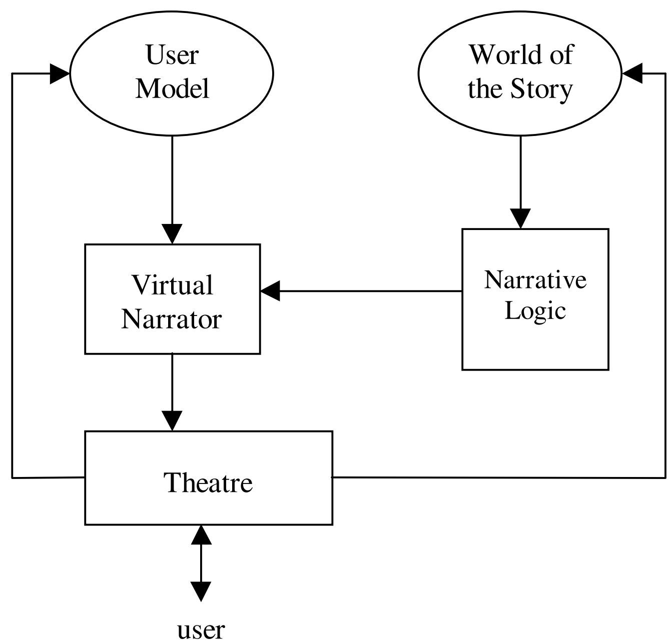

Figure1: general architecture of the system.

A virtual narrator

The Virtual Narrator acts as a filter between the Narrative Logic and the Theatre. It chooses, among all possible actions, which ones are worth being displayed to the user. Thus, it is the central piece of the whole system.

The main feature of the Virtual Narrator is that it is only guided by a narrative point of view: it aims at providing "storiness" and maintaining interest dynamically, according to the current story partially shaped by the user.

For that purpose, the virtual narrator uses narrative criteria for evaluating each action. We propose eight narrative criteria:
Consistency: an action is more or less consistent to the user's knowledge about the characters in the story.
Conflict: an action carry an amount of conflict if it makes the character torn between his/her need to reach the goal and his/her values
Surprise: the degree of surprise carried out by an action.
Expectation: is an action raising new questions or in the contrary is it solving existing intrigues (See (Bailey 1999) for a detailed treatment of expectations).
Progression: how much the action makes the intrigue evolve, rather than stagnate.
Demonstrativeness: how much an action illustrates character features to the user
Impressiveness : up to what point an action is spectacular.
Space continuity: an action takes place more or less close to the location of the previous action(s).

Some of these criteria are to be followed during all the drama, while others are important in certain periods. For example, it is expected that most actions are consistent, but in no way it is required to provide surprising or impressive actions exclusively. Also note that all criteria do not have the same importance.

Each of those criteria can be determined through a formula. We will not give here all the details of the used formulae, but we give two examples on how it works:

The *consistency* of an action *A* ("accept to steal a jewel to Mary") performed by a character C (John) is calculated according to the following elements:

- an a priori evaluation of the task ("steal") involved by the action, according to different *values* ("courage", "honor", "honesty", etc),
- the attachment of C to each value, as it is known by the user,
- the type of action ("accept", "refuse", "incite", "dissuade", "perform", etc.).

The *conflict* of an action is evaluated according to the two following elements:

- up to what point the action is necessary to achieve the goal,
- how negative is the action evaluated according to the character values

Being able to evaluate each action according to the eight narrative criteria, the Virtual Narrator has to choose one or several actions. It then refers to a *narrative heuristic* (similar to the abstract storiness heuristics described in (Bailey 1999)), which says at each stage of the narrative what kind of action must be performed. For example, at the beginning, demonstrative actions are necessary, while later in the drama, surprising actions might be better, in order to keep user's involvement. This heuristic describes the structure of the drama at a very high level, and guarantees the quality of the interactive drama. It can be programmed by looking at classical theories of drama, like the three act structure for example.
Interestingly, this heuristic could be linear, as a succession of sets of desired values for narrative criteria. But this linearity does not concern the actions themselves, but the high level effects a drama must produce towards a user.

The Virtual Narrator is thus able to manage the course of actions in the interactive drama, by focusing on the effect to the user rather than the behavior of the characters.

The criteria listed above do not yet constitute a complete set of narrative criteria. This is our first attempt to model the narrative effects produced by the drama, and it will be certainly refined in the future. Note also that even if some criteria will be maintained, the precise way to calculate the value of the criteria is subject to change.
We would like to discuss one particular criterion, the consistency. Consistency seems very close to a pure character based approach: actions must be chosen according to the features of the character performing the action. Two major differences should be however noted:

- Consistency is one of eight narrative criteria. The seven other criteria will balance the rule of consistency for a more interesting dramatic experience. Thus, character based drama can be seen as a special case of interactive drama, where only one narrative criterion is taken into account.
- the fact that a character is attached to a value is not stored as a feature of the character in *World of the Story*, but in the *User Model*. Thus, the consistency is established according to what the user has seen and done rather than according to an internal model of a character. Furthermore, adptativity, as described in the next section, makes consistency still more user oriented than the behavior based approach.

Adaptive narration

A system is said to be adaptive when some of its internal variables are durably modified according to the interaction with the environment. We will show below why it is necessary for an interactive drama system to be adaptive.
There are fundamental issues related to interactive drama, whatever the approach:

- How the intention of the author could be reached if the user can act deeply on the course of events? The succession of actions and events in a drama is a subtle equilibrium, which can be easily destabilized by the actions chosen by the user.
- How protagonist's behavior dictated by the user could be consistent with the personality thought by the author, if user and author happen to have different values and point of views? All characters in a fiction, and especially the hero, are carefully designed by the author. What happens if the hero is then controlled by

the user? The user would certainly act in a way that is not consistent with actions dictated by the author. Such a non consistent character prevents from identification, and thus makes the drama uninteresting.

There are currently two known ways to tackle the problem:

- The protagonist adapts to the user: if user behavior for the protagonist differs from the behavior initially chosen by the author, then learning techniques allow to adapt the protagonist model accordingly. After a training period, the user and the protagonist act in the same direction.
- The user adapts to the protagonist: the user does not completely control his or her protagonist, who has its own autonomy. If the user acts in a non consistent way, the protagonist refuse to execute ("no no, it is not a good idea") or if the user does not choose the action suited to the protagonist, then the protagonist performs it anyway ("sorry, I could not help…"). Progressively, user understands which actions the protagonist accepts without resistance, and plays accordingly.

None of these two solutions is satisfactory. User adaptation is frustrating in a context of interactive drama, and tuning the degree of autonomy is difficult. Protagonist adaptation puts the drama equilibrium in danger: for example, if the hero is shy and his challenge is to seduce his neighbor, suppressing his shyness makes the story not interesting anymore.

The solution we propose looks like the protagonist adaptation but it extends the adaptivity to a much wider range of application. We suggest indeed that for the main characters, *values are not attached to characters at the beginning of the story*. The attachment will happen according to the events that occur in the story, and in particular according to the actions performed by the user.

Let us give an examples. If a user, among different possible actions, systematically chooses the only actions which are not badly evaluated according to the "honesty" value, then the system progressively stores in the user model that the protagonist is considered as honest. Then, later in the story:

- the consistency criterion will promote honest actions;
- the conflict criterion will push actions creating conflict like "Mike incites John to lie in order to seduce Mary", John being the user controlled character;
- the surprise criterion will push actions like "John steals a jewel to Daisy", but user will discover later reasons why John behaved like that;
- etc.

So, at the beginning of the story, we let characters as a blank page, so that the story structure itself according to the user choices. This gives the system enough possibility to keep dramatic intensity whatever the user does, while preserving large freedom of action for the user.

Note that the attachment of characters to values also adapt according to actions chosen by the system itself: characters other than the protagonist constitute themselves dynamically, always to satisfy the narrative heuristic and to improve user experience.

The fact that the characters are not specified at the beginning of the story is greatly disturbing for an author, who is used to shape his or her characters very precisely in order to get an interesting drama. In interactive drama, the author would intervene at a higher level, by specifying:

- what are the values around which the narrative is articulated;
- which actions will be related to these values, negatively or positively;
- which goals the characters in general may have to reach.

We hope that authors will manage to express creativity by such indirect writing.

Conclusion

The work presented here makes a solid new basis for building some interactive drama, with a strong focus on the user and the narrative component of such experience.

By manipulating narrative criteria rather than psychological features, and by making character's values adaptive, we hope to solve difficult limitations of current known forms of interactive drama. In the same time, we push towards a new way of writing, and the challenge will be to verify whether it is effectively possible for a writer to create a drama at a higher level, without specifying the personality of each character.

We remained at a theoretical level in this paper, because we felt that interactive drama needed new foundations. We are currently building a system in Java, with the architecture depicted in figure 1. The World of the Story and the Narrative Logic have been already implemented, while the Virtual Narrator and the Theatre are coded in their simplistic form.

AI is used for organizing possible action in time (Narrative Logic), for selecting best actions (Virtual Narrator) and for adapting attachment of values to characters. In our quest of the narrative essence of interactive drama, we minimized the role of AI in characters themselves. AI in character is still necessary at the lower level, for managing emotional and reactive behavior. Thus, interactive drama future systems will certainly consist in rather complex architecture, where AI intervenes at many levels.

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