

DramaTour: Character-enacted Dramatized Presentations on Mobile Devices

Rossana Damiano^{†‡}, Vincenzo Lombardo^{†‡}, Fabrizio Nunnari^{†**} and Antonio Pizzo^{*‡}

[†]Dipartimento di Informatica, Università di Torino, [‡]CIRMA, Turin, Italy, ^{*}Dipartimento DAMS, Università di Torino, Turin, Italy, ^{**}Virtual Reality and Multimedia Park, Turin, Italy.
Emails: {rossana,vincenzo,nunnarif}@di.unito.it, antonio.pizzo@unito.it.

Abstract. This paper presents a novel methodology for creating information presentations based on a dramatization of the exposition. The methodology has been applied in the implementation of a virtual guide on a mobile device for an historical site.

On the one side, the author plots the presentation as the monologue of a character, who exhibits an engaging inner conflict; on the other side, the system architecture dynamically assembles the elementary units of the plot scripted by the author by implementing a dramatic tension between contrasting presentation styles.

1 Motivations

This paper proposes a novel methodology for information presentation systems, called *DramaTour*, that merges the use of storytelling techniques with the use of virtual characters. Characters are designed following the inspiration of the embodied conversational agents (ECA) paradigm [1] and the whole structure of the information presentation follows the interactive storytelling paradigm [2]. These two paradigms have significantly contributed, in the last decade, to the spreading of AI techniques in practical approaches to human-computer interaction (see [3–7]).

The working assumption of the DramaTour methodology is that information presentation is more effective if conveyed through a dramatic narration operated by virtual characters, who act in first person and share the user's present time and space, yielding a powerful effect of physical and emotional presence. Interactional and communicative strategies of the characters are explicitly driven by the notion of *drama*: the presentation delivered to the user features the inner tension and the sense of direction that are typical of dramatic performance.

In order to yield an effective computational model from the methodology and test the effectiveness of the approach, we implement the generation of the character behavior through the real-time assemblage of pre-defined audiovisual behavior units that respond to user input. Dramatization applies to both the production of dramatic elementary units (from scriptwriting to animation) and the editing operated by the system in delivering the content to the user.

The applicative domain in which we are currently testing this methodology consists of guided tours in historical sites, during which the visitor is accompanied by the dramatic character. In this paper, we describe a PDA-based version of the application.

2 System Architecture

The system architecture is based on a client-server schema, in which the client is a mobile device. The server has a modular structure: the handling of the interaction with the user is mapped onto the *interaction manager*; the content organization is mapped onto the *presentation manager*; the ultimate delivery to the user in a well-edited, audiovisual continuum is handled by the *delivery manager*. Details of the architecture are described in [8].

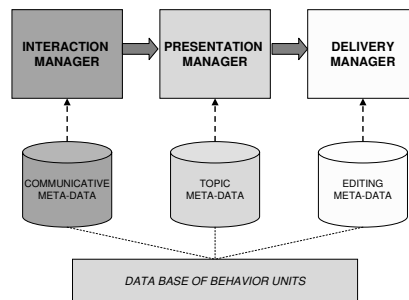


Fig. 1. The system architecture according to the DramaTour methodology

Behavior units constitute the knowledge base of the system. They contain multimedia content (an audiovisual clip with 3D animation and sound) and are tagged with the meta-data that the server uses to generate the interactional and presentational behavior of the character. The input to the server is given by the interaction history and the user input. The server responds to the input by generating a sequence of behavior units which is appropriate from a social and communicative point of view.

Communicative meta-data describe the communicative function accomplished by the unit. Although the main goal of the system is presentational, the artificial character who delivers the presentation must account for some basic interactional functions in order to qualify itself as a believable agent and thus promote the user engagement. So, each behavior unit must accomplish a well-specified communicative functions (social interaction, directive, phatic and presentation).

Topic meta-data contain the description of the informative content of the units, classified with respect to an ontological representation of the presentation domain. Topic description is necessary for the presentation module to shape a coherent selection and exposition of the content along one or more narrative lines.

Topic meta-data support a presentation strategy inspired by the focusing rules stated by Grosz and Sidner for task-related discourse [9]. Here, they have adapted to the presentation of a set of domain facts by mapping task decomposition relations onto topic-subtopic relations. Following sub-topic relations in an ontology according to the focusing heuristics corresponds to structuring the presentation along a certain modality of

presentation. In principle, several presentation modalities may be proposed for the same domain: for example, the facts about an historical site may be “described” according to a topological dimension or “narrated” following a chronological dimension. In order to enforce the dramatization principle incorporated in the methodology, the author must encode domain knowledge according to at least two different ontologies, that will serve the function of establishing a conflict between presentation modalities.

Editing meta-data contain the information needed for assembling the audiovisual clip with the adjacent ones by interposing an audiovisual segment (called a *Transition Unit*) between them, to obtain visual fluency [10]. The system incorporates a set of *editing rules*, which implement a number of editing techniques, e.g., graphic qualities (including framing, mise-en-scene, etc.) and spatial continuity.

In order to assist the authoring task, a web-based authoring interface has been created to edit the application data and tag them with meta-information.

3 An example application: Carletto

In line with the notion of drama formalized in [11], we see drama as the combination of two main features: the fact that drama displays action at present time and the fact that it enacts a relevant conflict related to an emotional-dramatic value concerning the characters. Drama moves toward the solution of this conflict, yielding the typical impression of movement, and does it through a sequence of elementary units, called beats [12].

The principle of first-person, present-time action must be enforced by the authoring of the behavior units in both discourse and other communicative modalities (like gestures and facial expression). The authoring process includes also the encoding of the meta-data information about the informative content (topic meta-data), the communicative functions of the behavior units (communicative meta-data), and their audio-visual properties (editing meta-data).

In our project, the conflict is between the role of an “audioguide” (who exposes facts orderly and plainly according to the topology of the location), and the desire to recount all the trivia and the anecdotes from an historical perspective (most of which see the character or his family personally involved). This substantiates an internal conflict of the character in order to gain the attentional and the emotional engagement of the users. Following the author guideline according to which the character itself must be carefully dramatized, Carletto engages in a continuous fight with the janitors, who would like to kick him out of the place.

The solution of conflicts yields a change within the character’s behavior. Hence the author is required to structure the content along at least two presentation modalities, i.e., to organize topics according to at least two different ontologies. For example, in the test application described below (a guide to a historical site), describing objects and narrating stories about the site are put in a dialectical opposition, in which the descriptive task of the character, as the visit progresses, leaves the way to an historical line of narration, thus realizing a shift of the character from “guide” to “storyteller”.

The author must also establish the rules that will govern the alternation between the presentation modalities as a consequence of the interaction with the user. These rules

must implement a meta-theatrical schema according to which user input along the interaction is interpreted as a positive or negative clue of user engagement and determines the presentational behavior of the character.

The test application of the methodology consists of an interactive guided tour and has been tested in a former residence of the Savoy family in Turin, Palazzo Chiabrese. The application is run on a mobile device; the input to the system consists of user localization through the use of wireless infrastructure and user commands through PDA buttons. The virtual guide is a teenage spider, "Carletto", whose family has inhabited the palace from ages. Carletto not only knows the history of the palace in detail, but knows a lot of funny anecdotes about the people who have lived there through the centuries, and is striving to tell them to the visitors.

The visit is structured along a topological dimension (corresponding to a topological ontology), according to which the palace is modeled as a set of rooms. The system starts by enforcing the greetings by Carletto, i.e., it plays audiovisual clips where Carletto welcomes the visitors and introduces himself. Then, Carletto starts talking about the room in which the visitor is currently situated. Each time the user enters a room, Carletto starts (or resumes) the presentation of the objects (furniture, artworks) in the room. The system proceeds by delivering about the 80% of the material related to each room. The idea of delivering the 80% of the whole material about each item along a certain ontological dimension pervades the whole architecture. For each subtopic of a room, the system delivers 80% of the material about the subtopic, and then performs a short digression along the historical ontology. For each return to a room, the system delivers 50% of the remaining material to be delivered: in this way, it sees to it that something relevant is left to be said about the room.

When all the subtopics of a room have been explored (with the rule of the 80% of the material) and the visitor remains in the same room for some time, we consider two cases. In case the system is still able to localize the visitor, it delivers some directional clips, that advise the visitor to proceed to some other room; in case of missing localization, Carletto switches to a historic presentation style for a while (corresponding to a chronological ontology), then gently starts inviting the user to regain the connection by moving. In both cases, if the user does not seem to react to the system, Carletto finally activates the phatic function, by playing funny games and gazing to the user from time to time. The system exits when the visitor has walked through more than half of the rooms of the visits and is near the exit door.

The current implementation is based on common hardware available on the consumer market and mostly on open-source software. The visit server is implemented in Java (<http://java.sun.com>), while the DBMS is MySQL (<http://www.mysql.com/>). The client runs on an ASUS A636 PDA (PocketPC series) and the video clips are encoded into Macromedia Shockwave Flash (<http://www.macromedia.com>). The PDA also supports a localization client, that identifies the room in which the user is currently situated.

The graphical interface of the PDA interface is very simple, since it includes only the window of the player, in which clips are shown to the visitor (see Figure 2). By using the PDA built-in buttons, the user can stop, suspend and resume the visit. In the bottom part of the screen, the visitor can read the current location identified by the localization system. This information is particularly relevant from the interactional point of view:



Fig. 2. The PDA for the guided tour.

since localization is only probabilistic, it may be incorrect from time to time. When the location is unknown, the player plays error clips in which Carletto invites the visitor to move to the center of the room and wait for the system to localize her/him.

The application has been tested from 6/4/2006 to 8/4/2006 in the historical site of Palazzo Chiabrese in Turin. Future work includes the analysis of the data gathered about the system behavior and the visitors' satisfaction, collected through interviews and written forms (about 250 users).

References

1. Cassell, J., Sullivan, J., Prevost, S., (eds.), E.C.: *Embodied Conversational Agents*. The MIT Press, Cambridge, Massachusetts (2000)
2. Mateas, M., Stern, A.: Integrating plot, character and natural language processing in the interactive drama faade. In: 1st International Conference on Technologies for Interactive Digital Storytelling and Entertainment TIDSE 03. (2003)
3. Gershon, N., Page, W.: What storytelling can do for information visualization. *Communications of the ACM* **44(8)** (2001) 31–37
4. Cavazza, M., Charles, F., Mead, S.: Interacting with virtual characters in interactive storytelling. In: *Proc. of the First Int. Joint Conf. on Autonomous Agents and Multiagent Systems*. (2002)
5. Stock, O., (eds.), M.Z.: *Multimodal Intelligent Information Presentation*. Springer (2005)
6. Nijholt, A., Heylen, D.: Multimodal communication in inhabited virtual environments. *International Journal of Speech Technology* (2002) 343–354
7. Poggi, I., Pelachaud, C., de Rosis, F., Carofiglio, V., Carolis, B.D.: Greta. a believable embodied conversational agent. *Multimodal Intelligent Information Presentation* (2005)
8. Damiano, R., Lombardo, V., Nunnari, F., Pizzo, A.: Dramatization meets information presentation. In: *Proceedings of ECAI 2006, Riva del Garda, Italy* (2006)
9. Grosz, B.J., Sidner, C.L.: Attention, intentions, and the structure of discourse. *Computational Linguistics* **12** (1986) 175–204
10. Biral, F., Lombardo, V., Damiano, R., Pizzo, A.: Cyrano goes to hollywood: a drama-based metaphor for information presentation. In: *AIMS 2003*. (2003) 17–24
11. Damiano, R., Lombardo, V., Pizzo, A.: Formal encoding of drama ontology. In: *LNCS 3805, Proc. of Virtual Storytelling 05*. (2005) 95–104
12. McKee, R.: *Story*. Harper Collins, New York (1997)