Design and Production of New Media Artworks

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ABSTRACT

New media artists today take advantage of, and are influenced by, the many possibilities offered by new digital technologies. They are very demanding users and a detailed examination of their practices and approaches will provide a better understanding of the usage of multimedia technologies. In this paper, we are interested in the design and creation of new media artworks. Through a concrete example, we present the different stages in the life cycle of an adaptive new media artwork and we identify the corresponding canonical processes.

Keywords

New Media Artwork, Design and Creation, Processes, Metadata.

1. INTRODUCTION

In their everyday work, media artists face the complexity and difficulties of multimedia art creation, installation, delivery and archiving. They are intensive and very demanding users of multimedia technologies, pushing pressure for integrated, flexible and easy-to-use software tools supporting the concepts they push and experiment in their artworks and installations. We believe that the needs they express today can be considered as the needs that will be expressed by tomorrow average users. We are convinced that a detailed examination of their practices and approaches will provide a better understanding of the usage of multimedia technologies. This concern also meets the observations recently made in the multimedia research community.

During the ACM Multimedia Special Interesting Group (SIGMM) Retreat held in late 2003[1], participants presented background on multimedia research as well as unifying themes, and then identified three Great Challenges that multimedia researchers should address: (1) "Make authoring complex multimedia titles as easy as using a word processor or drawing program"; (2) "Make interactions with remote people and environment nearly the same as interactions with local people

and environments" and (3) "Make capturing, storing, finding and using digital media an everyday occurrence in our computing environment" [11]. Challenges (1) and (3) are of particular interest in the context of this ACM Workshop on Multimedia for Human Communication - From Capture to Convey (MHC'05).

Concerning challenge (1), participants brought to the fore the necessity to develop approaches, algorithms and tools to reduce the effort required from average users to produce multimedia content. Even if commercial tools exist, they are usually dedicated to particular media and applications and their integration is still problematic. The participants to the retreat identified several topics that should be addressed by the multimedia research community. Among them, we believe that software abstractions are very important. Software abstractions are specifications (models) for software or application development and they should guide the user during multimedia content production, allowing him to focus on the conceptual perspective rather than the technical one. Software abstractions are essential to facilitate content and software reusing, running on different software and hardware platforms or producing different versions of the content. Concerning challenge (3), participants pointed out that, even if technologies allow capture and storage of large amount of digital media, the most important issue is to make it useful. Topics related to this challenge concern indexing and tagging multimedia data as well as searching and querying large multimedia datasets. Multimedia researchers should then work on approaches and fundamental algorithms to address these issues.

More recently, the Perspectives Workshop: "Multimedia Research - where do we need to go tomorrow", was held in Dagstuhl, Germany in March 2005 and organized by S. Boll, T.-S. Chua, N. Dimitrova and R. Jain [9]. The objective of this workshop was "to bring together leading researchers in the field to an open yet focused forum to formulate and consequently establish future research directions in multimedia". The challenges identified during the 2003 Retreat were identified as still valid and the participants to the Dagstuhl Seminar came to the conclusions that research directions should be driven by the needs of day-to-day users of multimedia technologies, leading to focus on users' working methodologies and processes, semantic of multimedia content and context-awareness. The participants all agree that working closely with day-to-day users of multimedia technologies is mandatory.

During the Dagstuhl workshop, a working group, entitled "Multimedia for Human Communication" and leaded by Lynda

Hardman, was set up. This group focused on how to model the human influence on the possible tasks in media creation, manipulation and organization, and identified the basic task primitives. The paper "Canonical Processes of Media Production" [3] is based on these discussions and clearly specifies processes and their input and output. In this paper, we illustrate these processes in the context of new media artwork design and production.

The rest of the paper is organized as follows. Section 2 introduces the context of our current research work. Section 3 presents the new media artwork we chose as a case study. In Section 4 we present the different stages in the life cycle of this artwork and we identify the corresponding canonical processes as given in [3]. Section 5 concludes and presents future work.

2. RESEARCH CONTEXT

Media arts, such as video art for example, have expanded significantly since early explorations with the transmission and reproduction of electronic moving image and sound. Creative video practices today take advantage of, and are influenced by, the many possibilities offered by new digital technologies [2, 5]. Contemporary practices take on a multiplicity of forms [10]. These include high definition, large screen pieces, multi-screen, multi-channel programs, interactive and adaptive installations, and web based streaming video works.

In this paper, we pay special attention to adaptive and interactive artworks, i.e. artworks that can modify their behaviour in response to changes in the state of the environment or the spectator. We are currently working on that topic in the framework of the research group: "New Forms of Narrative and Audio/Video Practice", being part of Hexagram, the Institute for Research/Creation in Media Arts and Technologies founded by Concordia University and Université du Québec à Montéal [4]. The artists and scientists of this group explore the relationships between video and the new technologies of producing and disseminating moving images and sounds. They research and develop new content and narrative forms of image and sound that exploit the possibilities offered by new technologies of reproduction, treatment and dissemination of video and sound. More specifically, B. Kerhervé and P. Landon have initiated a collaborative research project which aims at exploring the approaches, processes and software tools required to facilitate the design, creation and experimentation of new media artworks.

Through a concrete case study of visual adaptive artwork, we have proposed an adaptation framework that combines semantic and physical adaptation and which is supported by an adaptation engine. The adaptation framework has been validated through the implementation of a prototype of the adaptation engine. This prototype integrates the management of various types of metadata and allows a representation of adaptation scenarios in terms of the involved media objects, the events triggering the adaptation and the actions to be performed [7,8].

We are currently working to enhance this approach and to extend it to support the needs of other artists involved in the project: Jean Dubois, Chantal duPont and Mario Côté, whose practises consider interactive, online and audio artwork. Our objective is to propose generic solutions that will deserve their needs as well. We are currently defining a conceptual framework and an architectural framework for adaptive artwork design, creation and experimentation. Such a conceptual framework will integrate the different elements composing the adaptation models: media objects, relationships between objects, events and adaptation rules. In order to design this conceptual framework, and through an observation phase, computer scientists work with artists to understand the design and production processes of an adaptive artwork. The objective of this framework is to help artists in identifying the concepts relevant to adaptation and to guide them in the design of adaptive artworks. We also focus on the adaptation style of the artists in order to facilitate the reuse of some of the adaptation concepts. The conceptual framework should also help the artists to represent the adaptation model at a conceptual level, as independent as possible from implementation and technological constraints.

3. DESCRIPTION OF THE ADAPTIVE NEW MEDIA ARTWORK

The Man of the Crowd is an adaptive new media artwork produced and exhibited in 2003 and 2004 by Paul Landon, media artist ant researcher in the School of Visual and Media Arts at UQAM [5]. The artwork served as the case study in the collaborative research project presented in the previous section.

Landon explores the states of distraction and fascination the urban spectacle can inflict on the individual. ``The Man of the Crowd'' is an attempt at analysing and reconstructing the movements of a crowd. As the spectator enters a corridor, she sees four white screens. As she moves down the corridor, images appear on the screen. She sees the head and shoulders of a man walking past and she hears his footsteps. The same man appears on all the monitors at different intervals. The frequency of the man passing on the screens is increased as the movement of the spectators in the corridor increases.

This installation consists in four video monitors, the selection and diffusion of video sequences are adapted to the spectators' movements captured using a web camera. This installation has been produced as an application developed using the PureData graphical programming environment. The Pure Data application reads the spectators movements by way of the web camera and delivers compressed video and sound based on their position and movements.

4. PROCESSES FOR ADAPTIVE NEW MEDIA ARTWORKS

In this section, we analyze the design, production and exhibition of the The Man of the Crowd. We distinguish four different stages in the life cycle of this new media artwork:

Artwork design;

Media acquisition and production;

Artwork production;

Artwork exhibition.

We distinguish four different stages in the life cycle of this new media artwork and discuss these in terms of the processes identified in the [3]. Table 1. describes the dependencies between the four stages and the canonical processes.

4.1 Artwork design:
premeditate and message construction

At this stage, the artist specifies the different elements to be used to build a new media artwork. The intended message of the artwork can be expressed as follows: ``The adaptive artwork intends to reconstruct the movement of the crowd through the display of video clips that is simply adapted to the spectators' movements. This artwork should produce a passive, almost unconscious interactivity with the spectator''. This artistic message corresponds to the output of the message construction process. Note, actually the artistic message is not expressed explicitly.

Two different media captures are required: video sequences, to represent the movement of the crowd, and real-time video sequences to capture the spectators' movements. The result of the premeditate process is a set of decisions as to where to place the camera for monitoring the spectators and what type of crowd movement should be considered. The descriptions of these decisions are provided in form of notes, quite the same as the descriptions of the message, but those are not included in a system. Thus, no explicit annotations were created during the premeditation process.

4.2 Media acquisition and production:
capture, annotate and archive

Video sequences of the head and shoulders of a man walking past plus his footsteps were recorded. This corresponds to the capture process with video assets as output. Other video sequences were constructed through the superposition of several elementary video sequences, resulting in further captured media assets.

The captured sequences are annotated to specify the crowd movement they are representing, namely: heavy, light or no movement, as well as the depth of the man in the video, namely: `back`, `medium` and `front`. These annotations are later used to choose a video sequence during interaction with the installation. The video sequences and their corresponding annotations are then archived. In the context of this particular application, developed for the first exhibitions of the artwork, archiving means that there were no `compIDs`. The annotations appeared in the names of the video files, the `medID`. An example of file name is `lm212.mov`, indicating the video sequence number 212 which annotation is `lm`, `l` for *light movement* and `m` for *medium depth*.

In the prototype we developed, equivalents to `medID`, `annID` and `compID` are used, only that they were named differently. These media assets are classified according to the type of movement and the depth.

4.3 Artwork production:
query, organize, archive

This stage consists in building the artwork through the combination of the different videos sequences that were produced and archived in the previous stage. In The Man of the Crowd, the combination of the video sequences is done through the definition of an adaptation scenario. The adaptation scenario is built from adaptation rules describing how the display of video sequences is triggered. Adaptation rules can be seen as Event-Condition-Action (ECA) rules, specifying which, how and where the video sequences will be displayed. The events represent the movement of the spectator in the installation.

The processes we use in this stage are Query, Organise and Archive. The Query process corresponds to express the criteria used to select the relevant video sequences. The Organise process consists in the creation of the adaptation rules and scenarios that are used in the new media artwork. The adaptation rules are then archived during the Archive process. The selection criteria and the adaptation rules can be considered as the code to be executed during the exhibition of the installation. The mechanism we suggest here is similar to triggers and stored procedures in database systems.

4.4 Artwork exhibition:
capture, annotate, query and distribute

Once the artwork is installed in a particular environment it can be experienced by the spectators. To enable the interaction within the installation, capture of the movement of the spectators is needed. A web camera is used to capture images of the spectator in the installation. This is then analysed (annotation process) to identify the spectator's movement in terms of the annotation characteristics --- heavy, light or no movement.

The combination of the video sequences presented to the spectator is controlled by the adaptation scenario. Appropriate video sequences are selected from the archive of sequences based on the movements of the spectators in the installation. The specification of the query depends on the annotation characteristics decided upon in the message construction phase and on the real-time interactions of the spectators in the installation. The selected video sequences are distributed, in this case displayed, to the spectator.

In this stage, we use the following processes: Capture, Processing, Query and Convey.

The first two processes: Capture and Processing are necessary to identify the movement of the spectators in the installation. As we previously said, a web camera is used to capture the spectator in the installation, the corresponding video sequence is then processed in order to identify (categorize) the movement of the spectator (heavy, light or no movement). The last two processes: Query and Convey correspond to the selection of the video sequences according to the adaptation rules. Those video sequences are then conveyed to the spectator.

5. CONCLUSION AND FUTURE WORK

In this paper, we have presented the different stages in the life cycle of an adaptive new media artwork and we have identified the corresponding canonical processes. We plan to do the same exercise for audio and online new media artworks. Our medium term objective is to work on the integration of such processes into our conceptual framework.

6. ACKNOWLEDGMENTS

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Canonical process	Phases of the life cycle of a new media artwork
Premeditate (1)	*Artwork design*: Establishment of the main concepts of the media artwork; identification of the media to be used, their role and their relationships. Decisions about the types of video sequences and their semantic, decisions about the installation and infrastructure. Input: ideas of the artist; Output: description of the decisions.
Capture (2)	*Media acquisition and production*: Video shooting of the sequences to be displayed to the spectator. Construction of composed video sequences; Input: result of process (1) Output: the set of video sequences with their media identifier (medID) *Artwork exhibition*: Capture of the movement of the spectator in the installation; Input: result of process (1) Output: none, since in this phase, capture and annotation are pipelined.
Archive (3)	*Media Acquisition and production*: Saving the different video sequences on a server. Input: result of process (2) and (4) Output: the set of video sequences with equivalents of MedID, annID and compID; *Artwork production*: Saving the adaptation scenario on a server. In the first installation, the scenario was coded in the application. Input: result of process (1), (2), (4) and (7) Output: the set of adaptation scenario with their identifiers.
Annotate (4)	*Media Acquisition and production*: Annotation of the video sequences to be delivered to the spectator. Input: result of process (2) Output: annotation about the movement in the video sequence. *Artwork exhibition*: Annotation of the video sequence capturing the movement of the spectator in the installation; Input: result of process (2) Output: annotation about the movement of the spectator.
Query (5)	*Artwork production*: Search of video sequences according to selection criteria in order to build the adaptation scenario; Input: result of process (3), the set of video sequences Output: the set of video sequences satisfying the selection criteria. *Artwork exhibition*: Search of video sequences according to selection criteria in order to execute the adaptation scenario Input: result of process (2) and (7) Output: video sequences to be displayed.
Construct message (6)	*Artwork design*: Construction of the artistic message Input: the ideas and artistic vision of the new media artist; Output: the artistic message (not explicitly saved in the first installation).
Organise (7)	*Artwork production*: Construction of the adaptation scenrio Input: results of processes (1), (2) and (4); Output: the adaptation scenario..
Publish (8)	
Distribute (9)	*Artwork exhibition*: Display of the video sequences Input: result of process (5) Output: the spectator's experience

Table 1. Relationships between phases and canonical processes