Content-oriented Presentation and Personalized Interface of Cultural Heritage in Digital Dossiers

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Digitization of cultural heritage becomes an important requisite for remote co-operation, education and tourism between art institutes, museums and the general public since the 90's. Based on the demand to access the scattered collections from the Netherlands Institute for Cultural Heritage and Media Art Institute, we designed and implemented a digital dossier in 3D environment to present media-rich collections together with the artwork related information preservation and re-installations. In this paper, we describe the digital dossier in two generations by providing user scenarios. Focusing on the issues of presentation and personalization, we discuss the alternative ways to present rich media information of artworks in all its diversity. Also we explore a content-oriented approach combined with user personalization, which aims to re-present the original context of multiple artworks in a proper way suiting different users.

Keywords: Cultural heritage, presentation, personalization, content-oriented, digital dossiers, 3D.

1 INTRODUCTION

For long time, researchers and visitors are facing the problem of cultural heritage that a large amount of artwork collections are separated in different institutes. By time and space, it restricts the presentation of the diverse cultural information in a more widely immersive way for education, research and tourism.

Based on the demand to access the scattered collections from ICN[2] and Montevideo[3], we made the research of digitisation solutions and implemented a digital dossier[4] in 3D space to present a large collection of artworks, together with the art related information for the preservation and re-installation. It is a multidisciplinary cooperation between the Netherlands cultural heritage institutes and multimedia research students group of Vrije Universiteit Amsterdam in the context of international projects (INCCA[5] and European Culture 2000 project).

As a new tool, the digital dossier has some innovative features with regard to presentation, navigation, personalization and guided tour(s). In this paper, we focus on presentation and personalization. Based on the navigation using a concept graph, we orient the presentation of the dossier to the media-rich content of collections in all its diversity. A content gadget consisting of three windows is designed to facilitate the presentation of multiple media content (text, pictures, video, etc.) simultaneously. Also, the 3D environment demonstrates the interactive presentation and exploration of the artwork objects. By manipulating the position/angle of view and objects, users can get insight of objects and how they could be presented together. For personalization, we aim to provide an attractive and interactive interface/environment in a form that is appropriate for the actual users. The interface is adaptive to different users by changing the interface content like the environment attributes, models/objects and his/her viewpoint in 3D space. It could be either active where the user initiates the interface or passive where the dossier takes the interface as the default settings.

So far the digital dossier has experienced 2 stages: The first generation is the *abramovic* dossier which is used to present the collection of artwork of performance artist Marina Abramovic. As a prototype, we did a user performance test in a qualitative scale at ICN and Montevideo. It gave a positive and promising result as a new, immersive way but also did reveal some problems like usability and personalization.

After that, multimedia artist Jeffrey Shaw and his artwork was the subject for the second generation[6] of the digital dossier. Based on the first *abramovic* dossier, we improved the usability (e.g. adding filtering function and guided tours), realized the incorporation of 3D models of artworks, in this case for Jeffrey's installation 'Revolution' and explored the personalized 3D environment.

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[3] Montevideo (The Netherlands Media Art Institute) http://www.montevideo.nl
[4] Digital Dossier Marina Abramovic http://www.few.vu.nl/~dossier05 and http://www.incca.org
[5] INCCA (International Network for the Conservation of Contemporary Art) http://www.incca.org
[6] Digital Dossier Jeffrey Shaw http://www.few.vu.nl/~casus05/productwebsite/index.php

2 CONTEXT AND PROBLEM STATEMENT

Digital access to cultural heritage for the general public as well as research, education and tourism has become an important issue since the 90's. At the G7[7] conference of the Information Society in 1995, a series of pilot projects were approved to show the potential offered by the Information Technologies. The Pilot Project N° 5 named "Multimedia Access to World Cultural Heritage" was implemented and had its first demonstration at ISAD[8] conference in 1996. For the first time, digitisation of cultural heritage as an important issue in information society was recognized and considered.

Since then, many applications (e.g. 'digital library/museum', 'e-culture') are created based on the common interest of cultural heritage by using the current technology in Europe. ECHO[9] (European Cultural Heritage Online), as the first major project funded by the EU Commission was aimed to create a growing and evolving multidisciplinary and integrative network of research institutes, archives, libraries, museums and other institutions on the one side as well as their research and corpora of knowledge on the other[10]. In the Netherlands, the research program CATCH[11] (Continuous Access to Cultural Heritage) aims at providing new solutions for accessing digital collections, focusing on the support of collection managers of cultural heritage institutions.

Following the trend, the Intelligent Multimedia group of Vrije Universiteit Amsterdam started the cooperation with Netherlands Institute for Cultural Heritage (ICN) and Media Art Institute (Montevideo) in 2004. ICN is a leading, independent knowledge institute for the preservation and management of moveable cultural heritage. Also, it is coordinator of International Network for the Conservation of Contemporary Art (INCCA). Students in this group have related technical background from artificial intelligence, information science, industrial design and grid computing.

As a demand-pull project, our task is to 'Design and build a virtual environment (3D), that serves as a digital dossier to present rich-media collections of artworks, for the contemporary Serbian-Dutch performer artist Marina Abramovic'. The target users could be either expert users like curators, researcher or non-experts like the general public.

Despite many digital collections of contemporary art, we still encounter big problems which obstruct our progress. It is the similar situation which also happens to some other cultural heritage projects [1]. In summary, we may distinguish 5 points as below:

- Big volume: The first digital dossier only presents Abramovic one artist's works but it already contains a large amount of collections, including 40 texts, 10 reports, 8 interview clips, 82 pictures, 23 materials, etc. If more artists' collections added, the total size will be enormous.
- Wide diversity: The collections of Abramovic's artwork range from 2D pictures to performance videos, from real objects to paintings, from instruction texts to record audios. Besides, when it is presented in 3D environment, some 3D models are created according to the special installation artworks in real life.
- Multiple relationship: Most collections are highly inter-related. For instance, from a particular artwork, it links to its material. From this material, it links to other artworks which also use it.
- Context enrichment: Presenting the final product does not satisfy expert users who want to explore the traditional context. How to re-present the artwork's unique existence at the place where it happens to be?
- Multiple users: The user type of the digital reproduction ranges from museum curators to kids, from professional researchers to people who like art. How to meet different requirements from different user types?

3 THE *ABRAMOVIC* DOSSIER

The first generation of the digital dossier was aimed to present performer artist Marina Abramovic's artwork together with the artwork related information preservation and re-installations. The dossier opens with a short introduction, which will be quickly

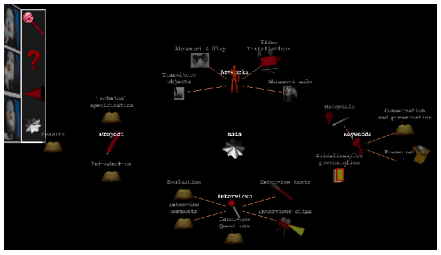

Figure 1. Overview of concept graph

[7] G7 (G-7 Ministerial Conference on the Global Information Society), Brussels, Belgium, Feb 25
[8] ISAD (Information Society and Developing Countries Conference), Midrand, South Africa, May 1996
[9] ECHO (European Cultural Heritage Online) http://echo2.mpiwg-berlin.mpg.de/home
[10] European Cultural Heritage Online (ECHO) http://echo2.mpiwg-berlin.mpg.de/home/project/pilotphase
[11] CATCH (Continuous Access to Cultural Heritage) http://www.nwo.nl/nwohome.nsf/pages/NWOP_5XSKYG

replaced by the main concept graph (see figure 1). For an explanation of concept graph in navigation, see [4].

Below, we give an example of using the digital dossier illustrating how to find information related to the artwork ‘China Ring’ (see figure 2).

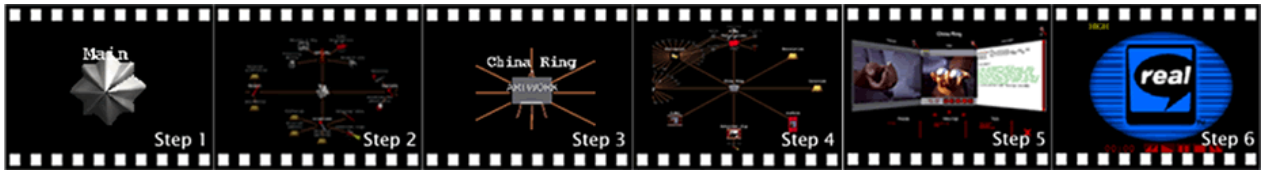

Figure 2. User scenario of ‘China ring’

- Step 1: Start main node in the concept graph
- Step 2: Surfing in the concept graph by clicking on the star main node. The dynamic structure spreads and children objects appear surrounding the center node.
- Step 3: Go to the artwork ‘China ring’ node via navigation in the concept graph. Alternatively, using the keyword search function of the tool bar, ‘China Ring’ can be easily found.
- Step 4: ‘China ring’ node move to the center position by clicking, surrounded by all its children nodes, which present information of ‘China ring’ in text, picture and video format.
- Step 5: The content presentation environment appears by clicking on the center ‘China Ring’ node. It opens with 3 windows to present different information which are listed below the windows. Here, the picture of ‘China Ring’ is presented in the left window, video in the middle window and text description in the right window.
- Step 6: if desired, the user can focus on any window by using a zoom in/out function.

When the presentation of media content is finished, clicking on the close button will result in going back to the concept graph. Alternatively, the ‘home’ function of the tool bar, may be used to return directly to where we started, the original shining star.

4 PRESENTATION ISSUES

Presentation of media content is supported by different visualization facilities. Presentation is an essential part of the digital dossier but is separated from navigation in concept graph. The presentation facilities are deployed when media content is selected for view. The digital dossier contains different presentation facilities for 2D and 3D content.

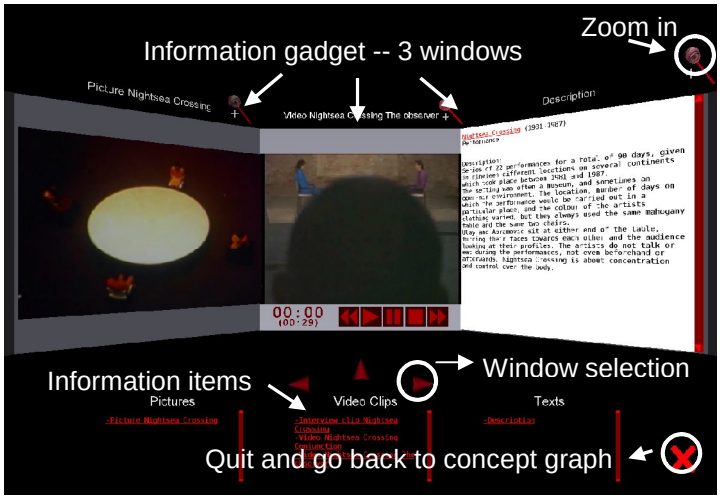

Figure 3. Presentation gadget with 3 windows visualizing content

Figure 4. 'Terra degli dea madre' in 3D

For 2D media content a visualization facility is needed that is able to present video, images or textual information. This facility is implemented as a content gadget with three windows (see figure 3). In each of the three windows the user can view 2D media content. These windows are positioned in such a way that the user can inspect the information simultaneously. In our experience, three images can be presented at the same time without much visual distortion [2]. Below the three windows a list of all content related to the selected information object is displayed. The content is categorized lists for each content type. The user can control on which of the three windows content is displayed. By using drag-and-drop the user can view content on a

window of choice. This functionality gives the user some freedom for customization instead of being bounded to a fixed display. If necessary, the user can focus on a particular window with a zoom option, to avoid distraction from the other windows.

Since we adopted 3D technology, we could easily accommodate a 3D model for one of the installation art works by Marina Abramovic. We implemented a plain exhibition room, providing a 3D perspective of the installation 'Terra degli dea madre' that allows the user to manipulate the position of the objects by a click-and-drag function. The 3D environment demonstrates the interactive exploration of the installation of an artwork. By manipulating position and/or angle of objects, museum curators can get insight into how the artwork could be exhibited.

For the visualization hierarchy, we list the following three paradigms to compare.

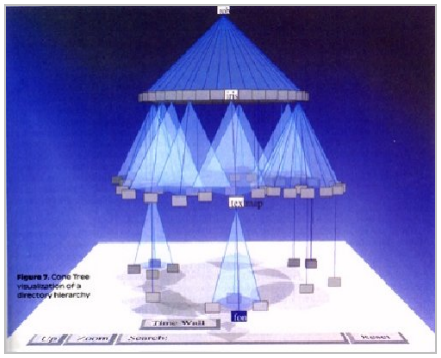

Figure 5. Cone tree visualizing hierarchy

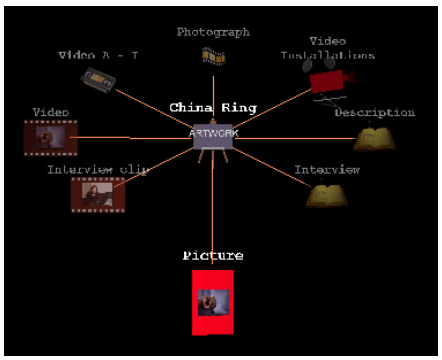

Figure 6. Concept graph in 3D

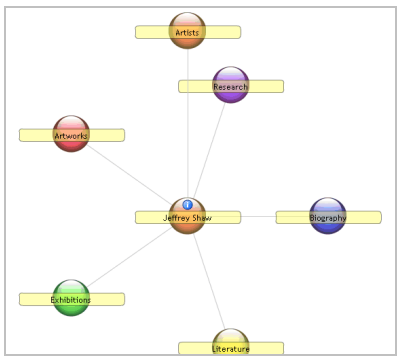

Figure 7. Concept graph in flash

- Cone trees in 3D[12] [3] (see figure 5)
  - \+ 3D visualizations of cone trees make optimal use of screen space and provide the opportunity to visualize larger hierarchical structures.
  - \- The cone tree presents all information at once. In case of a large amount of highly inter-related information structures this could lead to an information overflow.
- Concept graph in 3D (in the first *abramovic* dossier, see figure 6)
  - \+ The 3D concept graph presents information nodes in 3 levels of the hierarchy. By move and click, the 3-level structure changes dynamically due to the center node. It offers an overview of multiple relationships among different information nodes.
  - \+ The information nodes are created as 3D models mimicking real objects. A variety of realistic models give users a direct and clear expression related to the original objects.
  - \- The complicated relationships between lines, models in the concept graph might confuse users, especially non-experts. More explanation or guided tours are needed.
  - \- Some 3D models might mislead users. Some abstract 3D models are made based on artist's definition/explanation and designer's understanding. It is not precise enough to present without any misunderstanding or slight errors.
- Concept graph in 2D flash (in the second generation of digital dossier, see figure 7)
  - \+ The 2D flash version of concept graph is very easy and friendly to users without too much confusion and difficulty.
  - \- The information nodes in same style/template are not able to provide a vivid and rich image of the hidden information until click for the content presentation.

5 TOWARDS A CONTENT-ORIENTED APPROACH

As a continuation of our research, we would like to explore a more content-oriented approach in the next generation of digital dossier, whereas other projects seem to aim at a user-oriented approach. A user-oriented approach strives for realizing personalization primarily based on user profiles and user preferences [1]. But a content-oriented approach involves, first of all, the identification of concepts and relations within the combined cultural heritage content. Secondly, it aims to re-present the original attributes of artwork collections like wide diversity, complex relationship and traditional context in an attractive and clear way.

[12] Cone trees in 3D http://www.limsi.fr/Individu/jacquemi/IRI-TR/visu-inter2.jpg

The content-oriented approach however can be made adaptive to different users according to their information-need. In other words, we regard the analysis of the content-attributes as a pre-condition for effective personalization. For instance, one interesting aspect of the second generation of digital dossier for the artist Jeffrey Shaw is the added function of filtering based on content-attributes and selection in the concept graph. It enables users to set up the dynamic hierarchy of concepts and select which information is to be presented. Furthermore, it provided the availability of a tool environment to learn about the construction and de-construction of the Revolution installation and to experiment with the exhibition space parameters of the artwork, such as the lighting conditions, and the color and texture of the walls and the floor [4] [5]. For future development, it is very likely to realize more personalization functions in static interfaces as well as in dynamic, narrative, interfaces based on the rich inter-related content and users' information-need.

6 CONCLUSION

In this paper, we introduced the digitisation of cultural heritage in the international context; described the digital dossier in user scenarios; discussed presentation issues and finally we proposed a content-oriented approach. In summary, the paper addressed two aspects:

- Incorporation of media-rich collections of culture heritage in digital dossier(s)
- Presentation issues and personalization based on content-attributes

In the *abramovic* dossier, presentation of content is separated from navigation but there is a strong relation between them. Based on the navigation in concept graph, the presentation of the structure is dynamic, presenting a complete and intuitive overview of the hierarchy of all information nodes. Also, it provides the opportunity to present installation artworks in 3D environment, focusing on the interaction with users where users can manipulate the objects and environment. In the future development of the digital dossier, the personalization issues will be continuously tracked to present the artwork collections in an immersive [4] way suiting different users.

In the field of cultural heritage, we face the situation that more and more data as well as precious objects and real materials increase everyday. The digitization solution provides ample opportunity to the general public because digital reproduction is essentially cheaper, faster and more accurate than any mechanical reproduction [6] before. However, although digitization liberates the artwork from its dependence on presence (time and space), it raises new issues like how to re-present the lost context in the digital world.

ACKNOWLEDGEMENTS

We would like to express our sincere appreciation to the organizations and individuals who have contributed to the digital dossiers:

- Participants Multimedia casus 2003, 2004, 2005, Vrije Universiteit Amsterdam, Universiteit van Amsterdam and Technische Universiteit Delft
- The Netherlands Institute for Cultural Heritage : Tatja Scholte, Ijsbrand Hummelen
- Montevideo/Time Based Arts: Bart Rutten, Gaby Wijers

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