Exploration and guidance in media-rich information spaces: the implementation and realization of guided tours in digital dossiers

van Riel C [a], Eliëns A[1] and Wang Y [b] .
a Vrije Universiteit, Intelligent Multimedia Group, Faculty of Sciences, Amsterdam Netherlands
b Technical University, Eindhoven, Netherlands

Confronted with media-rich information spaces involves interfaces that are usually designed to facilitate personal exploration to locate information of interest. Navigating such media-rich information spaces, where information structures can be complex, may result in disorientation and demotivation. The need of suited approaches able to support the exploration of such media-rich archives has motivated the development of several types of guided tours. The aims of these guided tours are to support information retrieval, like locating objects of interest in a logical sequential order, and analysis, like learning how to interact with real-life objects or detecting relationship structures, in a dense information environment. This paper, discusses the application and realization of these guided tours in digital dossiers in the domain of Cultural heritage. Based on the results, we discuss the implications on future development of media-rich environments with regard to information exploration and guidance.

Keywords: Guided tours, Digital Dossiers, Media-rich environments, Cultural Heritage.

1 INTRODUCTION

In recent years, media-rich environments evolve with more complexity and possibilities due to technological developments in computational speed, the Internet and 3D graphics hardware. In the area of cultural heritage, these developments allow for new opportunities towards cultural communication. The virtual museum of Canada[2], for example, enables Internet users to access cultural content and related features of several Canadian museums and galleries. This online media-rich environment contains tens of virtual exhibits of cultural content and a collection of more than a thousand images of art.

The guided tours discussed in this paper are implemented to function in 3D digital dossiers within the domain of Cultural Heritage. A digital dossier can be interpreted as a digital media-rich archive in a 3D environment that represents particular information about a specific topic in a specific way. In more detail, it can represent architectural knowledge visually and facilitates the presentation of 2D and 3D media. The 3D digital dossier applications are created with VRML (Virtual Reality Modeling Language), which allows for creating virtual worlds and present them on the web. The web publication makes it possible for the interested general public to access the digital dossiers worldwide and more easily.

The introduction of digital dossiers and the related guided tours started as a master multimedia student's project, based on the course Multimedia Casus lectured[3] at the Vrije Universiteit Amsterdam, in close collaboration with the Netherlands Institute for Cultural Heritage[4] (ICN) - a leading, independent knowledge institute for the preservation and management of so-called moveable cultural heritage. The increasing interest in accessing multimedia information and related 3D representation of information objects in an application, desired by the Cultural Heritage institutes, has heightened the need for digital dossiers. In this perspective, and in a broader sense of Cultural Heritage, the digital dossier should serve as an information source for domain experts with regard to preservation, conservation and reinstallation of artworks. Because of the complexity of conceptual structures and related media, guided tours can be used to assist the user in navigation and search for information within a defined conceptual space. The aim of this paper is to provide experimental results that benefit research on using guided tours for information navigation and retrieval in media-rich applications.

In the following sections, we give more detailed explanation about our work: First, section 2 discusses the types of guided tours that are developed for the different applications of the digital dossier. In section 3 the use of the conceptual guided tour is discussed, followed by section 4 where we discuss the use of the environmental guided tour, and as last, in section 5 we discuss the use of the object centered guided tour. Next, section 6 gives an overview about the technical realization of guided tours within 3D digital dossiers, and finally, in section 7, conclusions and future research are provided.

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2 GUIDED TOURS FOR AUTOMATIC AND FOCUSED PRESENTATIONS

Personal exploration of media-rich environments becomes more extensive and time consuming with respect to quantity and quality of the information present, and the awareness of information locations. In such cases, locations of the collection of information to be accessed may be too large to remember and or the location of information is not known, forcing the information to be retrieved based on its content, its attributes or its relationships to information whose location is known [1], i.e. navigating through hyperspace. Navigation as such, due to the non-linear communication structure as found in media-rich environments, can cause some problems, like disorientation and quality loss in information retrieval [2]. Also, when confronted with high quality information, such as 3D representations that imposes greater information richness by six dimensional explorations, can affect the user in extensive and time consuming exploration i.e. the extent and awareness of 3D interaction possibilities.

By directing the user's focus of attention by automation, in situations where navigation is non-linear may prevent the user from becoming lost or confused and enables the designer to control which information in what order is processed, and as a consequence influence the quality of information retrieval. Also exploration of information rich objects can be accommodated in this way. From this perspective, guided tours can be used to automate user navigation and interaction, and function as a narrative story telling facility. Consistent with this assumption, an experiment was conducted where participants used dynamically planning guided tours to navigate through hyperspace. The results indicate that the guided tours overcome problems of getting lost, and accommodate information retrieval and information processing [3].

The types of guided tours developed and discussed in this paper are focused on, first of all, navigation and presentation:

- *conceptual guided tour* - automatic and focused presentation of conceptual information spaces and related media, and,
- *spatial guided tour* - automatic spatial guidance where objects are strongly related with the environment; allowing for manipulation of environmental parameters.

And secondly, we will look at object exploration:

- *Object focused guided tour* - automatic presentation of functional and/or technical aspects of real-world objects.

3 GUIDED TOUR(S) 1: GUIDANCE IN CONCEPTUAL SPACE

The creation of the conceptual guided tour is based on the *abramovic* digital dossier [4]. This digital dossier[5] uses a concept map as navigation paradigm to represent conceptual knowledge in a three level deep view, as shown in figure 1.
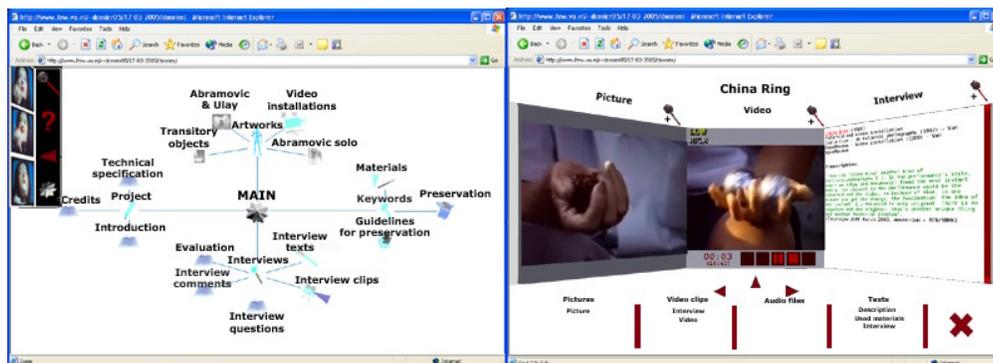

Fig. 1. Concept map visualizing information structures Fig. 2. Content gadget with 3 panes visualizing media

By browsing the conceptual nodes, which causes the concept map to change accordingly by a smooth transition, the user is able to detect relations between nodes and their related media content. When media content is selected for view, a 3D content gadget appears by which the user can select, view and focus on media, as shown in figure 2. As for 3D representations of artworks, can also be accessed by the conceptual space and are viewed in a plain 3D environment.

Due to the amount of relational data and complexity of the conceptual structure, a conceptual guided tour was developed that assists the user in information retrieval by directing focus of attention. This guidance - automating user interaction by a time-based sequence of events that activates navigational functions - uses the concept map as a starting point to act as a narrative story facility to present information of interest. Media information is presented by activation of media related nodes visualized by the concept map which changes by navigation. This allows the user to explore conceptual relations and related media or 3D representations by automation in a defined conceptual context more effectively (presenting all relevant information in a narrative order given its conceptual context) and efficiently (avoiding time consuming manual navigation finding objects of interest) without getting lost or confused.

A remaining issue is to instantly respond to user exploration interactively. With the current conceptual guided tour facility it is feasible to create or activate a guided tour based on user selection or on predefined topics. In the future, an autonomous dynamically generated guided tour that responds to user interaction should be desirable.

4 GUIDED TOUR(S) 2: GUIDANCE IN SPATIAL NAVIGATION

The second guided tour aims to assist the user in locating information of interest and orientation in a spatial environment. The dossier *Marinus Boezem* [6] uses a virtual atelier to represent two artworks of the artist Marinus Boezem, by a 3D representation of which one is interactive and the other animated, and related media. The aim of these representations is to inform the interested public about its use and presentation in an actual exhibition. Related 2D media content is accessed by real-life metaphors, like a file cabinet for text and a video projector for video, as shown in figure 3.
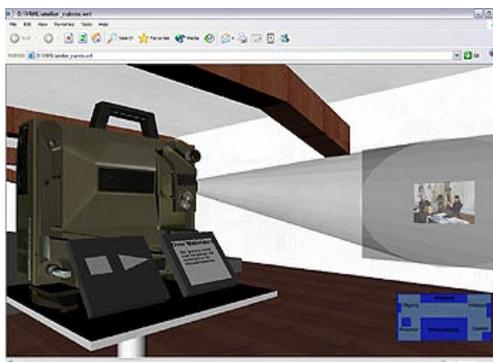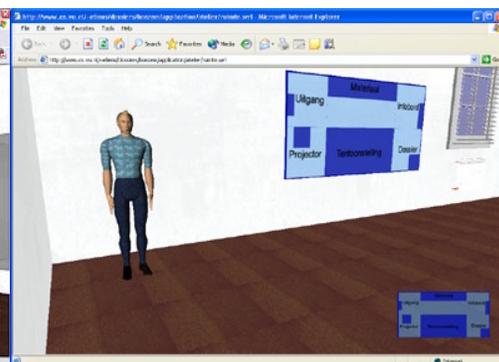

Fig. 3. Video projector showing audiovisual media   Fig. 4. Virtual agent acting as museum guide

In this digital dossier[6] the navigational metaphor is not abstract, as opposed to the abramovic dossier as discussed in the previous section, but realistic. Dealing with spatial environments as such requires to deal with spatial movement (limitations input devices and possible motion sickness) and orientation (being lost by lack of overview). Given this, the *Boezem* dossier uses an animated character (i.e. agent) that acts as a real-life museum guide (e.g. guiding, answering questions), as shown in figure 4. This guided tour operates by changing the user's viewpoint according to the position and transitions made by the virtual guide. To give the user more control over the environment a plane map of the virtual atelier can be used to click on a choice of continuations (e.g. instant narrative jumps) to support efficiency of information retrieval.

Currently, this guided tour suffers from several limitations. First of all, it is desired that the agent must be interactively responding on user focus of interest and/or attention as opposed to predefined actions. Secondly, with regard to interactive artwork installations, such guided tours could be extended with simulating interaction on artwork installations for the public, giving exhibitors insight in the use of the artwork and its environment, and based on this experiment with virtual environment parameters.

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[6] http://www.cs.vu.nl/~eliens/casus

5 GUIDED TOUR(S) 3: GUIDANCE IN OBJECT FOCUSED EXPLORATION

The dossier *Jeffery Shaw*[7] uses the conceptual navigational paradigm of the *abramovic* dossier to locate information of interest and to access media content (see section 3), and extended it with filtering options for personalization's, see [5] for more details.

Besides this, a 3D tool environment is available focusing on the artwork Revolution of the contemporary artist Jeffery Shaw. This tool environment contains a 3D representation of the artwork itself (see figure 5) and aims to provide exhibitors insight about how to install the artwork Revolution and how to influence its presentation by offering the following options:

- Anatomy tour,
- Construction tour,
- Deconstruction tour,
- Manual construction test, and,
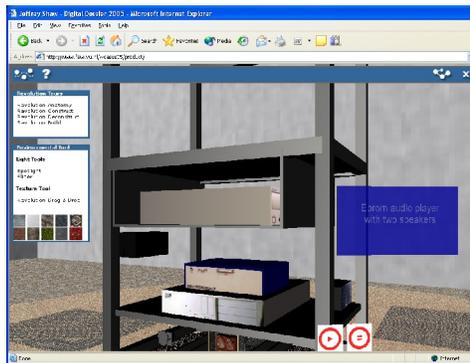- Manipulation of environmental parameters.

Fig. 5. Detailed view artwork Revolution   Fig. 6. Individual components artwork Revolution
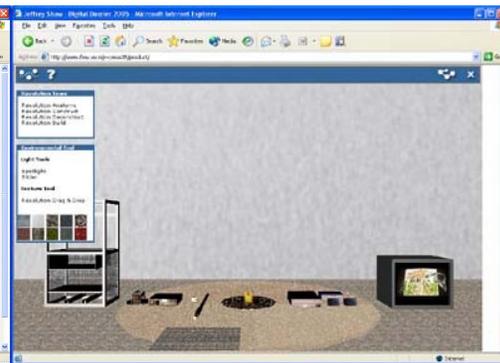
The (i) anatomy, (ii) construction, (iii) deconstruction tours and the (iv) manual construction test are developed aiming to provide interactive or fully automated guidance, and as such, can be interpreted as guided tours. When activated they present aspects of the construction and deconstruction process of the Revolution artwork in detail by 3D representations of each part of the artwork.

In short, the anatomy tour provides an automated exploration of the parts of the artwork, their material, position, connection and use. The construction tour provides an automated exploration of how the individual parts are installed, and the deconstruction tour represents the de-intallation process.

The manual construction test, allows for more user interactivity. The general concept of this tour has emerged from the IKEA (the Swedish home furnishing retailer) product blue-prints. The aim was to offer exhibitors a way to get familiar with the construction process of the artwork Revolution in a safe (i.e. virtual) environment. Especially when confronted with delicate material parts that are hard to replace or cannot be replaced when broken. This tour guides the user through the process of construction by giving textual and visual feedback when manually constructing the artwork by its parts.

The tool environment also offers some manipulation of environmental parameters (e.g. light, textures) to indicate the effect it has on the exhibition, and as a consequence its experience, and can be related to the intent of the artist. See [5] for more detail.

In the future, a tool environment as discussed could be improved by focusing on the artwork and its environment, which is part of the experience, allowing to extend the amount and degree of manipulating environmental parameters.

6 THE REALIZATION OF GUIDED TOURS

As mentioned in the introduction, the 3D technology VRML was used to develop the digital dossiers. The technical properties of VRML - with regard to the internal communication structure - allows for the creation of guided tours which communicate with the digital dossiers to mimic user interaction. In more detail, VRML environments consist of input and output channels that are used to send or receive events (i.e.

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[7] http://www.few.vu.nl/~casus05

internal commands). These events are used to activate functions present in the digital dossier.

In order to mimic user interaction, the guided tours operate by a sequence of events, that communicate with functions with regard to user interaction (e.g. mouse clicks or key strokes), with specific pre-defined values and fired at specific pre-defined times.

A more sophisticated approach is to create a *strategy of sequence* for events. This can be realized by dealing with selection and filtering, as done in the dossier *Jeffery Shaw* where only specific types of content can be shown, or based on attributes and properties for the creation of guided tours.

7 CONCLUSIONS

This paper began with the premise that using guided tours in media-rich environments support information retrieval and analysis. This study has uncovered several applications of guided tours in digital dossiers for the domain of Cultural heritage.

In more detail, we introduced a conceptual and spatial orientated guided tour, and a tool environment which offers automated and interactive tours to access 3D artwork representations and related media. In summary, depending on the metaphoric environment and needed information to complete user tasks, the use of guided tours for effective and efficient exploration and guidance in media-rich information spaces looks promising. However, because this study cannot of course be viewed as conclusive, evaluations focused on quantative results needs to be conducted to get a more accurate view.

For the future development of guided tours, we believe that guidance in media-rich information must be applied implicitly - switching from exploration to guidance based on the preferences and information-need of the actual user.

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