Heritage and Learning: Implementing a Virtual Guided Tour

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Abstract

This literature review is aimed at providing information on the research that has been done in the area of guided tours and paths through hypertext information, with a particular emphasis on education and rock art preservation. Hypertext is defined as a system that links information presented to the user to related information and graphics. To ensure that learners are exposed to all aspects of the system in a defined path-like manner, a guided tour which is set-up by an educator or outlined by the learner according to his needs and interests may aid the learner's educational experience. Following will be a discussion of the educational basis for creating guided tours,followed by a discussion of the research done on computer systems for this educational tool. Thus, technologies such as guided paths and Waldens Paths are explored in this paper as well as the notion of a guided tour within an information space. These mechanisms all seek to aid the user in exploring information in a structured manner as opposed to navigating the information aimlessly.

1 Introduction

The preservation of rock art, as well as cultural heritage, is an ongoing problem. Coupled with the enormous effort of ensuring the safety and preservation of these ancient artworks is the need to make the public aware of the importance of preserving such heritage sites. Most of the sites are not made public for the express purpose of protecting them. Organizations such as Trust for South African Rock Art (TARA) work tirelessly to ensure the protection of these sites (Parkington, 2007). However, recent technological developments have made it possible to document these sites in ways that were not available before. Pictographs, for example, are symbols or paintings representing ideas and are usually found in rock art. Over the years, pictographs have proven to be an extremely useful tool for documenting and recording these heritage sites. Now that methods exist for documenting these sites, it is important that effort is made to make practical use thereof. For this reason, it has been decided that the records containing these rock art images would be formulated into an interactive guided tour website that will allow users to take a trip through a virtual rendering of the sites and learn about the history and heritage found on the walls. The predominant audience for this sort of interactive tool includes, but is not limited to, school children in grades 6-10.

2 Educational Tools

At the Nairobi International Rock Art conference in 2004, both Deacon (2007) and Tacon (2007) agreed on the fact that visitors to rock art sites need to be presented with information on the art in an interesting manner that allows them to appreciate the value of the art and stimulate interest. Deacon (2007) stated that an important tool for rock art preservation is public awareness. Tacon (2007) laments, however, that this comes with a slight caveat in terms of increased threats of vandalism and removal of rock art pieces. Essentially, educating the public and making them aware of the importance of these historical pieces seems to be the next step in the preservation of rock art. According to Deacon (2007), one common step employed to educate the public on the rock art is the use of trained tour guides . This way, the public gets to experience the rock art first hand while simultaneously being given an explanation of the intricacies of the history behind the shapes. This fulfils that enriching experience that Deacon (2007) aimed for, as well as raises the awareness needed to ensure the preservation and protection of rock art.

2.1 Virtual guided tours

For a similar reason, guided tours that are implemented on computer systems may be thought of as an important learning tool for school children especially those interested in rock art (Shipman et al., 1996). This is in line with the view of Shipman et al. (1996), who stated that exploration is a valuable tool in learning. These guided tours then provide a system for learners to create a learning environment in which they may develop the knowledge-based skills that these information resources provide them with (Shipman et al., 1996). The guided tours will allow learners to experience

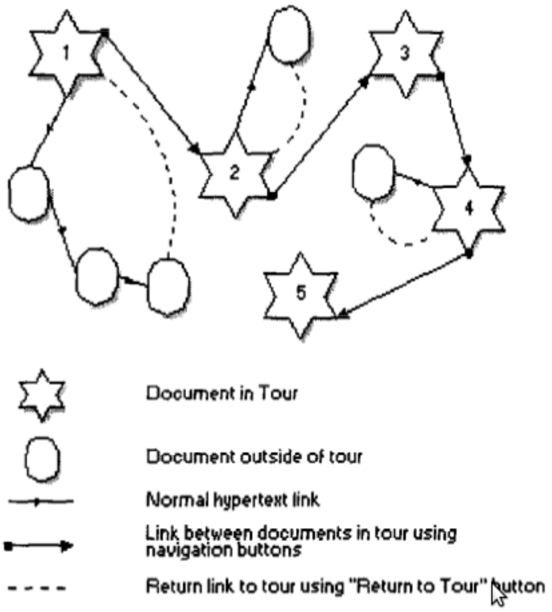

Figure 1: Example of a tour

the ancient rock art first hand, allowing them to learn from the exploratory experience. The aim of these guided tours is to allow learners to be able to navigate the information in a structured manner (refer to Figure 1). This is in line with the premise of digital libraries. Digital libraries are collections of information stored digitally and are thus accessible from a computer. According to Crane & Wulfman (2003), these libraries will allow users to explore and question information that they would not otherwise have been exposed to. This is important since Furuta et al. (1997) noted that learners found it difficult to navigate new systems in an unstructured manner. They would hesitate initially and express confusion at the unfamiliar information resource. For this reason, it became apparent that a mechanism for structured navigation of a system would be important.

3 Guided Tours: Research into Computer Systems

It was noted by Nicol et al. (1995) that computer systems involving education required a massive investment in time and human resources. However, there are merits to the undertaking since there is an educational need to provide users with an experience to learn through predefined routes and be allowed to return to a previous page of information or to delve deeper at any given point (Nicol et al., 1995). Nielsen (1990) noted that guided tours allow the users to be introduced to the notion of hypertext systems as opposed to aimlessly sifting through the information with no sense of navigation. The research into implementing guided paths thus shows that authors should essentially create a pre-defined path for users to use to navigate the system, while allowing for the possibility of digression and catering for this by providing the user with the ability to return to where they left off (Nicol et al., 1995). The emphasis on this technique is to ensure that users do not become disorientated in their traversal of the system.

3.1 Methods for Implementing Guided Paths

One method used to implement guided paths is to allow a point in the system where users are always able to go back to the last accessed portion of the system. Another technique is to provide a layout of the tour for users to navigate themselves if they choose to digress from the predefined tour (Nielsen, 1990). It is important to provide an explanation of the navigation tools provided to the user so that they know exactly where they are heading in the system and thus alleviate the confusion that may ensue as a result of a user digressing (Nielsen, 1990). Furthermore, providing the user with a guided tour of a virtual system presents its own challenges, according to Li et al. (1999). Besides the computational efficiency

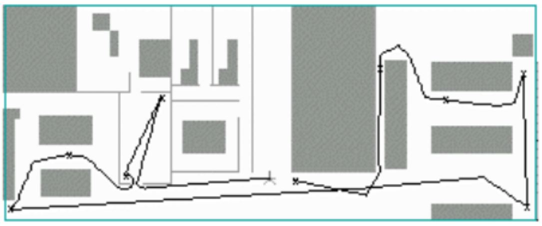

Figure 2: Example of a tour

required to build such a system, it is important to try to create a system that generates optimal paths with user-defined locations (Li et al., 1999). They further noted that the problem of finding an optimal traversal could very well become the NP-Complete travelling salesperson problem (See Figure 2). The approach used by the team was to plan a tour path first and then to generate the camera path for the virtual system based on this tour path (Li et al., 1999). Essentially, this makes the tour a function of time and thus the system becomes a 4D problem. Various approaches may be used to tackle the problem of virtual tours of systems. These include decomposing higher dimension problems into lower dimensions in order to make navigation easier (Li et al., 1999). For example, according to Angelidis (2004), if the problem space is 6D, then there are 6 possible dimensions for movement that a user may perceive. This sort of space is important for representing rigid movement (Angelidis, 2004). These 6D space problems may be decoupled into two 3D spaces according to Li et al. (1999). This means that the original space may be computed as two separate 3D spaces in order to produce the visualization that the user is expecting. Another method involves the greedy approach for optimal path sequencing in the automatic generation of a tour path (Li et al., 1999). These approaches therefore provide a means of traversal for users to navigate a system and allow them to experience the virtual reality with a particular emphasis on the educational merits of the system for presenting users with information on rock art.

4 Research into systems implementing guided paths

Further research into guided tours includes the Walden's Paths project. Shipman et al. (1996) and Furuta et al. (1997) provided an implementation of a guided path by means of a path server prototype named Walden's Paths. Shipman et al. (1996) defined a guided path as an ordered list of information pages that is independent of the general Web structure. Thus, a path is a particular traversal of this list (Furuta et al., 1997). Walden's Paths provides a user typically an educator in a classroom setting with the capabilities of creating directed paths over the information space by providing an ordering of the information for the purpose. The Walden's Paths server allows a user to present the information of the source document without the constraints of the underlying structure of the source document or information space (Shipman et al., 1996). The Walden's Paths creation also allows the user to provide context of the information by annotating the information being presented. It was also noted by Zellweger (1989) that any path defining mechanism should provide a user with the ability to navigate in both the forward and back direction along a path as well as allow the user to branch off in a new direction while maintaining the ability to navigate back to where they left off. Zellweger (1989) outlined the path mechanism called Scripted Documents, which makes use of paths as its sole linking system for the information being provided. This mechanism provided paths with active entities called scripts, which have path specification scripts embedded in the path. This method proved useful for providing a means of creating sequential paths. The script entries are stored separately from the documents in a simple database. The navigational support for maintaining tours is much stronger for this guided path system than it is for the guided paths mechanism in NoteCards, an idea management system . Halasz et al. (1987) discussed this system and its method of providing branching paths with nodal entries. However, these nodes did not provide enough information to allow the user to navigate through the tour.

5 Conclusion

According to the research done by Zellweger (1989), Furuta et al. (1997) and Shipman et al. (1996), guided paths systems need to be able to provide the user with the following capabilities:

- Creating and editing paths that are independent of the underlying structure of the source information space
- Navigational support
- Visualization of the paths
- Playback control of the path
- Path storage
- Interaction as opposed to just participation

With these objectives in mind, an implementation of a guided tour system for rock art will need to cover at least these aspects of guided paths in order to allow the educational experience of the user to be enriched. Furthermore, the users will need to be able to recognize features of the unfamiliar system in order to know how to navigate through the information space (Furuta et al., 1997). Future considerations may include implementing a virtual tour guide such as the one researched by Li et al. (1999).

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