Prototype Mobility Tools for Visually Impaired Surfers

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ABSTRACT

In [1] we extended the notion of travel to include environment, feedback and the purpose of the current travel task. Specifically, we likened web use to travelling in a virtual space, compared it to travelling in a physical space, and introduced the idea of mobility - the ease of travel - as opposed to travel opportunity. This paper describes our continuing work in building a prototype mobility tool to address some of these issues.

KEYWORDS: Mobility, visual impairment, prototype, implementation.

INTRODUCTION

The Towel mobility tool was designed for evaluating our assumptions and design principles and was also intended to be as simple as possible to use. The method used was four fold, in order to accurately represent the real world mobility analogy.

1. We find out what mobility objects are present (and add those that are not) by application of our mobility framework [1].
2. We manually marked-up any mobility objects found, and added those that are not found.
3. We implement a mobility tool (in this case a Netscape plug-in) containing our techniques conforming to our principles and apply it to the marked up document.
4. We use our resulting mobility rich hypertext within our browser to assist us in travelling around our site or document.

The plug-in is designed to work with XHTML pages (eXtensible HyperText Markup Language [2]), that have been marked up with 'Towel Mobility Extensions' (TME). These are keywords placed in hypertext `CLASS` or `ID` attributes and can be used as part of a `SPAN` or `DIV` element. It is intended that in the future this TME mark-up will be automatically inserted with only minor designer intervention required, however for our prototype version we manually marked up a page [3].

Travel rendering techniques have not been part of this research, and therefore all travel information has been rendered textually. However, it is envisaged that more sophisticated techniques will be developed in the future.

CREATING TME OBJECTS

A TME object is created such that information about its placement is encoded into the naming convention for the extension thus:

`'TMEi:`*`Location:Area:Type:Description`*`'.`

TMEi stands for **T**owel **M**obility **E**xtension **i**nline tag. This tag is used as a prefix so that any user agent that understands TMEs can process them without destroying the HTML, XML, or XHTML.

The Location attribute represents the area that the TME tag represents. Specifying `page` as the location signifies that the information should be used when mobility around the page is required, and `Site` signifies that information about the whole virtual area is encoded within the TME tag.

The Area attribute specifies the part of the virtual environment under investigation and associates it with both the Mobility Framework and Guidelines [4] in terms of real world analogies.

- Memory (`mem`) represents information that is stored within the page to be referred to when required like route and layout descriptions.
- The environment (`env`) attribute represents information that is directly part of the actual hypermedia environment like hyperlinks and images etc.

The Type attribute specifies the real world mobility metaphor used within the tag, and represents the context in which the information should be addressed.

- A navigation (`nav`) context means that the tag should be used for movement from location to location, and should answer the question ‘Where can I go?’.
- An orientation (`ori`) context means the tag should be used to ‘place’ a traveller within a journey and should answer the question ‘Where am I?’
- A cue (`cue`) context is intended to draw the attention of the traveller to a particularly relevant piece of information within the journey. This information may be overlooked if it is not explicitly documented and therefore a users journey may be more difficult than it

needs to be.

- An obstacle (`obs`) represents a mobility object that could cause problems when a user is journeying. This could be Java Applet that is not accessible or a HTML frameset that cannot be view properly.
- An out-of-view (`vws`) context is used when a cluster of information cannot be read within 20 seconds. It is a way of creating summary information so that a traveller can quickly overview a page or site

The description represents a simple and explicit textual description of what the tag represents and the mobility information stored within it. An example of a TME object placed within a hypertext FONT element would be:

```
<font id='TMEi:page:env:cue:Important'>in terms</font>
```

Here the TME object is a cue placed within the mobility environment (`env`) (the XHTML `BODY`) and its contents are related to information on that page.

THE TOWEL MOBILITY TOOL

The Towel Mobility Tool (TMT) produces a series of fragmented hypertext files, decorated with generated information derived from the placement of the TME objects. The TMT is loaded when the browser encounters an XHTML EMBED element within the unprocessed hypertext file signaling that there are TME objects available. Once loaded the plug-in is driven by a series of keystrokes, which both activate and control its operation. When the TMT is activated the TME objects are processed and the page fragmented and saved as separate local hypertext files with an automatically generated preview page. This page preview is a clustering of hyperlinks to the individual page fragments. Each hyperlink is post-fixed with a word count of the target document so that a user knows what to expect when the fragment is reached. In this way orientation to the page contents is much quicker. The mobility objects representing external memory are also processed so that a memory overview of the page and site content and layout are created. These external memory aids are implemented such that the layout and content are presented as pop up message boxes which can be viewed at any time by using a hotkey. Each generated file has hyperlinks to move through the fragment set and to move back to the preview, so that the travel analogy is maintained along with the regularity of the environment. This regularity is important to visually impaired users because it enables a degree of predictability, and this predictability can often compensate for some of the loss in visual cues.

The preview page, and hence the fragments, can now be accessed from the main browser window. Therefore, egocentricity is also supported because the fragments and preview can be viewed in any sequence at any time. Movement can also occur in any direction, which means that the user chooses the way they move around a document and not the hypertext designer or the user agent developer. Additionally the links on the fragment to fragment journey are described in relation to the previous page and not as absolute references, which naturally aids this sense of egocentricity. Further, as part of the fragmentation process the obstacle and cueing information are inserted into each fragment. This information is required at the time the fragment is accessed and not with the preview, as this would create unwanted information overload for the user.

Obstacles are dealt with by placing a hyperlink to a hypertext anchor `'name'` attribute at each end of the obstacle so that by selecting the hyperlink the user can jump either forwards or backwards over the obstacle. Therefore the obstacle is retained in case the user finds it useful, but it can be avoided if required.

Cueing is implemented by placing a hyperlink at the top of the fragment. This link is joined from the top of the fragment to the cue destination within the fragment by an anchor `'name'` tag (as for an obstacle). In this way a user immediately knows of any important mobility information contained within the fragment. This cueing information means that users travelling through a journey can rely on explicit cues and not just those that may be provided like titles and section headings. In this case the traveler knows that the hypertext designer has seen fit to explicitly mark cues that they feel will be useful.

CONCLUSION

While extensive evaluations and field trails have yet to be carried out we have already performed some initial testing. These results have been initially encouraging with users finding page fragmentation most useful. Also the clustering of links to these fragments and the journey metaphor seem to aid a users overall orientation. The system also brings together other travel metaphors (landscapes [5] and pathways [6]) and combines them with our own research into a holistic mobility system mirroring real world travel.

REFERENCES

1. Goble C., Harper S., Stevens R., 1999, Towel: The Travails of Visually Impaired Web Travellers, Hypertext 2000, USA, 2000.
2. WWW Consortium - http://www.w3c.org
3. http://www.man.ac.uk/towel/TMETest.html
4. Harper S., Stevens R., Goble C., 2000, Web Mobility Guidelines for Visually Impaired Surfers, Journal of Research and Practice in Information Technology Special Issue on HCI, Vol. 33, No. 2, ed. Hammond J., May 2001, Australian Computer Society.
5. Chen C., 1997, Structuring and Visualising the WWW by Generalised Similarity Analysis, In: Proceedings of the 8th International ACM Conference on Hypertext and Hypermedia, ACM Press New York 1997
6. Furuta R., 1997, Hypertext Paths and the WWW: Experiences with Walden's Paths, In: Proceedings of the 8th International ACM Conference on Hypertext and Hypermedia., ACM Press New York 1997.