# Semantic Bookmarking for Non-Visual Web Access *

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## ABSTRACT

Bookmarks are shortcuts that enable quick access of the desired Web content. They have become a standard feature in any browser and recent studies have shown that they can be very useful for non-visual Web access as well. Current bookmarking techniques in assistive Web browsers are rigidly tied to the structure of Web pages. Consequently they are susceptible to even slight changes in the structure of Web pages. In this paper we propose *semantic bookmarking* for non-visual Web access. With the help of an ontology that represents concepts in a domain, content in Web pages can be semantically associated with bookmarks. As long as these associations can be identified, semantic bookmarks are resilient in the face of structural changes to the Web page. The use of ontologies allows semantic bookmarks to span multiple Web sites covered by a common domain. This contributes to the ease of information retrieval and bookmark maintenance. In this paper we describe highly automated techniques for creating and retrieving semantic bookmarks. These techniques have been incorporated into an assistive Web browser. Preliminary experimental evidence suggests the effectiveness of semantic bookmarks for non-visual Web access.

## Categories and Subject Descriptors

K.4.2 [**Computers and Society**]: Social Issues—*Assistive Technologies for persons with disabilities*; H.5.4 [**Information Interfaces and Presentation**]: Hypertext/Hypermedia—*Navigation*; I.7.5 [**Document and Text Processing**]: Document Capture—*Document Analysis*

## General Terms

Algorithms, Human Factors

## Keywords

Bookmarks, Semantic Partitioning, Assistive Browsing

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## 1. INTRODUCTION

The World Wide Web has become an indispensable aspect of our society. However, the primary mode of interaction with the Web is via browsers designed for visual modes of interaction. This limits access to the Web for an entire community of people with visual disabilities. This target population faces particular difficulties in accessing, scanning, summarizing, and distilling information on a Web page or group of pages.

Assistive devices like screen readers and audio browsers such as Freedom Scientific's JAWS are being used by blind users to access the Web. However, the problem with these systems is that they provide almost no filtering of Web page content to eliminate "noise". The user is forced to arrow down or page down through a single columned presentation of the entire content in a given page including the text, navigational links, and advertisements. This is due to the nature of the way they present a particular Web page whereby the entire content is rendered as a single column regardless of the structural organization of the content in the page. In short, the user encounters considerable information overload when using these kinds of assistive tools.

One interesting approach to address the information overload problem during ad hoc exploratory browsing is to summarize the content. In fact, this important and useful idea was first explored in BrookesTalk [31, 32]. Another idea is to provide the user with the logical structure of a Web page's content, and the user selects which parts of the document to listen to and when to navigate to a new page. Generating such a logical structure would require capturing the semantics of the page's content. Indeed this seminal idea was pursued in some recent papers on assistive browsing [24, 22, 28, 29, 13]. Of course, browsing based on the logical structure can be integrated with summarization to yield still greater reductions in information overload.

Exploratory browsing is used for ad hoc access to Web pages. Quite often users perform repetitive browsing tasks, *i*.e., frequent and periodic visits to certain predefined pages at a site or groups of sites (*e*.g., news and educational sites). Efficiency of such tasks is considerably improved by personalization. A simple form of personalization is bookmarking. Bookmarks provide the user with direct access to pages, via a Web browser, that are repeatedly accessed for information.

This problem of creating bookmarks and retrieving information with them, via assistive Web browsing tools, for individuals with visual impairments has been pioneered in [7, 19]. By and large these works propose syntax-driven solutions for this problem. In such solutions the Web page is viewed as a sequence of HTML tags. Creating bookmarks correspond to placing anchors in this sequence around the desired content which typically are sentences/phrases. Retrieving information with a bookmark amounts to identifying