Chapter 18
Addressing Challenges in Web Accessibility for the Blind and Visually Impaired

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ABSTRACT
Searching for relevant information on the web is an important aspect of distance learning. This activity is a challenge for visually impaired distance learners. While sighted people have the ability to filter information in a fast and non sequential way, blind persons rely on tools that process the information in a sequential way. Learning is slowed by screen readers which do not interact well with web pages. This paper introduces WAVES, a tool for the fast retrieval of information in a web page for blind and visually impaired people. The paper describes the WAVES prototype, a system that performs a page restructuring of webpages. The system analyzes webpages, identifies elements of interests from a webpage, evaluates their importance by using semantic information and visual cues, sorts them by importance and uses them to restructure the webpage so that data from the original webpage are presented to the reader in a concise format. A preliminary evaluation test of the prototype system has been performed with a sample set of users. The results of the preliminary test show an increase in speed and accuracy when the WAVES system has been used.
INTRODUCTION

Browsers and search engines are essential tools for retrieving information in distance learning but this technology is still a challenge for blind and visually impaired persons. The number of visually impaired distance learners is large and is going to increase. According to the Center for Disease Control, more than 3.4 million (3%) Americans 40 years and older are either blind or are visually impaired and millions more are at risk for developing vision impairment and blindness. By 2030, the number of blind and visually impaired people is predicted to double (Center for Disease Control and Prevention, 2006). Many of these individuals are now or will become users of computers in one form or another. For these persons, the computer is a tool and a bane.

For the blind and visually impaired, learning with computers can be frustrating and intimidating. While the sighted use mouse driven GUI (graphical user interfaces), visually impaired must rely on command line, keyboard shortcuts and screen readers (i.e., JAWS, Windows-Eyes, VoiceOver, IBM Easy Web Browsing) for interface with their computers. Many screen readers claim to have ways to untangle web pages for ease of use, but even with the latest innovations, major problems with websites arise quickly and consequently learning is slowed down (Miyashita & Sato, 2007).

The problem is that most sites do best when they are mouse controlled. The two dimensional page layout and the use of frames are sometimes confusing to screen readers and it may be meaningless to a person who is blind from birth. Colors are used to show pertinent data. Popup windows redirect the page and cause confusion. Forms that are to be filled out can timeout or refresh themselves before the persons have time to fill them in. All these situations raise barriers that make it difficult for a blind user to decide if a page is worth reading. In distance learning where much information is conveyed through web pages and/or applications that are shown via a web browser the speed and the accuracy of deciding if a page is worth reading constitutes an important step in the speed up of the learning process.

In this paper we introduce WAVES (Web Accessible for Visually-impaired Extraction System), a system designed for visually impaired and blind users that provides faster web navigation. WAVES is a tool for the fast retrieval of information in a web page which uses visual cues to filter web pages and produces an excerpt of information that helps the user to decide if a page is worth reading. Data from the webpage are presented to the reader in a concise and sorted-by-weight format which reduces the access time of the screen reader to specific information. An experiment was performed to test the difference in speed and accuracy of identifying a random assigned query to a random set of webpages with and without the use of the system. The result show an increase in speed and accuracy when the WAVES system has been used.

The paper is organized as follows. In Web Accessibility and Technology Support we review the state of the art of the existing tools and technologies for blind users. In The WAVES System we give the rationale for designing and creating our system. In Page Analysis and Restructuring we discuss the page analysis and the need for the reconstruction of the page in a synthetic format, while in The System Prototype we describe the strategies used for the data identification, the data extraction, and the page reconstruction. In Experimental Results we discuss the results obtained from an experiment utilizing the WAVES system. Finally, Conclusions and Future Research topics are presented at the termination of the paper.

WEB ACCESSIBILITY AND TECHNOLOGY SUPPORT

The problem of web accessibility is well known. Many recommendations and legislation (U.S. Department of Justice Civil Rights Division Dis-
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