

An Interactive Method for Accessing Tables in HTML

Toshiya Oogane
Master's graduate of SANNO College
(Department of Management and Informatics)

bigbell@tt.rim.or.jp

Chieko Asakawa
IBM Japan, Tokyo Research Laboratory
1623-14 Shimotsuruma Yamato-shi
Kanagawa-ken, 242 Japan
+81 462 73 4633
chie@trl.ibm.co.jp

ABSTRACT

Although visually impaired people can access digital information by using computers, GUIs make it difficult for them to do so. One of the main obstacles preventing them from taking advantage of the almost unlimited information resources on the Web is the use of visual representations such as tables, image maps, and classified structures. This paper proposes a method for converting these visual representations into non-visual representations in HTML. After describing a system that we developed to evaluate our method, we will discuss an interactive method for accessing tables in HTML files.

Keywords

WWW, blind, visually disabled, table, conversion, HTML

1. INTRODUCTION

Visually impaired people are able to access digital information via a character interface by using screen readers [1][2]. But graphical user interfaces (GUIs) make it difficult for them to access information via computers. On the other hand, GUIs make it easy for sighted people to use computers, for two reasons. One is that they do not need to remember a lot of commands, and the other is that they can operate computers intuitively by manipulating graphical objects and metaphors with a mouse. These intuitive operations are not available to the visually impaired, since it is difficult for them to recognize two-dimensional information and graphical objects such as icons. There are screen readers for GUIs, such as Screen Reader/2 [3] for the Japanese version of OS/2 Warp [1], but they are not totally satisfactory. Screen Reader/2 reads all the text information on the screen, including icon labels, but it cannot represent visual information.

Nowadays, the Web is a useful information tool for computer users. However, visual data such as tables, image maps, and hierarchical sentence structures in World Wide Web (WWW) pages are big barriers for the visually impaired. Screen Reader/2 can only read the displayed text information from top to bottom, line by line, word by word, character by character, and so on, if there is no profile for an application written in profile access language (PAL) [4] of Screen Reader/2. In addition, Screen Reader/2 cannot read two-dimensional representations such as tables.

This paper proposes a method for converting such visual representations into non-visual representations in Hyper Text Markup Language (HTML). We first describe a prototype system that we developed to evaluate our method. Our discussion will then focus mainly on an interactive method for accessing tables in HTML files.

2. OVERVIEW OF THE PROTOTYPE SYSTEM

In this section, we give an overview of a prototype system that we developed to evaluate our method for converting visual representations of data into HTML tags, which will be discussed later.

2.1 System Configuration

Figure 1 shows the system configuration. The system is divided into two parts: an HTML analyzer and a Netscape profile. The HTML analyzer is divided into three parts: the first is for communicating with a Web server and getting HTML files, the second is for analyzing HTML tags, and the third is for converting visual representations into nonvisual representations that will be displayed in the Netscape window and read by Screen Reader/2. The Netscape profile provides an user interface for reading the Netscape window quickly and easily after the HTML analyzer has converted an HTML file into a nonvisual representation.

2.2 Screen Reader/2

Screen Reader/2 is a screen reader for the Japanese version of OS/2 Warp version 3. It can read displayed text information, icon labels, and window information such as titles, menus, and so on. Screen Reader/2 uses ProTALKER/2 [5] as a text-to-speech system, and uses a sound board on a PC. A special keypad that simulates mouse functions can be used to enter all the reading commands.

2.3 PAL (Profile Access Language)

PAL enables blind users to access applications quickly and easily with Screen Reader/2. When the status of a line is changed, Screen Reader/2 can read out the line automatically, but this automatical reading must be defined in a profile. New assignments to the keypad can be also defined in a profile. PAL is a useful language for increasing the power of Screen Reader/2.

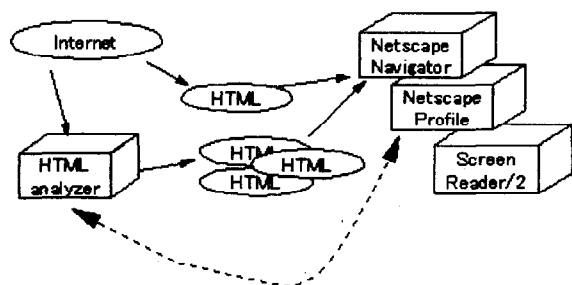


Figure 1: system configuration

2.4 Data Processing

The system must get the HTML file first. The command to start up our system can be entered by using the keypad. Next, the system gets the HTML file for the page on the Netscape window. Then the HTML analyzer analyzes the HTML tags and converts visual representations into nonvisual representations in HTML. In the case of tables, the system creates several HTML files from an HTML file. The number of files created corresponds to the number of cells in the table tag. For example, In the case of a 3 X 3 table, the system creates 9 HTML files and an index file. Finally, it fetches the converted HTML files, which are then displayed in the Netscape window.

3. INTERACTIVE METHOD FOR ACCESSING TABLES IN HTML

3.1 Problems

In the Netscape window, Screen Reader/2 cannot read columns and tables, even if there is a profile for Netscape. We therefore need to convert tables and columns into text information that can be read easily by Screen Reader/2.

3.2 Data Cell Navigation Links

A table is divided into cells. Each cell becomes an HTML file. Since each cell has a different HTML file, Screen Reader/2 can read them correctly. Each cell's HTML file has 8 links: to the cell above, to the cell below, to the left cell, to the right cell, to the top cell, to the bottom cell, to the left-edge cell, and to the right-edge cell. With these cell navigation files, users can browse all the cells in a table.

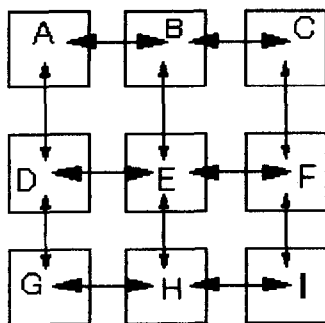


Figure 2: table navigation links

3.3 Unsquared Tables

If each cell of a table is arranged in rows and columns, it is simple and easy to divide a table into HTML files corresponding to cells, and to create cell navigation links. But if a cell is not arranged regularly in rows and columns, it is not easy. For example, in figure 3, the cell for "Western foods" should be linked to "high calorie," "standard," and "low calorie." But It would be difficult for users to understand this kind of unsquared table.

Therefore, the system creates a new table arranged in rows and columns. For example, if the cell uses three rows, the system divides this cell into rows, then creates three cells with the same contents.(see figure 4). But if users have to link this newly created table by using the eight cell navigation links, the original table structure will be lost.

The upper link from the newly created cells, can be linked to the cell that was originally above them, and the lower link from the newly created cells can be linked to the cell that was originally below them. Figure 4 shows this linking structure. For example, the cell for "Western foods" is divided into three cells. Each of these three cells has the same upper link, to the cell for "Japanese foods." Each also has the same lower link, to the cell for "Chinese foods."

		Mon	Tue
Japanese Foods			
Western Foods	High Calorie		
	Standard		
	Low Calorie		
Chinese Foods			

Figure 3: unsquared table

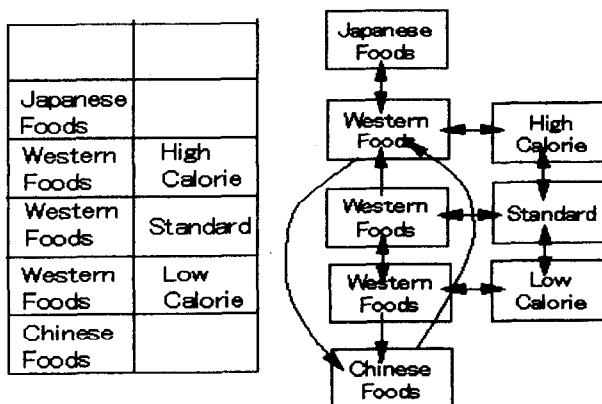


Figure 4: linking structure for unsquared table

3.4 Creation of a Table Index

A table index is an HTML file that is used to access each cell directly. In the table index, the size of a table is described first

as, for example, three rows and four columns. There are three hyperlinks. One links to the left upper corner of a table, and allows users to read the table by themselves by following the eight cell navigation links. The second links to the row labels section, which consists of the cells on the left edge of a table. The third links to the column labels section, which consists of the cells in the top row of a table.

The row labels section is a list of the contents of the left-edge cells of all the rows. Each row label is linked to the column labels section. When one of the column labels is selected, the system presents the corresponding contents. The column labels section is a list of the contents of the top cells of all the columns. Each column label is linked to the corresponding list of row list.

3.5 Interface for the Operation for Moving from Cell to Cell

The operation for moving between cells is divided into two parts. One is to navigate a table by using a table index provided by the system, and the other is to navigate a table by using the eight cell navigation links. For the first operation, there is a hyperlink to a table index in a converted HTML file that is produced by the system at the beginning of this conversion process. The user presses a key combination on the keypad, simulation a mouse click, to move to the table index, and then clicks one of the hyperlinks for the left upper corner, the row labels section, or the column labels section. First, for example, the user moves to the row labels section, and then has to select a certain row to move to the column labels section. Finally, the user selects one of the labels in the column labels section to get the content of the target cell.

For the last of these operations, users have to change from the normal browsing mode to a table-browsing mode by simultaneously pressing "*" and "0" on the keypad. The operation for moving between cells is as follows. (In the explanation below, the term "key sequence" means that you have to press the first key, release it, and then press the second key.)

Key sequence * then 2: moving to the upper cell
 Key sequence * then 8: moving to the lower cell
 Key sequence * then 4: moving to the left cell
 Key sequence * then 6: moving to the right cell
 Chord * and 2: moving to top cell
 Chord * and 8: moving to bottom cell
 Chord * and 4: moving to left edge cell
 Chord * and 6: moving to right edge cell
 Key sequence * then 5: reading current cell content
 Chord * and 5: reading current cell content and number of row and column

4. EVALUATION

Our prototype system was evaluated by visually impaired people who are advanced computer users. When they used the original functions of Screen Reader/2, they could not understand tables correctly, and could thus not get any tabular information from the Web. We offered them our new method for accessing tables and taught them how to use it. As a result, they were able to understand tables by

themselves, using both the table index and the eight table-navigation links. The table index was more effective for accessing a cell directly if they already knew the image of a table. On the other hand, the table index can also be used to understand the outline of a table accessed for the first time, because it contains row and column labels. In this way, they were able to access information such as television program schedules on the Web.

In the case of unsquared tables, however, it was difficult for them to understand the structure, so they lost their way in the table navigation mode and in the table index.

5. Conclusion

After explaining that the many visual representations of data in GUIs constitute a significant barrier to visually impaired people, we showed that the Web could be a useful medium for visually impaired users if we could provide a system for nonvisual Web access. That can handle visual representations of data, such as tables and image maps, in Web homepages.

Next, we gave an overview of the prototype system, and proposed a method for interactive access to tables. An evaluation confirmed that visually impaired people can access two-dimensional information such as tables.

Our next plan is to improve the user interface for moving between cells, and to simplify the table index structure to allow understanding of unsquared tables. We then will try to put this method to practical use.

REFERENCES

- [1] Asakawa, C. Computer access system for the visually disabled on DOS/V. *Proceedings of the 51st annual convention of the IPSJ No.1 4T-5* (Toyama Japan, September 1995), 367-368.
- [2] Asakawa, C. Enabling the visually disabled to use the WWW in a GUI environment. *Technical report of IEICE HCS96-29* (Tokyo Japan, September 1996), 39-44.
- [3] Asakawa, C. A web reader for the visually disabled. *Proceedings of IWHIT'97* (Fukushima Japan, March 1997), 71-74.
- [4] Asakawa, C. A study of nonvisual Web access using voice input and output. *Technical report of IPSJ LSP-17-10* (Yamanashi Japan, July 1997), 53-58.
- [5] Saito, T. ProTALKER: a Japanese text-to-speech system for personal computers. *IBM research report RT0110* (June 1995), 493-496.
- [6] Thatcher, J. The problems and challenges of the graphical user interface. *2nd U.S./Canada conference on technology for the blind by national federation of the blind* (1993).
- [7] Thatcher, J. Screen Reader/2-programmed access to the GUI. *Proceedings international conference on computers for handicapped persons* (1994).

Permission to make digital/hard copies of all or part of this material for personal or classroom use is granted without fee provided that the copies are not made or distributed for profit or commercial advantage, the copy-right notice, the title of the publication and its date appear, and notice is given that copying is by permission of ACM, Inc. To copy otherwise,

to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or fee.

ASSETS 98 Marina del Rey CA USA
 Copyright 1998 1-58113-020-1/98/ 4...\$5.00