

Simple browser construction toolkit

Osamu Miyamoto

Tsukuba University of Technology,
Kasuga 4-12-7 Tsukuba Science city, Ibraki, 305-8521, Japan,
miyamoto@k.tsukuba-tech.ac.jp
<http://www.tsukuba-tech.ac.jp/>

Abstract. A special browser is a specialized browser designed only for a specific website, providing a very comfortable user interface for that website. However, it is usually necessary to update the special browser when there is a design change to the website. Therefore, a special browser should be easy to update. I propose such a browser here. The proposed browser also has robustness, meaning that it does not need to be updated for a small change to the website. *abstract* environment.

Key words: Visually impaired person, Special browser, Web harvesting

1 Introduction

1.1 What is a special browser?

A special browser is a specialized browser designed only for a specific website, providing a very comfortable user interface for that website. Unlike a general-purpose browser[1], however, a special browser cannot access sites other than the specific site for which it is designed.

There are several examples of special browsers for visually handicapped persons in Japan, including those for accessing "NAIIV net" (a site where one can download Braille books, managed by a group of Braille libraries)[2], news sites[3][4][5], internet radio stations[6], train schedules[7]. These browsers are sold or are available for free.

Although there are even special browsers for sighted persons (for example, there is a browser that can access YouTube), special browsers are much more effective for visually handicapped persons.

Consider the case of learning how to use new software. A sighted user can easily use the software without referring to the manual, for example, by selecting from the menu bar, icons, etc. Even for more complex operations, a sighted user can make selections while referring to the manual. So for sighted users, there is little difference between a special browser and a general-purpose browser. On the other hand, in many cases visually handicapped persons cannot use the software until they have read the manual and completely memorized it. For this reason, special browsers are much more effective for visually handicapped persons than for sighted persons.

Visually handicapped persons can use personal computers by making use of screen reader software, but this software is very difficult to use initially. The adoption of easy-to-use software should be extremely effective in improving the information literacy of the visually handicapped.

1.2 Comparison of general-purpose browser with special browser

To check the effectiveness of a special browser for visually handicapped persons, I examined the differences between a special browser and a general-purpose browser for a certain task. I download and read a Braille book from "NAIIV net" using both a special browser and a general-purpose browser, and I checked the number of keystrokes required. The general-purpose browser required 155 keystrokes, and the special browser required 36 keystrokes.

Screenshots for downloading and reading one Braille file from library with general browser



Screenshots for downloading and reading one Braille file from library with special browser



Fig. 1. Screenshots of downloading and reading a book with a general-purpose browser and a special browser.

The best type of browser for a visually handicapped person to use depends on the situation. It is controlled by various factors, like the skill level of the user, the frequency of site updates, the availability of attractive content, and so on. The most popular special browser in Japan is probably the one designed for accessing NAIIV net.

1.3 Merits and problems with special browsers

Merits of special browsers:

- They are easy to use. They can have a friendly interface designed for visually handicapped persons, and they can be operated by using only the up and down cursor keys and the enter key.
- Support is straightforward. Visually handicapped persons can install, operate, and learn how to use the software by themselves.

Problems with special browsers:

- If even a small change is made to the website design or layout, the special browser is likely to become inoperable.
- The ability to access sites other than the target site is non-existent or extremely limited.

1.4 Parameter specification

A certain conventional browser^[4] specifies a script called a "parameter file", which is written using regular expressions (RegEx). The aim of this script is to let the user follow updates to the website. However, this script is very difficult to make. List 1 is an example of a script file.

List. 1 An example of a "parameter file" for a conventional browser.

```
AllCategory=<a href="/([a-z0-9-_]+)/update/[^.]+\..html)">
([^\<]+)</a>(\((([0-9]{2}/[0-9]{2} [0-9]{2}: [0-9]{2})\))</li>){0,1}
Category9=
<a href="(\/editorial([0-9]{4}[0-9]{2}[0-9]{2}){0,1}\..html)">([^\<]+)</a>
Category10=
<a href="(\/column([0-9]{4}[0-9]{2}[0-9]{2}){0,1}\..html)">([^\<]+)</a>
```

1.5 Analogy with spreadsheet program

Consider making a calculation table. Making a program for calculating a table is not so difficult using a computer language such as BASIC or C. However, the program must be updated if a new item is inserted or another slight change is made.

On the other hand, rather than using a programming language, this updating is relatively easy using a spreadsheet program. However, it is very difficult to make an easy-to-use spreadsheet program.

The same thing can be said about a special browser for visually handicapped persons. It is not so difficult to make a special browser for the visually handicapped by using a programming language. However, every slight design change of the website must be tracked and reflected as changes to the browser program. Therefore, I consider that a more effective browser is needed, like a spreadsheet program for visually handicapped persons.

1.6 Thoughts of a special browser developer

Author developed a special browser for the visually handicapped in 2001, and has continued to sell it since then. The development work was not so hard, but maintenance is extremely difficult. If a website design changes suddenly, the browser must be quickly updated. Such changes are an extremely common occurrence on most websites.

2 Proposed solution

I propose a toolkit that can be used to easily construct a special browser for visually handicapped persons.

With currently available special browsers, the developer must update the software when design changes are made to the target website. On the other hand, the proposed browser can acquire update information by matching current web pages with older web pages.

The toolkit has two features: It is easy to make a specialized browser, and a browser made with this toolkit rarely causes rendering errors.

2.1 How to construct a special browser

Reading (interface from computer to user) A general-purpose browser cannot recognize what information is important. Basically, a general-purpose browser speaks (i.e., text-to-speech conversion) all items on the web page. On the other hand, a special browser speaks the required information only. Advertisements should not be spoken. Also, the order in which items are spoken should be sorted by relevance or importance.

Thus, it is very important to easily specify the data to be read when the browser is constructed. In the proposed browser, the user specifies item to be spoken from a Document Object Model tree. A box is displayed on the web page corresponding to the item specified by the user. This makes the specifying task simple.

Fig3 shows an example of conversion from a table to a list box.

Selection (interface from user to computer) The proposed browser can handle links, push buttons, radio buttons, list boxes, text boxes, etc.

Fig4 shows examples of these items in a general-purpose browser. With a general-purpose browser, when there are many selectable items on the web page, the user must choose one item and use it. Usually, the user must memorize the locations of those selectable items. With a special browser, the browser lets the user use the selectable items one after another.

Fig.fig:ExampleOfFillIn shows example web pages containing a number of selectable items on the general-purpose browser and the special browser.

Text boxes for ID and password are typically filled in with the same information each time. Therefore, IDs and passwords could be stored in the program. Of course, the user can also fill them in each time.

- Conventional Way 1.

Generic browser

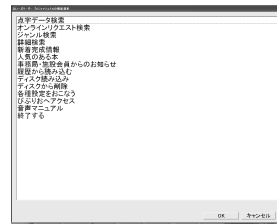
⇒ Difficult for beginner



- Conventional Way 2.

Special browser

⇒ Update is needed if site design is changed.



- Conventional Way 3.

Special browser

⇒ Script is hard to write



Example of part of script.

```
[NewsURL_RegExp]
AllCategory=<li><a href="/[0-9]{4}/[A-Z]+/([a-z]+)/{0,1}/[0-9]{2}/[0-9]{2}/[^/]+/index.html">{[^<]+}</a>
```

- Proposed way

Special browser



Fig. 2. Screenshots showing how to make a browser with the conventional approach and the proposed system.

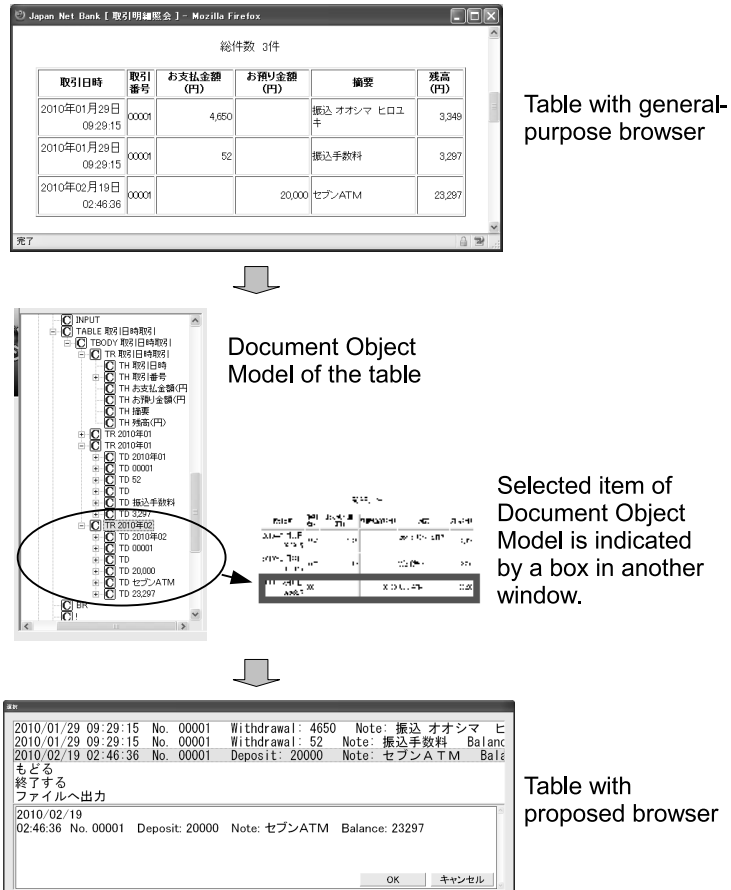


Fig. 3. Example screenshot of proposed browser (Construction Browser).

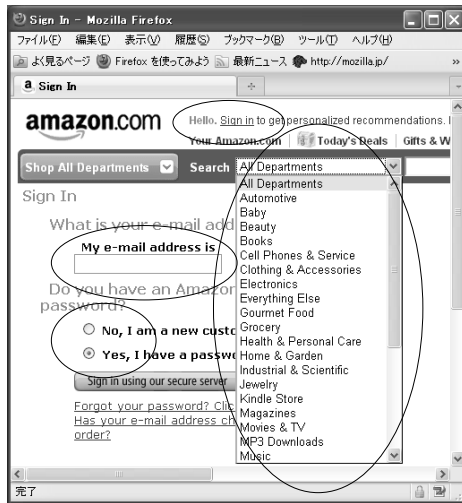


Fig. 4. Screenshot of user interface for selection.

2.2 Matching algorithm

The software saves previous editions of the website and then obtains the current edition of the website and matches the previous and current pages. This matching is done by dynamic programming.

3 Experiment

I made a special browser that can be used by visually handicapped persons to order items on Amazon. The basic usage of this special browser is as follows. The user scans the barcode of an item with a barcode scanner. The software obtains a detailed description of the item and speaks it to the user. If the user selects "Purchase" by pushing the enter key, the software orders the item from Amazon. When installing the software, it is necessary to set up 1-click ordering beforehand.

In this scenario, the user can find the names of items in the supermarket using a portable computer with a mobile internet connection. The user should scan the barcode on the commodity shelf, not the barcode attached to the item itself. Therefore, the browser has the ability to choose barcode databases other than Amazon's.

4 Conclusion

I proposed special browser construction toolkit for visually handicapped persons and showed its effectiveness. I believe that this toolkit will contribute to improving the life of visually handicapped persons.

General-purpose browser

照会期間: 年 月

Special browser

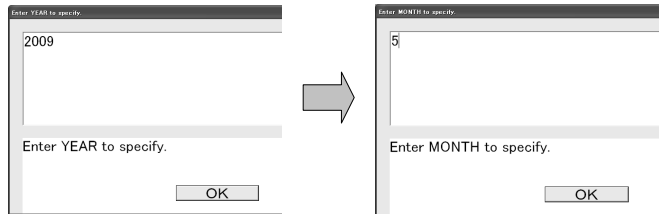


Fig. 5. Screenshot of user interface for selection.



Fig. 6. Screenshot of navigating with the proposed system.

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