Testing AudioBrowser

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Abstract

We are developing AudioBrowser, a browser for visually impaired users. This paper presents a usability analysis study that was carried out on the first version of the browser. Due to the lack of availability of visually impaired users not involved with the tool's design, we had to resort to simulate a visual impaired situation with regular sighted users. Although this may seem unrealistic we believe that this is actually a worst case scenario. The problems identified during this study are described, and proposals for the next version of the tool are put forward.

1 Introduction

We are developing a browser for visually impaired users (AudioBrowser). The AudioBrowser (Fernandes, Martins, Pereira & Paredes, 2001; Fernandes, Pereira & Campos, 2004), in its current status, is a talking browser, i.e. a browser that uses a speech engine to read web pages (Fernandes et al., 2004; Maeda, Fukuda, Takagi & Asakawa, 2005; Zajicek, Venetsanopoulos & Morrissey, 2000). One of its main features is that it is supports simultaneously visually impaired users, regular and near-sighted users. All users can share simultaneously a web surfing session because the AudioBrowser provides speech, a visual representation of the page, as in a regular browser, and an area where the text is greatly enlarged and presented in high contrast, see Figure 1.

The AudioBrowser also includes some features to attain some degree of real accessibility for visually impaired users. This class of users wants fast access to information; hence they require something more than merely reading a web page sequentially. These features include different views of the page. At the moment, these features, although quite simple in concept, provide faster access to the page's information.

In this paper we present the results of a usability study on the AudioBrowser. A new version of the tool is being developed and the results of this study should inform its design. With that in mind, after describing the major problems identified in the study, a proposal for redesign is put forward.

During development a few interviews with visually impaired end users were carried out in order to validate the design. Some of these users had the opportunity to test the tool for several days. Some important conclusions regarding the usability of AudioBrowser were reached with these interviews. Mainly from real visually impaired users that had used the tool for several days in their day to day activities. However, a full scale usability test was never actually carried out due to the difficulty in setting up such study.

One major problem that was identified was that of the integration of the AudioBrowser with the remaining assistive technologies. More specifically, visually impaired users resort to screen readers to interact with the computer. These screen readers include a speech synthesis engine. AudioBrowser comes with its own speech synthesizer. The integration of the AudioBrowser's speech synthesizer with the screen reader's speech synthesizer raised problems since it becomes necessary to switch between the two when starting and stopping AudioBrowser. In the gap between switching the screen reader off and starting AudioBrowser, users are left with no feedback. If something goes wrong at this point users may be unable to gracefully recover.

Figure 1: AudioBrowser 1.3

A new version is now being developed under two main directions:

- Turn the browser into a more friendly tool by integrating it with the remaining assistive technologies;
- Upgrade from a stand alone tool to a web service.

The first working direction will evolve the AudioBrowser from a talking browser to a "whispering browser". A whispering browser is a browser that does not produce speech directly, but instead communicates, i.e. whispers, to a screen reader the text to be read. In this way the integration problem identified during testing is solved.

The web service aims at providing a more flexible scheme for transcoding web pages, without the need for software updates every time a transcoding script changes, while at the same time being totally transparent for a user of the AudioBrowser. The AudioBrowser is prepared to talk to the web service and will be able to request simultaneously a number of views of the web page requested, in addition to the original page, among which the user can select the most suitable. Furthermore, a simplified version of the web service, where the user must explicitly select a view, will be available to use with other browsers.

2 Usability study

Although the user response to the first version of AudioBrowser had been positive (except for the problem identified above), the strategies had yet to be validated. Hence, a usability study was planned in order assess up to what point the different implemented strategies are useful or not.

A first problem in setting up the study related to the lack of availability of visually impaired users for the testing sessions (Stevens & Edwards, 1996). The number of available subjects was reduced, and most available subjects had already been exposed to the tool. This rendered them unsuitable for the usability test since they had been involved in discussions about AudioBrowser's design and features.

Due to the difficulty in finding visually impaired users for carrying out the study we decided to use regular sighted users and simulate a visually impaired situation by turning off the display screen (actually, turning the screen away from them and to the video camera taping the sessions). Although this might be deemed as an unrealistic testing

setting, we argue that it can be considered as a worst case scenario: visually impaired users should fair better than a regular sighted user that suddenly is deprived of vision.

2.1 The study

The test was carried out by six users, one at a time. Four users were students from a Masters' in Informatics taking a course on Human-Computer Interaction. One subject was a non expert user with some experience in using the web. Another user was a computer scientist that had involvement with project. The objective behind the inclusion of the non expert and the expert was to simulate blind users with little experience of web navigation, and web users already familiar with tool respectively.

The users were placed in front of a computer with no screen available to them after having been given 15 minutes to try the tool in a sighted condition. During the 15 minutes period of getting to know the tool, they were given a list with the main commands in the tool and three simple tasks to perform: visit the tool's web site; look for a word in Google; and find information in a newspaper's web site. In each case tips were given about how best to perform the task.

For the usability test a new set of tasks was used. The initial set of tasks aimed at leading the test subjects to learn the different controls in AudioBrowser. The tasks for the testing session were geared towards using the web to achieve some goal. The tasks consisted of: looking for information on a web site they were not familiar with and which had a rich structure in terms of navigation (menus and sub-menus); reading an editorial in a popular Portuguese online newspaper; and downloading the latest version of AudioBrowser, using Google to locate it.

There were problems with some users feeling they were being evaluated, not the tool. This caused frustration when some task could not be adequately carried out. In some situations users were lost and could not recover. In that case the evaluator would step in and give them some help

The sessions were video taped for analysis. At the end of the sessions the test subjects were asked to fill in a questionnaire focusing on their subjective impression of different features of the tool.

2.2 Study results

For each user and each task a log was created detailing the major events in the interaction and the time when they occurred. These logs enabled the analysis of three aspects: performance of the test subject in carrying out the tasks; identification of major usability problems during the interaction; and the strategies that were used to accomplish the tasks (in particular, whether the facilities provided by AudioBrowser where used and useful). Due to the nature of the study, performance issues are not paramount in the analysis. Here we will report on the two other aspects.

2.2.1 Usability problems

The usability problems found can be classified in three categories: problems with the users acquiring a correct mental model of the page; problems with browser missing useful features; problems related to the dialogue control in the current implementation of the browser. Some of this problems are caused not by the tool itself but by the web site design. Ideally the browser should try to compensate for bad web design in what blind users are concerned:

Mental model problems:

- Confusion between links and section headers in the page – recurrently users would misinterpret section headers that related to the test goals with actual links to the information and would try to select them.
- Confusion when the link description is outside the link tag – A significant number of websites places the text describing the link prior or after the link itself. The user is therefore confronted with only the link text, for instance "here", instead of an appropriate description such as: "To download the latest version press here", where here is the link text. This is especially problematic when the description of the link is after the link itself.
- Sites with long menus – sites that have menus tend to confuse users since every time they select a page they start hearing the some text again. If we exclude the expert user, of the five other users only one seemed to

build an appropriate model of the menus in the web site without problems. Two other users were actually confused to the point of needing assistance more than once to continue navigating the sites.

Browser missing features:

- HTTP error messages – when an HTTP error occurs a web page describing the error is presented and read. This can be confusing both because the message tends to be technical, and also the language of the message might not be the language of the site (in this case Portuguese).
- Lack of a search facility – almost all users asked for the possibility of searching text in the page. AudioBrowser has the possibility of typing keys and finding section starting with that key but this was found of very limited usefulness.
- Speaking the types – the tool speaks out the type of the element it will read next (internal link, external link, etc.). This can become annoying and other options should be available. In fact there was some evidence of users no longer hearing the types. For example, users would try to select normal text, and would not notice relevant links.

Browser specific interaction problems:

- Problem with navigating the links only view – the way in which this view is used is inconsistent with how pages in full mode are navigated. This inconsistency manifests itself at two levels: a) the arrow keys only navigate the top level of the sections hierarchy, and the enter key is needed to enter a section (in full mode the arrow keys navigate inside the sections), this has created some confusion with users not being able to enter the section they intended; b) once the section end is reached navigation does not proceed to the next section (in full mode navigation this happens), besides the natural confusion caused by two different navigation models to two views of the same document, this means that if the user enters the wrong section it will have to backtrack to the beginning of the section to be able to choose another one.
- Problem with the text in some links not being read – for some links the text of the anchor is not read and instead the URL is read. This might actually be a bug and not a design issue.

2.2.2 Navigation strategies adopted by the users

Most users tried to use the links view and the forms view to speedup browsing (mainly when using Google). The problems with these views, as identified above, meant that there were some difficulties in achieving the intended speedup. This feature is very much dependent on the web site. In the case of the links view, if, as point out above, the description associated with the link is not adequate, then the view becomes of little use as is.

The text only view was less used. This seems to have to do with the fact that users were not familiar with the web pages (at least, not in the non-sighted condition). Hence, they preferred to hear the non-filtered page. It should be expected that as users would get more accustomed to the web pages the use of this feature would increase (this is consistent with the fact that links and forms filters were used mostly in Google, a web site the users knew well.

Users had the tendency to start selecting links very quickly. Thus, seldomly reaching the end of the page. Because menus are typically at the top of the pages, this meant that in some situations users would move on to another page without actually having learned what was inside the current one. This typically results in disorientation. Clearly users had difficulties in adapting to the sequential model of information presentation, which is natural given that no context information about what comes next in the page is provided. This may be a lesser problem with visually impaired users.

2.3 Study outcomes

Based on the results of the usability analysis sessions, we know present a number of recommendations for the new version of the AudioBrowser tool.

- A mechanism would be useful that helped users find out where they were inside a web site, not just inside a page. All the pages would have to be analysed and potential menus identified (for example, by looking at the same links appearing in all pages in the site). The menus could then be spoken out only on request. This would also improve the speed of navigation since the menus would not be read over and over again.
- A full text search mechanism should be implemented.

- HTTP errors should have pre-defined error messages provided by AudioBrowser.
- Alternatives to identifying the type of element that is being read (resorting to different types of auditory cues) should be investigated.
- Interaction with the links and forms view should be made consistent with interaction with the full page, as per the aspects identified above.

Users should be advised to attempt reading as much as the page as possible when entering sites for the first time. This would help them in not getting lost in menus. Additionally, it will help them in building a correct mental model of the web site which will be useful later on in the use of filters to speed up navigation.

3 Conclusions

In this paper we have presented the results of a usability study that has been carried out in order to determine AudioBrowser's strong and weak points. AudioBrowser is a browser for visually impaired users which takes advantage of the underlying HTML document's structure to present the information to users using different filters. This allows for different navigation strategies to be selected by users depending on their goals.

To perform this study we were faced with the problem of not having visually impaired that were not involved with the design of the AudioBrowser. Therefore we had to resort to regular sighted users. Although we believe that this is actually a worst case scenario, we also recognise that different results could have been obtained had we tested the tool also in visually impaired users. Therefore we hope to be able to include visually impaired users in the next usability test. Based on this study results we would like to check if the sequential nature of the dialogue is actually a lesser problem for the visually impaired users.

A new version of the tool is under development. With that in mind, a number of proposals for redesign were put forward. These proposals were derived from the major usability problems found during usability tests. Once a new version is available a new usability study will have to be carried out in order to assess the implementation of these proposals.

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