Providing Web Accessibility for the Visually Impaired

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Web accessibility means ensuring that online content, services or applications can be accessed and used by everyone, including those with special needs. Usability, on the other hand, is a multidimensional concept that depends on the application, the user context and on the goal itself, and its aim is to provide a fully satisfactory user experience. Although closely related, accessibility and usability are frequently addressed as two separate issues. Nevertheless, it is very important to apply them synergistically from the earliest phases of design in order to guarantee satisfactory interaction for users with disabilities.

Several general accessibility and usability guidelines have been proposed in the literature. One of the more authoritative sources is the WAI group (Web Accessibility Initiative) of the World Wide Web Consortium (W3C), which defines accessibility guidelines for Web content, authoring tools and user agent design. The W3C Web Content Accessibility Guidelines (WCAG) are general principles for making Web content more accessible and usable for people with disabilities. However these general criteria need to be broken down with explicit and detailed guidelines that can be assessed simply and rapidly in order to be concretely applied. The context of use as well as the desired goal must be carefully considered (eg the goals of e-commerce are different from those of social networks).

We are working on simplifying interactions with Web content and services for visually impaired people, without developing an alternative Web site. The objective is to offer blind users an interface that is easy to use, simple to understand and quick to navigate. By intervening at the level of the interface source code, a satisfactory interaction can be guaranteed for everyone while maintaining a Web site's original graphic appearance (and thereby avoiding any negative impact on the sighted community). An additional goal is to promote the adoption of W3C standard guidelines and technologies such as WCAG 2.0 and WAI-ARIA (Accessible Rich Internet Applications), and to contribute to their diffusion and application.

Blind people usually explore the Web using a screen reader and voice synthesizer. The screen reader is an assistive technology that interprets the user interface (UI), announcing its content sequentially as it appears in the (X)HTML source code. In addition to the text, the screen reader announces the interface control elements and non-textual components, such as links, images and window objects, that are embedded in the page content. These elements are important for helping a blind user to figure out the page structure, but if the layout is too complex, the actual reading process can require considerable cognitive effort.

Lack of visual perception prevents the user from having an interface overview at a glance, meaning blind people can spend much time navigating without finding relevant content. Serialization also makes the reading time-consuming and annoying when part of the interface (menu, navigation bar etc) is repeated on every Web site page. As a consequence, blind users often prefer to navigate from link to link with the tab key, or to explore content row by row via arrow keys. This can lead to:
1. Lack of context. When navigating via the Tab key the user can access only small portions of text and may lose the overall page context; thus it may be necessary to reiterate the reading process.
2. Difficulty understanding UI elements. Screen reader commands allow movement via links, tables and buttons; these should be context-independent and self-explanatory.
3. Difficulty working with form control elements. The order in which the user visits form elements (eg via the tab key) should reflect the logical order for the user compiling the form. If possible, the user should be able to jump to a group of homogenous elements.

Investigating the screen-reader usability of Wikis.

Our aim is to enhance Web user interaction, in particular with respect to collaborative and cooperative aspects. In the last two years our team has been investigating the screen-reader usability of Wikis (Wikipedia editing page), eCommerce systems (eBay transactions) and Learning Management Systems (Moodle Demo Course). Appropriate design allows users to make additions to UI elements to clarify the page structure and to navigate more quickly via the keyboard (alternative descriptions for images, summaries for tables etc). Similarly, adding specific tags or attributes such as heading elements or hidden labels can contribute by creating more usable content. Moreover, due to the serialization process, the arrangement of the content (ie the location of UI sections/elements in the source code) is crucial to making it clear and comprehensible.

Our methodology starts by analysing the Web UI (inspection via screen reader) and defining specific design guidelines aimed at removing accessibility and usability barriers. We then develop a prototypal UI conforming to the criteria identified, and test it with blind users.

To build an accessible UI we use the WAI-ARIA suite which, by defining roles, states and properties for UI elements, can greatly enhance interaction for the blind. Adding semantics to (X)HTML objects, ARIA makes dynamic Web content more accessible to differently-abled people since changes in the UI can be captured by the assistive technology and communicated to the user. Furthermore, UI logical sections may be marked as ARIA regions, specifying standard XHTML landmarks (main, navigation, search etc) or defining customized regions. In this way the user is able to get a page overview (the list of UI regions), to move around a specific region and also to jump from one region to the next. Last, if appropriately tagged, a UI element may be silently ignored by the screen reader (eg a table used as

layout). In this way the user has more control over the interface and over the amount of text announced by the screen reader, giving them a better interaction experience.

Much positive feedback from users, coupled with the fact that Web accessibility is still generally poor, encourage us to continue in this direction. We have recently started to analyse online social networks like Facebook, to evaluate whether they actually offer the visually impaired an opportunity for active social participation. In future work, we will consider more specific collaborative environments and groupware applications that can be used for distance meetings or classes.

Links:
http://hci.isti.cnr.it/accessibility/
http://usability.iit.cnr.it/
http://www.w3.org/WAI/
http://www.w3.org/TR/WCAG20/

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