A Modified Google Docs UI accessible via screen reader

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Abstract
Collaborative editors are simple tools that enable people to create, share and exchange documents via Internet, quickly enhancing learning, knowledge and socialization. However, at present collaborative software is designed with little attention to the needs of differently-abled persons, such as the blind. Dynamic user interfaces and visual features delivering meaning may be inaccessible via screen reader, if an appropriate design is not adopted. In this demo we show a prototype of some modified Google Docs User Interfaces (UIs) -- for accessing and editing a document -- that allow full accessibility via JAWS screen reader. An interaction with the original and modified UIs is shown to highlight barriers and possible solutions for their elimination.

Keywords
Collaborative editing, Google Docs, Accessibility, usability, blind, screen reader

ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces – Graphical user interfaces (GUI). K.4.2 [Social Issues]: Handicapped persons/special needs.

General Terms

Algorithms, Design, Human Factors

Introduction

Collaboration is the basis for many activities such as learning, working and playing. Several studies state the efficacy of cooperation and collaboration regarding learning [5], [2]. Collaborative tools are a great opportunity for students and should be accessible and easy to use for all, including people with disabilities. Google Docs is a widely used Web tool that allows one to work on different kinds of documents, such as word processing, spreadsheets and presentation tools, in a real-time collaborative way. In previous studies, we analyzed interacting via screen reader (an assistive technology used by visually impaired people along with a voice synthesizer) with the Google Docs environment and found some accessibility and usability issues [6]. We have developed a prototype of the Google Docs environment (focusing on the collaborative editing of a word processing document), which by improving the accessibility of the UI enables a better interaction experience for blind users (via screen reader access).

Related Work

Cooperative environments are particularly useful in the educational field, where cooperatively assembled knowledge enhances learning. Khan et al. [3] performed a usability study with four novice and four experienced users in an educational environment, comparing ThinkFree (a collaborative writing system) with Google Docs. Authors found that although ThinkFree proved effective for the proposed tasks, efficiency and availability of resources were more limited than in Google Docs.

Schoeberlein et al. [8], revising recent literature on groupware accessibility solutions, observed that most studies focus on a specific category of differently-abled persons: the visually-impaired. To simplify access to a popular groupware system (Lotus Notes), Takagi et al. developed a self-talking client that allows blind people to access the main functions of Lotus Notes efficiently and easily, masking the complexity of the original visual interface from the user [9]. Kobayashi developed a client application (Voice Browser for Groupware systems, VoBG) to enable visually impaired persons who are inexperienced with computer technology to interact with a groupware system, Garoon 2, very popular in Japan. The browser intercepts Web pages generated by the groupware server, parses their HTML code and on-fly structures content in a more accessible format [4].

Baker et al. adapted Nielsen's heuristic evaluation methodology to groupware, showing that usability inspection can also be effectively applied by novice inspectors, at low cost [1]. Ramakrishnan et al. [7] investigated usability assessment in "information management systems", groupware environments characterized by users' asynchronous usage, integrating and adapting Nielsen's usability heuristics.

Awareness, one of the main properties of a groupware system, is one basic accessibility principle: the user must be able to perceive via the screen reader UI all dynamic changes and events (e.g. a new person joining the chat, a new message arriving on the board, a new user working on the document, and so on). The WAI group defined the Accessible Rich Internet Applications specification (WAI-ARIA) to make dynamic web content and applications more accessible to people with

disabilities [10]. Using WAI-ARIA, web designers can define roles to add semantic information to interface objects, mark regions of the page so users can move rapidly around the page via keyboard, define live regions, etc..

Interaction via screen reader

Blind people perceive page content aurally and sequentially when accessing the Web by screen reader and voice synthesizer. Furthermore, blind users navigate mainly via keyboard. This kind of interaction leads to several problems in perceiving content, as content serialization, lack of context, lack of interface overview (if the content is not organized in logical sections), mixing content and structure, difficulty understanding UI elements or working with form control elements (if not appropriately organized for interaction via keyboard), etc.

The Original Google Docs UI

Several difficulties are encountered when interacting with Google Docs via screen reader [6] including:

- inaccessibility of some interactive elements (not standard (X)HTML elements, with labels announced as simple text)
- difficulty orienting oneself on the interface, with no possibility of quickly accessing its main functions (such as creating or accessing a document) or the document list
- lack of the summary attribute for table used for the document list, not allowing one to obtain useful information on its content
- the main menu (file, edit, view, etc.) and the style formatting toolbar (font type or size, etc.) of the editing page are inaccessible; bold, italic or underlined functions can be used only through shortcuts.

The Modified Google Docs UI

The modified interfaces maintain the same look&feel of the original ones (Fig. 1). The main goal is to make the same UIs more accessible and usable for all by preserving the same layout, showing how a UI can be made usable by everyone including who interacts via screen reader.

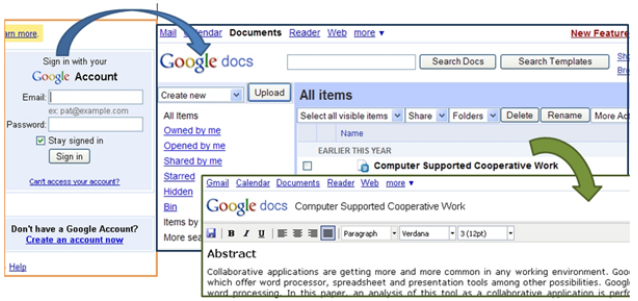

Fig. 1. Modified Google Docs UIs: (1) log-in, (2) list of documents, (3) a word processing document

All the elements of the modified UIs are standard (X)HTML interactive widgets (buttons, links, pull down menus, etc.) that now are focusable via Tab key and operable via keyboard, so accessible and correctly announced by the screen reader.

To solve the difficulty of orienting oneself on the interface, the modified UIs uses ARIA landmarks and hidden labels to provide a “logical structure of UI content”. Thus, using special screen reader commands,

the user can rapidly jump to a desired section of the page (“main”, “search”, or other standard/customized regions) to another. Specifically, hidden labels were used as a trick for associating labels with customizable UI sections, because at the moment browsers and screen readers are unable to correctly announce them.

In addition, to further simplify interaction a summary attribute has been added to the document list table.

The editor has been substituted with a simplified but accessible editor (TinyMCE[1]) that allows one to correctly edit via keyboard and to access the toolbar.

These modifications allow a better navigation experience for blind users. In this demo we intend to show the interaction via screen reader and vocal synthesizer with the original and the modified GoogleDocs user interfaces.

Discussion and Future Work

At the moment, the prototype has reduced functions (vs Google Docs) and only allows interaction for document editing:(1) the log-in page, (2) the Google Docs personnel home page – i.e., where all of the user’s documents are listed – and (3) the Editor page for a document (word processing) which implements the main accessibility features considered in our approach. However, this prototype shows how interaction changes (and improves for blind users) comparing the original and the modified UIs. In the future we plan to extend the prototype, making collaborative features of Google Docs accessible via screen reader, and to carry out user testing with blind people to gather data on the proposed solution.

[1] http://tinymce.moxiecode.com/

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