Froggy: A Tool for Enhancing Web Page Readability

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ABSTRACT

Readers face many obstacles on today’s Web, including distracting content constantly competing for the user’s attention and factors interfering with comfortable reading (poor color contrast, tiny fonts, and unreadable font faces). On today’s primarily English-language Web, nonnative readers encounter even more problems, even if they have some fluency in English. In this paper, we focus on the presentation of the content, offering several new techniques for enhancing web page readability. Froggy is a Firefox extension for reducing distractions and changing paragraph format to enhance reading comprehension.

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INTRODUCTION

Readers face many obstacles on today’s Web. Distracting content is constantly competing for the user’s attention, such as ads, animations, logos, videos, and photographs. Poor color contrast, tiny fonts, and unreadable font faces interfere with comfortable reading [1]. Some web sites are better, but many are worse.

Furthermore, on today’s primarily English-language Web, nonnative readers (whose first language is not English) encounter even more problems, even if they have some fluency in English. Problems include unfamiliar vocabulary, complicated grammatical structure, and long, crowded, or otherwise intimidating content display. All of these problems hinder nonnative readers from reading the content fluently.

Dictionary, thesaurus, and translation support is already provided by many existing online tools and browser addons. This paper focuses instead on the presentation of the content, offering several new techniques for enhancing web page readability: (1) automatically detecting and deemphasizing distracting elements; (2) summarizing content by making key sentences stand out; and (3) breaking paragraphs into sentence chunks separated by whitespace.

Although this work was driven by the needs of nonnative readers, we hypothesize that these techniques could improve the experience for native readers as well.

USER INTERFACE

Froggy is a Firefox extension that we built to demonstrate these ideas. Froggy adds a toolbar (Figure 1) to the browser for interactively controlling the content transformation.

Figure 1: Froggy toolbar.

Reducing Distractions

When the Clean Page button is toggled on, Froggy changes the current page to reduce distracting page components, such as large images, animations, and Flash. Unlike ad blockers, which typically remove offending images, Froggy merely reduces them in size and dims them out, so that the user can still recognize them. When Clean Page is toggled off, the images return to their original size and appearance. This decision was motivated by subjects in our early studies who mentioned that some advertisements are useful to them and they don’t want to delete them completely.

Emphasizing Key Sentences

Where Clean Page transforms image components, the Jenga Format button transforms the text itself. In Jenga Format, Froggy summarizes the page by emphasizing the main sentence of every paragraph, shrinking the font size of other sentences. This mode also allows paragraphs to be individually expanded by clicking on them. The Font slider on the toolbar adjusts the font size of secondary sentences. When the user drags the Font Slider to its smallest value, the secondary sentences actually disappear, so a lengthy article can be shortened to only a few topic sentences.

Expanding Paragraphs

The other feature of Jenga Format is a technique for making paragraphs more readable by introducing more whitespace. Most web pages display content in traditional paragraph format, which we call Standard Format (SF). Although this format is good at conveying information in limited space, and readers are very familiar with it, the standard format has some disadvantages. For example, it is easy to jump back to wrong line when you finish reading current line and continue to the next line. Because the text is dense, it is easy to miss the main idea when reading a long article. It is especially difficult for nonnative readers to read and understand long articles because they may need to identify syntactic structures [2] or mentally translate the content to their native language.
In order to find key factors affecting native and nonnative readers, we conducted a small informal paper prototype study of different transformations. In the study, we found two important factors that affect reading speed and comprehension -- sentence separation and sentence spacing. Based on these two factors, we designed a new approach, Separated Sentence Format (SSF) transformation. (Figure 2) Basically, this method divides a paragraph into sentences and inserts whitespace between them.

![Figure 2: Separated Sentence Format (SSF) transformation.](image)

One advantage of SSF is that it highlights the paragraph, helping the reader focus on it even if they are reading a long and crowded article. Furthermore, because each sentence is identified separately, the sentences are easier to follow in sequence. When we apply SSF to a paragraph, we also change the background color to light yellow to help the reader concentrate on it.

However, motivated by observations from our ongoing study, we have developed another enhancement to the SSF transformation. Although sentence separation is helpful to reading, it forces the user to move their eyes to the left margin every time they finish reading a sentence, which interrupts the continuity of reading in the paragraph. To solve this, we designed a new method, Jenga Format (JF), which inserts space between sentences without changing their shape. The format is named Jenga because the gaps between interlocking sentences are reminiscent of the Jenga puzzle game.

As Figure 3 illustrates, the JF transformation separates the sentences of a paragraph, and each sentence connects to previous sentence with a space. To show the identity of each sentence, we highlight each sentence with light yellow color. A gray line is used to separate paragraphs.

Froggy uses the JF transformation. When the Jenga Format button is checked, the user can click on any paragraph to transform it into JF. The Space slider on the toolbar enlarges and shortens the space between sentences, as Figure 3 illustrates. With the Space slider set to minimum space, Jenga Format looks the same as the familiar standard format.

![Figure 3: Jenga Format transformation. The Space slider changes the space between sentences for reading.](image)

CONCLUSION
We found that when users try to read information on the Web, they suffer from unnecessary distractions. Furthermore, to nonnative users, a lengthy web page makes reading more difficult. In this paper, we try to solve these problems from two directions: distraction elimination and content transformation. In our past study, we found two important factors affect the reading: sentence separation and sentence spacing. Although the ongoing study shows promising results for SSF transformation, we found some potential enhancements and designed JF transformation.

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