

# An Alternative to Scrollbars on Small Screens

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## ABSTRACT

This paper describes a web-browser based on the focus+context technique *Flip Zooming*. A prototype was developed and evaluated against an ordinary web-browser that used scrollbars on a small screen with a resolution of 160\*160 pixels. A preliminary evaluation show that the prototype provides better overview and makes searching for specific items easier compared to the traditional browser. These findings indicate that there are constraints that have to be acknowledged when designing the user interface on small screens.

## Keywords

Information Visualization, Focus+Context techniques, Small Screens, Flip Zooming

## INTRODUCTION

The dramatically increased growth of mobile information technology, such as personal digital assistants (PDA:s) and cellular phones, raises new questions about interface usability. On web-browsers developed for ordinary screens, scrollbars are used in order to enable users to explore a page too large to fit into the screen. Is this strategy useful when designing for small screens as well, or do we have to develop other techniques? This project aims at exploring one alternative to scrollbars based on a focus+context technique, by means of designing a web-browser for small screens.

## FOCUS+CONTEXT VISUALIZATION

The techniques collectively termed *focus+context visualization techniques* attempt to give users both an overview and a detailed focus at the same time. This enables users to move their center of attention to different areas, while maintaining an overview. One such visualization technique is the *generalized fisheye view* [2], which provided a basis for much subsequent work. Other examples include the *Continuous Zoom* [1], the *Perspective Wall* [4] and the *Document Lens* [5].

## Flip Zooming

In the focus+context technique *Flip Zooming* [3], users navigate through a data set by flipping between the individual pieces, as when flipping among pages in a book. When an entry is to be examined in detail, it is selected by clicking on the representation of the item. The image of the item is then zoomed to a readable size. The surrounding items are reduced in size and re-arranged to



**Figure 1.** A image browser using the original Flip Zooming technique

accommodate the expanded focus image. There is no distortion of the images, except for decreased size.

There are two ways of switching to a new entry. The user can switch between entries either by a click directly on the entry in question, or by using a keyboard shortcut to go the next or previous entry in the sequence. An already focused object can also be made to occupy the entire screen space, if the user wishes to view it in more detail.

## FOCUS+CONTEXT VISUALIZATION ON SMALL SCREENS

The goal was to transfer and possibly modify the Flip Zooming technique for browsing web pages on PDA:s. The main problem was how to create a visualization of a page that does not fit into the available screen size.

The allowed resolution was set to 160\*160 pixels. Early in the design phase, we decided that *stack and card* metaphors would be used, as these are used in frameworks for wireless web access, such as the Wireless Application Protocol [6]. The web pages would therefore be presented as hierarchies of stacks containing cards. A card was defined as an object small enough to fit in the allowed screen size.

## Flip Zooming on Small Screens

Given the prerequisite that each web page was to be divided into several cards, this could be achieved in several ways: layout, markup structure – e.g. HTML tags – or textual structure, as analyzed by simple token counts and surface syntax. We decided to try to use an algorithm to divide the page into cards of similar length by simple lexical analysis.

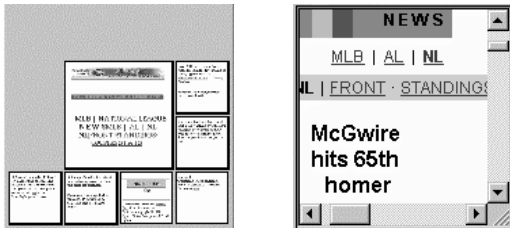


Figure 2 & 3. The prototype browser and a traditional browser on a 160\*160 pixel display

### Using Alternative Views

The original Flip Zooming technique did not transfer very well to the new screen format, as the context objects became very small. Although they were too small to be readable, they did support recognition if the user had seen the card in question before. Thus, they provided some overview after the page had been browsed. In order to support first-time or intermittent browsing as well, we developed a prototype that utilizes several different views on the objects.

#### Summary / Keywords

By basic term frequency based keyword extraction algorithms, a very compact summary (about three words) of the content in a card was created. As only three words were used, the letter size could be made bigger and thus easier to read even when the card in question was not in focus.

#### Hypertext Links

We also extracted hypertext links from individual cards which were presented in a view showing solely the links, in order to provide help when searching for specific links or to get an overview of existing links.

#### Switching Between Views

Given these alternative views, the user can switch between inspecting the objects as graphical objects, and reading them as short summaries by means of a few keywords or alternatively in the shape of the links they contain. One reason for introducing these views was that the project worked under the assumption that the use of web browsers on small screens would be more focused on retrieving specific "important" information than general surfing.

### EVALUATION

As we wished to find the strength and limitations of the prototype web browser, we performed a preliminary formative evaluation in which the prototype was compared with a browser that uses scrollbars. The size of the display area on both browsers were set to 160\*160 pixels and no navigation toolbars or menus (e.g. search functions) were available. The applications each showed the same web page. The subjects were asked to find specific items in the material, by using the different search strategies possible in the two browsers. After completing the tasks, the ten subjects were asked to fill in a questionnaire with both qualitative and quantitative

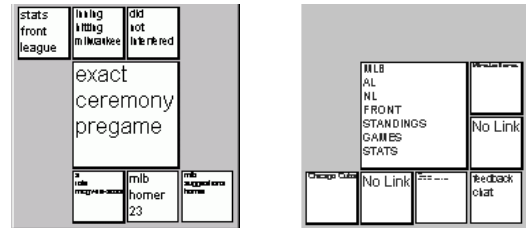


Figure 4 & 5. The keyword view and the link view in the prototype browser

questions. The subjects were students familiar with computers and consisted of 6 males and 4 females.

The users thought that the Flip Zooming technique took some time to become familiarized with. The evaluation also indicated that our prototype provided a better overview than the traditional browser with a mean difference of 3.4 on a scale of 1 to 7 (95% confidence interval of 0.80). Searching was also easier with the focus+ context technique with a mean difference 2.25 for finding a text input field (95% confidence interval of 0.87).

### CONCLUSION

The evaluation indicates that the focus+context technique is a promising alternative to using scrollbars on small screens, especially for providing an overview. Evaluating the prototype on ordinary screens will reveal more about the similarities and differences between "desktop-sized" screens and their smaller counterparts, and what constraints small screens put on interaction design.

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