

Flicking through Page-based Documents with Thumbnail Sliders and Electronic Dog-ears

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ABSTRACT

Current interfaces for electronic page-based documents, such as books or magazines, offer support for navigation based on explicit reference (hyperlinks) or page-numbers. These methods don't resemble the view of page-content a reader has when browsing paper documents. In this paper we describe a method for navigation based on the coarse mental image readers have of a page they have seen before. We discuss experience from using two implementations and ongoing work on a Designer's Sketchbook, where the method is further developed.

Keywords

Browsing, document navigation, thumbnails

INTRODUCTION: BROWSING PAGES

Traditional interfaces and controls for browsing through page-based electronic documents mainly support page-by-page browsing for sequential reading and navigation based on explicit references (hyperlinks).

Prior work has shown that readers often have a coarse mental image of pages containing specific information and use that for returning to pages [2]. When people are browsing through a magazine or book for inspiration, or try to returning to a picture or a diagram, they typically flick through the pages until a striking or familiar image jumps out at them. Current browsing controls do not facilitate this way of browsing.

Interfaces for navigating pages

In early GUI-based word processors, the bottom-right corner of a page indicated the existence of previous/next pages and allowed page-by-page 'leafing'. Although this metaphor is easily understood and allows flipping pages, it is not suited for larger documents that require many page turns.

Scrollbars support leafing (by clicking over/under the handle) and allow the user to drag the handle to a new position, skipping the inbetween pages. By displaying all pages during the drag-action the natural browsing-by-flicking behaviour might be supported, were it not for

technical and perceptual problems. Technically, building up the page often takes too long, and the users get confused in a flood of layouts being drawn and erased. Perceptually (and this may be even more important), even if the pages could be instantly displayed, the overflow of flicking full-screen visual pages can be uncomfortable and disruptive. On the other hand, a scrollbar does have the advantage that its handle roughly visualises the position of the page in the document.

Scaled-down copies of the pages (thumbnails) are used in some applications such as Adobe's Acrobat Reader or Microsoft's Powerpoint. These thumbnails are displayed in an area next to the page display (Acrobat) or as a fullscreen grid (Powerpoint). Although this gives a good overview of about a dozen pages, browsing becomes scrolling through a separate window, which again distracts from the primary content (the document pages). Even if the space needed for displaying thumbnails can be limited (eg as suggested in [1]), issues concerning the used metaphor remain: A list (or grid) of thumbnails represent another spatial page layout than the original stack of pages.

THUMBNAIL SLIDERS

In the method we developed, a single thumbnail representation of the current page is permanently displayed in a corner of the screen. By click-dragging on the thumbnail it is animated to reveal other pages in the document. Moving the cursor to the left and right, the user navigates back and forth through the pages. Only upon release of the mouse-button the current page is replaced by the one corresponding to the currently displayed thumbnail.

Our method bears similarities to the thumbnail sliders in MetaCreations' Bryce 3D. For instance, sliding the cloud density thumbnail in the 'sky & fog' panel changes the cloudiness in the thumbnail's picture. Although this picture is not a preview of the actual effect on the user's scene, this visualisation provides a more useful representation than a numerical slider. When used as a page-navigation control however, the thumbnail should represent the actual pages in the document.

First prototype

A thumbnail slider for page-navigation was first applied in the yearbook of a student society [3]. A small and informal study of the typical browsing behaviour in the paper version of the yearbook showed that sequential navigation was less important than exploratory browsing by flicking through

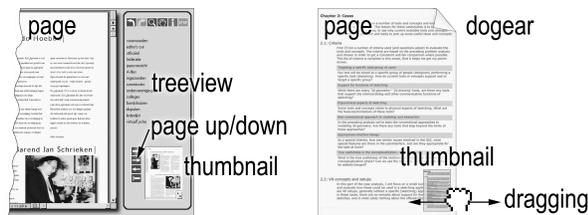


Figure 1: Prototypes 1 (left) and 2 (right)

pages. The CD-ROM version of the document featured a page window, a thumbnail page slider in the corner of the screen, and conventional navigation means (page up/down buttons, document hierarchy), see fig 1.

Although the implementation suffered from minor technical flaws, responses from users were encouraging. They liked the ability to scroll ranges of 50 to 100 pages while still being able to locate the destination page in one smooth gesture. All users had first browsed through the paper version of the book, and easily located their personal favourite pages in the CD-ROM version using the thumbnail slider.

Some limitations were found from user's comments. For example, some pages (eg. starts of chapters, personal favourites) were considered more important than others, but the thumbnail mechanism provided no support for this. In addition, the thumbnail gave no indication of the position in the document like scrollbars do. When users inadvertently scrolled one page off their desired destination, they used the thumbnail to rectify this, even though the page up/down buttons were located next to it and the required small movement is a bit cumbersome.

IMPROVEMENTS OVER THE FIRST IMPLEMENTATION

On the basis of the responses, the design was modified. A mechanism for leafing was added to the thumbnail control itself: a short click to step one page forward, a long click to step back (a control that many slide projectors use). Because buttons can now be omitted, the thumbnail can now be placed on the page (subdued when not in focus), to maximise the space available for the page itself.

In the new design the importance ('weight') of a page is reflected in the time that it appears during a browsing gesture (fig. 2). The weight is visualised through a 'dog-ear' in the top-right corner of the page. As with their real-world counterparts, pages with dog-ears are visible longer during a flicking gesture. The user can manually change the weight by (un)folded the upper right page-corner. Alternatively, the weight of a page could be automatically determined from its content style (eg emphasising chapter titles) or from the content of the page where the browsing action started (making pages with similar content show longer).

Although we tried some ways of representing the current position in the document, none of these proved satisfactory. On the other hand, this omission may not be important for all types of documents.

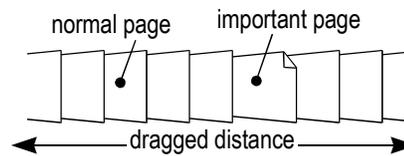


Figure 2: With a weighted thumbnail-slider, important pages appear longer than normal pages

Second prototype

The new design was implemented in a digital document as the only navigation method (see fig 1). As a preliminary test, five people were briefly demonstrated the prototype, and asked to find back illustrations or whole pages which were shown in a paper version. The findings showed all five could find the pages without further instruction. As expected, the weighted pages were easier to find and select. Also, people found and used the page up/down mechanism without additional instruction.

CONCLUSION AND FUTURE WORK

The method described in this paper provides an intuitive and useful complement to existing sequential navigation methods such as scrollbars, but is not a replacement for those methods. It may be used to support the reading of a book of prose, but it's better suited for more exploratory browsing or finding back pages in magazines, books of poetry, picture collections, and books of sketches.

It is in the area last mentioned that we intend to use and further evaluate it. The thumbnail page slider is part of research into a digital sketchbook. The pages of the sketchbook reflect the evolution of the sketches. Here we also study how the weight of pages can be automatically derived from the document's creation and viewing history. For instance, a large weight can be given to a page that was looked at often, or to pages that are in some way related to the page where the drag action started. We have high expectations for using the thumbnail slider to represent such implicit relations between pages, which would be hard to visualise using conventional methods.

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