

The ScrollSearcher Technique: Using Scrollbars to Explore Search Results

Staffan Björk

PLAY, Interactive Institute, Box 620, SE-405 30, Göteborg, SWEDEN
staffan.bjork@interactiveinstitute.se

Abstract: This paper introduces the ScrollSearcher, an enhanced scrollbar that provides users with an overview of the results of text searches and allows users to explore the results using direct manipulation. The ScrollSearcher maintains the original presentation of documents and allows users to combine searches so dependencies between different searches can be studied.

Keywords: scrollbars, widgets, direct manipulation, visual searching

1 Introduction

Scrollbars are one of the most common types of components used in graphical user interfaces. They allow users to quickly navigate between different sections of a document and they indicate what section of the document is in view by changing the size and position of the scroller. Beyond this basic functionality, several enhanced variants of scrollbars have been developed (cf. Ahlberg *et al.*, 1994; Shneiderman 1997; Smith *et al.*, 1999).

Standard scrollbars only provide very rudimentary overview of documents. This restricts users to two forms of navigation: either moving in small steps

in order to maintain continuity or, for familiar documents, trying to move immediately to a position by approximating its position in the scrollbar. Even though scrollbars help users navigate quickly in documents, they do not offer explicit support for searching documents for particular text pieces.

Most search functions in applications simply move to the location of the first hit, sequentially advancing to additional hits if requested. This method of searching does not provide an overview of the search results and does not allow users to explore the results by using direct manipulation. Search methods that provide overview usually do so in separate views (cf. Hearst, 1995).

The ScrollSearcher technique was designed to allow users an integrated method of searching for text pieces in documents and then exploring the results of searches using the direct manipulation navigation style provided by scrollbars.

2 The ScrollSearcher Technique

The ScrollSearcher technique is implemented in a proof-of-concept application, the ScrollSearcher text editor. This application is a simple editor with a scrollbar that initially is indistinguishable from a normal scrollbar. However, when a search is conducted, a *result bar* is shown next to the scrollbar. This bar shows the location of all the found hits using the scrollbar's representation of the document. To help users find hits in the section of the document in view, the left and top parts of the border around the document shows small indicators of where the hits are located. Figure 1 shows the ScrollSearcher text editor after a search for the word *Abraham* has been performed in the book of Genesis.

The ScrollSearcher technique tightly couples the presentation of results with the navigation provided by the scrollbar. Users move to hit locations by sim-

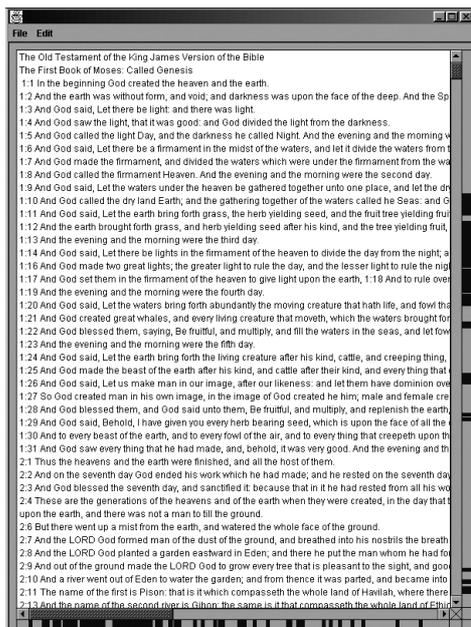


Figure 1: The ScrollSearcher text editor after one search.

ply dragging the scroller so that it is aligned with the indicator for the hit. This navigation style allows users to move between different hits using a direct manipulation technique, and allows users to choose in what order to view the hits.

As all hits are presented in relation to the document as a whole, users are provided with a view of the distribution of the hits. This allows users to identify hits with characteristics usually hard to notice using simple search functions, e.g. groups of hits, hits that are isolated, and hits that are located in certain regions of the document such as the beginning or the end.

Additional searches are shown by placing more result bars next to the first, using color-coding and pop-up views (so-called tool tips) to help users distinguish the different result bars. As all searches are visualized next to each other, they can easily be compared. This allows users to see where hits from different searches coincide; effectively showing the result of compound searches using Boolean expressions based on the search keys. Further, other information such as absences of hits, sequences between different searches, etc., can be found by visually comparing the different result bars. Figure 2 shows the ScrollSearcher text editor after searching for *Abraham*, *Isaac*, *Jacob* and *angel* in the book of Genesis. Besides showing the order in which people are mentioned, the view shows that Abraham and Isaac are often mentioned together and that when they are mentioned after a period of disuse, the term *angel* is also used.

Preliminary user feedback has been positive, but future user studies need to be conducted to validate the benefits and drawback of the ScrollSearcher. Among other things, the ability to keep the presentation of the documents unchanged while showing the results of searches should be evaluated.

3 Related Work

Visually similar enhancement of scrollbars, Chimera (1992) uses a bar to show the numerical value (e.g. file age or size) of items, using each item's individual value to determine its size in the bar. As the bars do not use the scrollbar's frame-of-reference, they are not tightly coupled and should be seen as independent navigation aids. As an example of Instrument Interaction, Beaudouin-Lafon (2000) introduces a "search and replace" widget that presents search results inside the scrollbar and uses tight coupling. However, as multiple searches are shown together, recent searches occlude previous ones and prevent users from comparing them.

The SeeSoft system uses a categorical slider to enable searches of multiple files represented as thin rows (Eick *et al.*, 1992). Eick (1994) uses a generalization of sliders to present distributions and allow selection of disconnected intervals. However, these systems do not tightly couple the navigation of scrollbars to the presentation of search results.



Figure 2: The ScrollSearcher with multiple result bars.

4 Conclusions

The ScrollSearcher expands the functionality of scrollbars, allowing users to explore the results of searches by using direct manipulation without changing the presentation of the searched document. Position and distribution of hits are easily identifiable by a visual coupling between result bars and a scroll bar. Further, multiple searches are shown without occlusion, enabling users to identify dependencies and patterns between different searches.

References

- Ahlberg, C., and Shneiderman, B. The Alphaslider: A Compact and Rapid Selector. In *Proc. of CHI '94*. ACM Press, 1994.
- Beaudouin-Lafon, M. Instrumental Interaction: An Interaction Model for Designing Post-WIMP User Interfaces. In *Proc. of CHI 2000*. ACM Press, 2000.
- Chimera, R. Value bars: an information visualization and navigation tool for multi-attribute listings. In *Proc. of CHI '92*, pp. 293-294, ACM Press, 1992.
- Eick, S.G. Data Visualization Sliders. In *Proc. of UIST '94*, pp. 119-120, ACM Press, 1994.
- Eick, S.G., Steffen, J.L., and Sumner, Jr. E.E. Seesoft - a tool for visualizing line oriented software statistics. *IEEE Transact. on Software Engineering*, Vol. 11, No. 18, pp. 957-968, IEEE Press, 1992.
- Hearst, M.A. Tilebars: Visualization of term distribution information in full text information access. In *Proc. of CHI '95*. ACM Press, 1995.
- Shneiderman, B. *Designing the User Interface*. Addison-Wesley Publishing Company, 1997.
- Smith, R.B., and Taivalsaari, A. Generalized and Stationary Scrolling. In *Proc. of UIST '99*, ACM Press, 1999.