Artificial Landmarks Augmented Linear Control Widgets to Improve Spatial Learning and Revisitation Performance

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ABSTRACT

Revisiting locations within a linear document (e.g., video or PDF) is a very common yet important task that requires both recall and precision from user. Modern linear control widgets (e.g., sliders and scrollbars) provide various navigational features including an abstract mapping of the entire document in the body of the widget. These linear mappings, however, are visually undifferentiated and often make revisitation task difficult. We present two artificial landmarks augmented designs: one that placed arbitrary abstract icons in the body of the widget, and one that added thumbnails extracted from the document and tested those in two types of content (a video, and a PDF document). Our findings demonstrate that augmenting linear control widgets with artificial landmarks can provide substantial benefits for document revisitation and navigation.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI) → Interaction paradigms**

KEYWORDS

Spatial memory; artificial landmarks; revisitation

1 OVERVIEW

Linear documents such as text, audio, or video typically use linear widgets (e.g., scrollbars or sliders) for navigation. These widgets provide an abstract spatial representation of the entire document in that one dimension of the controller (e.g., Y-position of a PDF, or timestamp in a video). Aside from this spatial mapping, most linear controllers do not provide any visual marks that represent document content. Often linear controllers (e.g., YouTube or Adobe Acrobat Reader) provide interactive thumbnails showing only a small portion of the document (but not the whole document) allowing users to access the content close to the focused region. As a result, using the controller to build document's spatial understanding, and to recall and revisit specific document locations, can be difficult [1].

Past works showed that human spatial location memory is highly effective, and can be both expansive and accurate if the environment is rich and spatially stable [1-4]. Therefore, it is possible that revisitation with linear widgets can be substantially improved simply by adding a rich set of spatially-stable landmarks to the controller – allowing users to build up spatial memory of important document locations.

In the paper [5], we reported on a study of how artificial landmarks affected spatial learning and revisitation using two different linear widgets (a horizontal slider and a vertical scrollbar) and two different kinds of content (a video and a PDF document). We augmented the widgets with two types of artificial landmarks [5] (abstract icons and with thumbnails extracted from the content) and compared with no landmarked version. Results showed that both artificial landmarks improved spatial learning and revisitation performance, with the thumbnail condition performing best in both systems.

2 CONCLUSIONS AND FUTURE WORK

Linear control widgets can provide a stable spatial representation of a document, and enable efficient navigation and revisitation. Our study shows that artificial landmarks are a simple and valuable method for improving navigation in linear documents. In future, we would like to explore the use of landmarks in large linear documents. Also, we invite people in the HCI community and interested in spatial memory interfaces, interaction designers to come and talk to us, and provide valuable feedback on this interesting issue.

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