

ART-SHTA: A Tool for Sculptural Hypertext Authoring

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ABSTRACT

The ART-SHTA (Sculptural HyperText Authoring) tool supports information and concept structuring for analytical and scholarly compositional tasks. ART-SHTA employs three hypertext techniques: *sculptural hypertext*, *spatial hypertext*, and *hierarchy browsing*. While the notion of sculptural hypertext was originally introduced to provide tools for hypertext narratives, our approach demonstrates that it also provides a powerful method for supporting analytical and scholarly authoring tasks; which we call *sculptural hypertext authoring*. Integrated with the interaction technique for spatial hypertext and the 3-column view for hierarchy browsing, the ART-SHTA system serves as a cognitive tool for a user in a more natural and unobtrusive manner.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces – *Graphical User Interfaces, Interaction styles.*

General Terms

Design, Human Factors

Keywords

Spatial hypertext, sculptural authoring, scholarly work, interaction design, cognitive models

1. INTRODUCTION

The ART-SHTA (Sculptural HyperText Authoring) system supports information- and concept-structuring for analytical and scholarly compositional tasks. ART-SHTA employs three hypertext techniques: sculptural hypertext [1], spatial hypertext [5], and hierarchy browsing. The system has been used for such tasks as to understand and specify system requirements (see Figure 1), and to clarify research concepts to design a structure for authoring an academic paper.

Sculptural hypertext refers to a type of hypertext where one “creates a structure by removing unwanted connections, much as a sculptor may create objects by removing unwanted material” [1]. While the notion of sculptural hypertext was originally explained

to provide “exotic tools for hypertext narratives” [1], we argue that the approach also demonstrates a powerful method for supporting analytical and scholarly authoring tasks, which we call sculptural hypertext authoring.

Spatial hypertext representations help users gradually define and fix relationships among objects using emerging structures [3][7]. Additionally, with the interaction design technique used in the four ART systems we have developed [8], a space provides a way to view the entirety, giving a global view of the space of information chunks being constructed.

The 3-column view for *hierarchy browsing* has been used to display a focused element in the central column, and linked elements in the columns on the both sides. This allows a user to easily move within the hierarchy without losing the context.

The ART-SHTA system has a name starting with “ART” because throughout the interaction design of this system and other systems (such as ART#001, #002, #003 and #004 presented in [8]), the design principle called ART (Amplifying Representational Talkback) has been applied [5][6]. ART emphasizes that computational media should (1) allow a user to easily represent what he/she wants to externalize, (2) allow a user to easily understand what he/she has externalized, and (3) “be quiet,” not offering disturbing services [9].

2. THE ART-SHTA SYSTEM

ART-SHTA helps a user in creating, modifying, or removing elements (i.e., nodes) and their directed links (*inbound* and *outbound*). Each element consists of (1) title, (2) content, (3) a list of inbound links, and (4) a list of outbound links. Currently, the system can only deal with textual content for each element.

The system (Figure 1) consists of two parts: SpaceView and ElementView. SpaceView, located in the upper half of the system, is a 2D space for hypertext where a user can freely position elements. ElementView, located in the lower half of the system, consists of three columns: ElementEditor in the center, the InboundLinkList on the left, and the OutboundLinkList on the right.

Each element in SpaceView is represented as a box with its title as the label. A user drags an element in SpaceView and moves its position through direct manipulation. All elements are displayed in SpaceView, possibly representing emerging relationships among the elements. Note that relationships represented in the space are independent of the existence of links. All the links, which are specified only through ElementView, are represented with straight lines connecting boxes. Each box has two triangles (both pointing right) on each side. Straight lines representing

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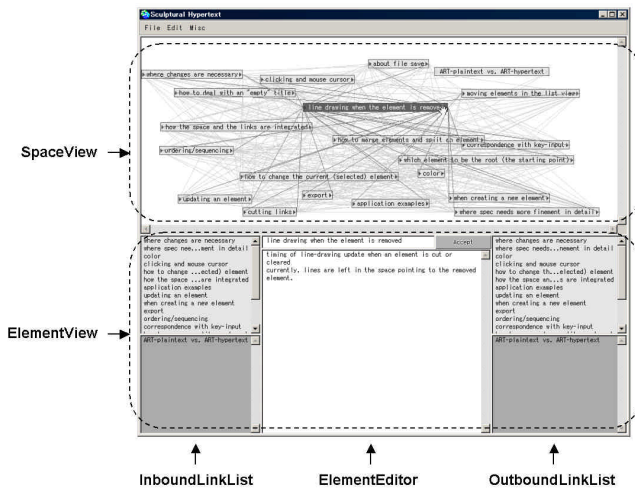


Figure 1: The ART-SHTA System

inbound (outbound) links of an element have their heads (tails) attached to the triangle on the left (right) side of the box. As a user drags an element in SpaceView, straight lines representing links will follow in a real-time manner.

By clicking on an element in SpaceView, a user *focuses* on the element. A *focused* element is shown with dark background with white foreground in SpaceView. Links going into or going out from the focused element become emphasized in black (the rest of the links remain gray).

When focused, the element is presented in the central column of ElementView, called ElementEditor, where a user can create or modify its title (a small pane in the top) and its content (the larger pane in the bottom).

Each of the left (InboundLinkList) column and the right column (OutboundLinkList) allows a user to create or remove links of the focused element. The left (right) column consists of two panes. The upper pane shows a list of titles of elements with which the focused link has inbound (outbound) links. The lower pane shows a list of titles of elements with which the focused link has no inbound (outbound) links. The user can specify to which elements the focused element has inbound (outbound) links by moving elements between the two panes (by dragging an element from one pane to the other). Thus, the upper and lower panes together always list all the other existing elements in each of the two columns. A user may focus on another element by double-clicking on the name of the element displayed in any of the lists.

Basic authoring activities using ART-SHTA include creating a new element or focusing on an element and edit the element. When creating a new element, a user clicking on an empty space in SpaceView. Then, the system releases the focus, making ElementEditor blank, and becomes ready for the user to create a new element. When this happens, existing elements are all listed in the upper panes of InboundLinkList and OutboundLinkList, ready to be designated as links. Thus, by default, a new element is set to have inbound and outbound links to all the other existing

elements. When pressing the *Accept* button (located on the right of the title pane), a new element appears in SpaceView with lines connected to all the other elements. This is where the system encourages a user to *sculpture* the information structure [1][2].

Another option is to reverse the default option. If the user presses the shift key and the *Accept* button simultaneously, all the links are taken away and elements listed in the upper panes all move to the lower panes. A newly created element is now not connected to any other elements. This allows a user to proceed the authoring task as a conventional *calligraphic* authoring process [1].

Once created, any element can be selected (by clicking on an element in SpaceView or by double-clicking on an element in the link lists) as a focused element and brought into ElementView. Then, a user may move the element in SpaceView, or add or remove any of inbound and outbound links by dragging elements between upper panes and lower panes. The title and content can also be modified.

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