

A Cognitive Tool for Navigational Learning and Its Meta-Cognition in Hyperspace

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Abstract: The main issue addressed in this paper is how to improve the coordination between navigational learning process and its meta-cognitive process in hyperspace provided by existing Web resources, which includes coordinating two different meta-cognitive processes: navigation planning and reflection. This paper demonstrates the cognitive tool, which enables learners to reify and coordinate their navigational learning process and the meta-cognitive processes.

Keywords: cognitive tool, meta-cognition, navigational learning, Hyperspace

Introduction

Web-based resources generally provide learners with hyperspace within which they can navigate the Web pages by following the hyperlinks among the pages to learn domain knowledge embedded in the navigated pages [2]. The navigation process involves making a navigation path and constructing knowledge learned at or between the navigated pages. Such navigation with knowledge construction is called navigational learning [1].

In succeeding in navigational learning, it is important to make a plan of navigation path to be followed for achieving a learning goal before navigation, which is called navigation planning. It is also important to review and reconstruct their knowledge constructed from the navigation path followed, which is called reflection. Such navigation planning and reflection can be viewed as meta-cognition in navigational learning [2]. However, it is difficult for learners since navigation planning and reflection are concurrent with navigation and knowledge construction process in a spiral way.

The main issue addressed in this paper is how to promote the spiral process consisting of navigation planning, navigation with knowledge construction, and reflection in hyperspace provided by existing Web resources. This paper proposes a cognitive tool with which learners can reify and coordinate navigation planning and reflection processes, and which they can also improve the coordination between navigation with knowledge construction and its meta-cognitive processes.

1. Framework

The cognitive tool proposed here consists of Web browser and annotated navigation history. The annotated navigation history enables reification of navigation planning and reflection, and enables seamless coordination between navigation with knowledge construction and these meta-cognitive processes.

The annotated navigation history allows learners to operate their navigation history for making a navigation path plan, constructing knowledge with link annotation between the learned pages, and reflecting/reconstructing knowledge structure constructed.

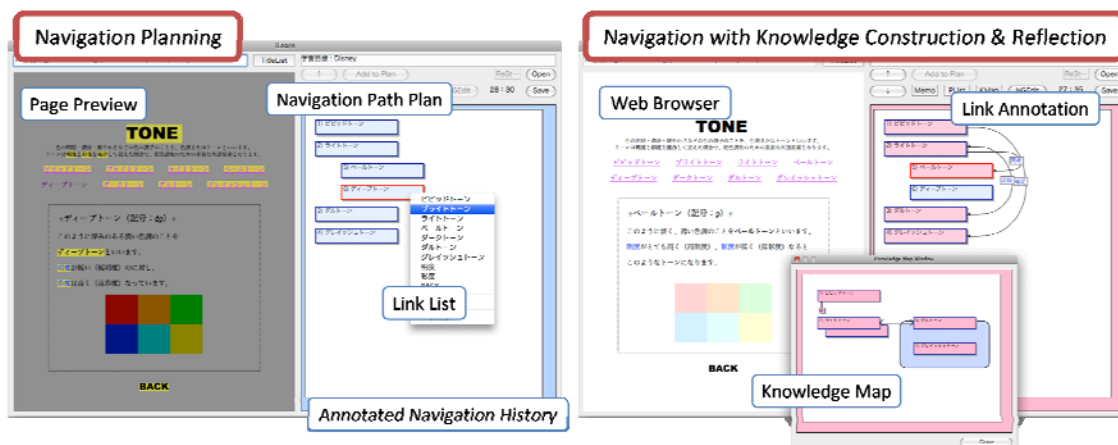


Figure 1. User Interface and Functions of the Cognitive Tool.

2. Functions

Figure 1 shows functions of the cognitive tool. First, learners can initialize a learning goal with a list of the titles of all pages included in a Web resource and page preview highlighting the key information in each page. The learners can then make a sequence of the pages, which they want to learn in the hyperspace, as navigation path plan by means of the page preview and the link list including anchors of the hyperlinks the page contains. The page planned is previewed in the Web browser.

They are next expected to execute the plan with the Web browser and to navigate the pages to construct knowledge. In the knowledge construction process, they can take notes about the pages learned, and can also annotate the navigation history with the link between the learned pages. In addition, the learners can have a knowledge map, which is a visual representation of the annotated navigation history, to reflect on their knowledge constructed. In reconstructing it, they can modify the annotated navigation history.

In case the learners could not construct their knowledge suitable for achieving their learning goal, they could return to the planning phase to re-plan the navigation path. They could then carry out the plan to reconstruct their knowledge in a spiral manner.

3. Conclusion

This paper has described the cognitive tool whose goal is to coordinate different meta-cognitive processes and to combine navigational learning process with the meta-cognitive processes. The cognitive tool enables learners to reify navigation planning and reflection with annotated navigation history, which also enables the seamless connection between navigation/knowledge construction process and its meta-cognitive process.

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