SidePoint: A Peripheral Knowledge Panel for Presentation Slide Authoring

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ABSTRACT

Presentation authoring is an important activity, but often requires the secondary task of collecting the information and media necessary for both slides and speech. Integration of implicit search and peripheral displays into presentation authoring tools may reduce the effort to satisfy not just active needs the author is aware of, but also latent needs that she is not aware of until she encounters content of perceived value. We develop SidePoint, a peripheral panel that supports presentation authoring by showing concise knowledge items relevant to the slide content. We study SidePoint as a technology probe to examine the benefits and issues associated with peripheral knowledge panels for presentation authoring. Our results show that peripheral knowledge panels have the potential to satisfy both types of needs in ways that transform presentation authoring for the better.

Author Keywords

Presentation authoring; peripheral displays; natural language processing

ACM Classification Keywords

H5.2 Information interfaces and presentation: User Interfaces.

INTRODUCTION & BACKGROUND WORK

Preparing for presentations is of critical importance for many people, but often complicated by the need to collect necessary information during the authoring of slides. To understand how this affects user behavior, we conducted an exploratory study with 8 students, each spending an hour to prepare for a 5-minute presentation of their research. We observed participants spending a substantial amount of time using the Web to find both informational and inspirational content, with constant switching between the Web browser and the presentation environment. Presentation authors thus have both *active needs* (typical of what they would attempt to satisfy through proactive Web search), and *latent needs* (previously unanticipated by the author and often identified and satisfied simultaneously when browsing).

Our exploratory study also showed that the unstructured nature of Web search results and the density of Webpages often made it hard to isolate relevant and usable information. As a result, participants often had to spend more time in the Web browser than in PowerPoint. We can interpret this through the lens of Information Foraging Theory [13], which suggests people naturally adapt their environments to maximize the gain of valuable information per unit cost of time and attention. We therefore identified a design opportunity to embed implicit search into the presentation authoring environment, reducing the cost of information finding and supporting both kinds of information needs.

Figure 1 shows our SidePoint add-in for PowerPoint – a peripheral panel that shows concise knowledge items relevant to the content of the current slide as it is being created. We source these knowledge items from NeedleSeek [15, 16, 17] – which offers semantically relevant facts and descriptive sentences – before processing and displaying them in a concise, browsable format. These items can provide value in two ways. The first is directly by left-clicking an item to copy to the notes section of the slide. The second is indirectly through item information-scent [13]: right-clicking on an item loads a Web browser showing literal search results for that item to explore details of the information. Future improvements in knowledge base technologies can directly transfer to interfaces like SidePoint.

Using SidePoint as a technology probe [8], we examine the potential benefits and issues associated with peripheral knowledge panels for presentation slide authoring. This work contributes to the understanding of the needs of presentation authors, demonstrates the feasibility of peripheral knowledge panels, and offers future design directions for such systems.

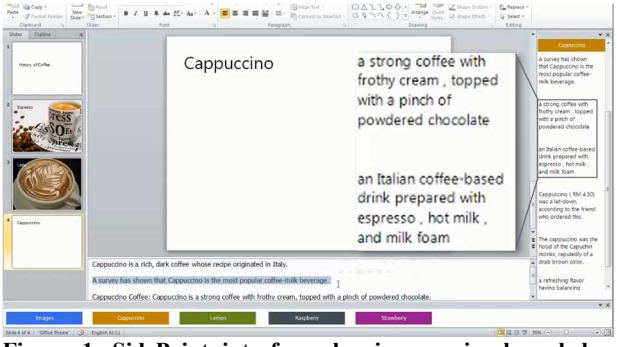

Figure 1. SidePoint interface showing concise knowledge items relevant to the slide content ("Cappuccino"). We use SidePoint as a technology probe to examine how peripheral knowledge panels can support presentation authoring.

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RELATED WORK

Implicit search has been investigated as a way to improve Web search experience [9] and advertisement accuracy [2], as well as interactive systems more generally. Information retrieved by implicit search is often presented in ambient and peripheral displays [12]. Such displays offer non-critical or secondary information [3] without significantly distracting the user's focus from the main task. Thus, peripheral displays are used as an appropriate design for implicit search results.

The Remembrance Agent [14] is an implicit search engine for Emacs showing documents related to the current one the user is reading or writing. Dumais et al. extended this idea to the context of email authoring [5]. Their system offers information relevant to the current email retrieved from other emails, the calendar, Webpages, files, and instant messaging history. Similarly, implicit search has been applied to support information management and retrieval tasks with Webpages [4], answer discovery for questions posted in online social network status updates [7], software development [1], and the user's learning of complex software [11].

Implicit search can include user context beyond interaction within one application. Henzinger et al. [6] built a system offering Webpages that the user might want to read based on TV programs she is watching. With sensors in the environment, the system built by Maekawa et al. [10] shows tips relevant to the user's current activity in the real world. Our work contributes to further understanding of benefits and design challenges of implicit search and peripheral displays focusing on presentation authoring.

SIDEPOINT IMPLEMENTATION

SidePoint is a peripheral interactive panel that displays knowledge relevant to current slide content. Our design allows SidePoint to be integrated into existing tools (e.g., PowerPoint) without interfering with the main workspace.

Text Parsing

SidePoint infers what topic the user is considering for her presentation based on her text input. When the user finishes entering words or sentences in a textbox, SidePoint analyzes them with the Splat parser [18]. This parser returns a dependency tree (a tree representing a grammatical structure), and the system extracts nouns and noun phrases (e.g., adjective + noun, or noun + preposition + noun) as a keyword set. SidePoint then retrieves knowledge about each keyword set through NeedleSeek [17] (technical details of NeedleSeek are available in [15, 16]).

When the keyword is too specific or too long, NeedleSeek may not offer any result; in this case, SidePoint uses Web search results. Although these results are not necessarily optimal, our pilot studies indicated that people would still want to see some information about such keywords.

Knowledge Panel

After SidePoint collects knowledge from NeedleSeek, it shows the results in a knowledge panel on the right side of the PowerPoint window. These are derived from key sentences describing the keywords. These sentences in general have a structure of *[keywords]-[Be verb]-[description]*. SidePoint parses the sentences with Splat to extract the subject complement of the keywords as a concise description. It then orders all descriptions by increasing length. In this manner, SidePoint prioritizes descriptions that are quick to browse. Some NeedleSeek results are short facts related to the keyword (e.g., demographic information of a city), which we list first.

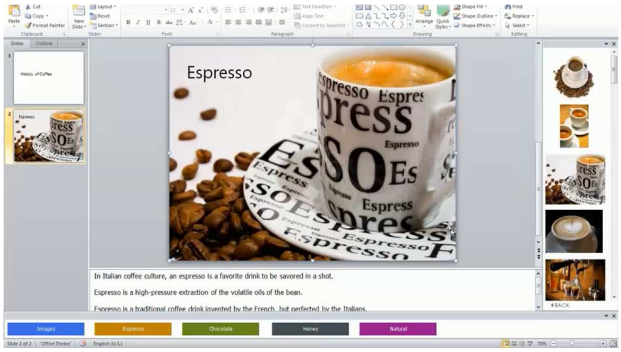

Figure 2. Concept Panel for the term "espresso". The user can simply click an image to import to the slide.

Left-clicking on an item in the panel imports that fact or description into the note section of the current slide. Items can thus be stored for reference or copied onto the slide itself. Right-clicking on an item navigates the user to the Web browser and automatically shows literal Web search results for that item, revealing its source. In this way, the system offers a smooth transition from glanceable facts and descriptions to deeper exploration on the Web. When NeedleSeek returns no results, SidePoint simply lists Web search result summaries in the knowledge panel. They link to search results in the browser in the same way.

Concept Panel

In addition to the knowledge panel on the right side of the interface, SidePoint also incorporates a concept panel that runs along the bottom of the interface and shows alternative concepts that can populate the knowledge panel if selected. This panel displays three different kinds of concept. The first is images: clicking on the image concept appropriates the space of the knowledge panel to display categories of image search results (photos, monotones, graphics, and people). Clicking on any of these shows results of that type; clicking on a desired image automatically adds it to the current slide. Semantically related concepts retrieved from NeedleSeek and alternative nouns and noun phrases from Splat make up the final two concept types. Clicking on any of these updates the knowledge panel results accordingly.

USER STUDY

We examined the benefits and problems of SidePoint in the context of presentation authoring – in particular, how they could satisfy active and latent needs. Our integration of NeedleSeek knowledge allowed us to investigate the satisfaction of both need types and observe how it would support slide authoring. We recruited 12 participants (8 male, 4 female, P1-P12) of age 21-44 (mean 24), with 5+ years

PowerPoint experience and backgrounds in engineering, design, and finance, from our laboratory. None of them knew the SidePoint system before the experiment.

Procedure

The main task in our experiment was to build a 5-minute presentation about their life (e.g., places lived, schools or universities attended, and countries visited). The experimenter first guided the participant through an example presentation showing SidePoint functionality, before participants progressed through three stages:

1. **Plan**. Plan key points to present by typing them in the notes of empty slides; e.g., in a slide on Paris, these might be food, culture, landmarks, or examples thereof.
2. **Build**. Use SidePoint while authoring slides. As our focus was to observe the user experience of SidePoint, we did not allow Web search or free browsing.
3. **Discuss**. Describe how SidePoint supported both planned and unplanned key points, and discuss how SidePoint affected the overall authoring experience.

Findings

On average, participants planned 9 key points per 5-minute talk, found supporting information from SidePoint for 5 of them, and incorporated 2 additional items. However, there were large individual differences, shown in Figure 3.

P1, P3, P5, and P12 had detailed preliminary ideas about what key points to discuss (e.g., weather, culture), finding supporting information for about half of those points. On the other hand, P7 and P9 decided immediately what to say and wrote detailed scripts up front, and did not use SidePoint often. Uniquely, P8 found greater inspiration from suggested items than in her initial planning. We now explain these behaviors by grouping into four themes.

Saving author's time vs. using authoring space

Participants positively mentioned the time-saving nature of peripheral knowledge panels. For example, P11 commented "*if you want to add information or add images, it really saves time"*, referring to how she was pleased to find and use directly an image of her favorite building. This process was *"really convenient, much better than searching on the Internet, saving to my local desktop, and dragging onto slides"*. Along with other participants, she also described the images and text as inspirational: *"this kind of text* (description points) *is helpful for my presentation. It helps me to explore the topic. I got inspiration from this"*.

SidePoint was also described as a beneficial use of the authoring space. For P5, *"this design is not distracting, the image search is convenient, and automatically adding a reference into notes is good too"*. For P8, *"the ambient display design is good, it only takes up a very small space. I don't feel it is distracting"*. These descriptions suggest that relatively small embedded knowledge panels can save time and support fluid authoring when they reduce application switching costs and automate otherwise manual actions.

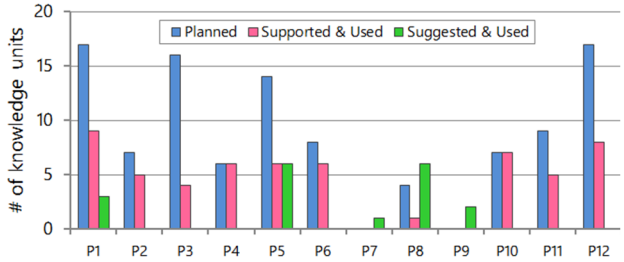

Figure 3. Numbers of planned key points and used knowledge items during the user study.

Triggering implicit vs. explicit search

Several participants remarked that SidePoint felt like search without searching. For P11, *"when I want to get some information, I don't need to go to the Web browser and search, I can just input something here… I don't even need to input really"*. She continued that *"If I just describe places I have been, I don't want to go and search them on the Internet. It's too boring. So if you show them on this place* (the panel)*, it gives me inspiration, I can see more about it"*. In particular, she was inspired by the description of her hometown as "*a beautiful and romantic city with countless stories and fascinating scenery*" and used it on her slide. In another example, P2 noted *"I don't have particular goals or expected topics in mind. I just want to input the words and see what information returns, then choose the ones I feel are good for this slide, and then think about what else I may need"*. This approach created opportunities to satisfy latent needs, e.g., for P3, *"the 'surprising result' moment happened several times, which is really good for me"*. This demonstrates the potential value of implicit search to support thought processes without losing attention to slides.

Although participants agreed that implicit search helped their presentation slide authoring, some requested greater control over what would be searched for and when, e.g., for P3, *"I want to have a button or something to trigger search when I need it, and to stop or refresh the search as I want"*. Satisfying both active and latent needs is difficult, but one behavior in particular linked the two and demonstrated our intended crafting of information scent: *"I didn't find what I wanted from the results, but I did find them by right-clicking and jumping to web sites... hmm... just by right click I could arrive at the content, in that sense it is quite useful"*. For example, the description *"Tianjin dining culture is renowned throughout China, and not only the traditional Tianjin snacks, but the cuisines from other regions of China can also be found"* linked to a website listing all of the different kinds of such regional snacks.

Finding the right facts vs. descriptions

Some participants appreciated knowledge presented as facts; e.g., for P5, *"the fact data is good… it basically provides most of the information I want to introduce my city"*. For others like P6, however, *"the facts are not interesting. I don't think people will be interested in the population or GDP of my hometown"*. This highlights how the value of such facts can be subjective and relative to the specific purpose of the talk, whether to inform or entertain.

Many participants found more value in the description points. For P8, *"the descriptions aren't bad and did suggest some useful aspects I didn't think of"*. During the study, he read through the text points while repeatedly commenting that *"this is good"*, *"this is right"*, and *"this is very true"*. He particularly liked the precise and succinct descriptions of his research area, e.g., *"the study of how knowledge about the world can be represented and what kinds of reasoning can be done with that knowledge"*.

Exploring related concepts vs. attributes

Some participants appreciated the display of related concepts in the concept panel, e.g., for P1, *"the related concepts are useful. I want to show places to travel when I introduce my city, and it suggested nearby cities*". P9 remarked how the system was "*smart*", offering Graphic Design after she had entered Industrial Design on her slide.

However, participants also found that the related concepts offered by NeedleSeek were often too tangential to be relevant in a talk about a particular topic. A suggested alternative to related concepts is to reveal more of the attributes of the current concept. For P11, *"it's better if they have any kind of filter, like if I input a place, I can chose people or scenery"*.

Design Considerations

Based on our results, we propose four design considerations for peripheral knowledge panels that support slide authoring:

1. Trade interface space for time saving until the complexity of the transformed task requires tool switching, providing information-scent-rich entry points for tool switching.
2. Show implicit knowledge results for visual and verbal inspiration, but appropriate the display space for search results when information needs are expressed explicitly.
3. Show a variety of knowledge types at the beginning of the task (e.g., facts, descriptions), but improve relevance over time by adapting to author behavior and content.
4. Support attribute-driven idea refinement through both structured exploration of known attributes and dynamic combination of cues to test for possible attribute relationships (e.g., by searching "{bullet} of {title}").

Together, these directions characterize the ways in which peripheral knowledge panels can become pivotal in their support of presentation authoring – helping authors to pivot between different applications, search modes, result types, and knowledge levels in the increasingly semantic Web.

CONCLUSION AND FUTURE WORK

The core design problem of the information age is to increase the relevant information encountered by a user as a function of the amount of time they invest in interaction [13]. Our SidePoint prototype aims to maximize such exposure to relevant content during time already committed to the primary task of authoring presentation slides. Through our study of SidePoint as a technology probe, we have shown that peripheral knowledge panels have the potential to satisfy both active and latent information needs in ways that transform presentation authoring for the better.

Future work should investigate peripheral knowledge panels in broader contexts and over longer timescales. Comparative studies with other intelligent search tools would also help identify the characteristic benefits and issues of peripheral knowledge panels. In addition, the present study only examines the effect of peripheral knowledge panels on specific presentation topics. Our criterion for the topics was something the user was familiar with but does not necessarily remember all details about. This type of topic frequently generated both active and latent information needs as seen in our experiment. Future studies should examine how frequently other kinds of topic raise active and latent needs and how this affects the use and value of peripheral knowledge panels in general.

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