

Mixed-Initiative Interfaces For Slide-Ware Authoring and Presentation

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Abstract

We present current work on the NextSlidePlease slide-ware presentation tool and discuss how mixed-initiative principles may support the complex tasks of combining multiple linear presentations into a network of related content. We discuss future directions in two areas: supporting the layout of complex sets of interconnected slides, and refining the time requirements and content importance in these networks.

Introduction

We present our ongoing work integrating mixed-initiative authoring support into NextSlidePlease, a slide-ware application. Unlike many slide-ware applications which use a linear, film-strip structure, NextSlidePlease encodes relationships among slides as a 2d directed, weighted graph. Figure 1 illustrates the authoring interface where users can arrange slides and create/edit these relationships. Edges represent potential connections between slides, and are weighted with both a priority (importance of transitioning from one slide to the next) and a time-cost (the time that the next slide is predicted to require).

This work is informed by a survey of presentation usage patterns in industry and academia (Spicer and Kelliher 2009). We observe that in many enterprises, slide decks are frequently constructed by building on already-existing decks, re-arranging, adding, and removing material to suit different audiences and/or incorporate new information. NextSlidePlease affords this kind of engagement with slides by allowing users to import multiple existing PowerPoint slide decks into this 2d graph structure, combine multiple decks, and navigate through the resulting structure during the presentation. We focus on re-using and improving existing content, rather than authoring entirely new slides.

In evaluations of early versions of NextSlidePlease, users commented that constructing these 2d graphs of relationships was time-consuming, although a valuable exercise for reflecting on their presentation content. For this reason, we implemented an automated presentation analysis tool that segments presentations into sections of related content and generates a basic 2d layout, which the user can edit. In

the current iteration of NextSlidePlease, this process is performed once per presentation, and only considers slides in a single imported PowerPoint deck.

To address limitations of this approach, we propose user interface design decisions that implement mixed-initiative (Horvitz 1999) interfaces to support the user in the complex, time-consuming task of converting linear presentations created in traditional tools into the richly interconnected concept map structure afforded by NextSlidePlease.

Our approach proposes integrating the user-controlled aspects of authoring and data input with the tuning of parameters that drive the algorithmic processes. This differs from many contemporary approaches because we posit the computer as creative partner, rather than the computer as a machine that performs a certain set of tasks on demand. We discuss both tradeoffs involved in implementing these types of algorithms and interfaces, and challenges in building both generic and user-specific models of intent.

Related Work

Existing tools have addressed the need to work with multiple generations of the same slide deck (Drucker, Petschnigg, and Agrawala 2006), and to help users extract structure from and search within corpuses of slide decks (Bergman et al. 2010). NextSlidePlease builds on this work by using a computational approach to arrange related slides in 2d space.

The idea of integrating computational support into user interfaces to improve usability has been discussed in terms of providing better interfaces to computational tools and balancing predictability and convenience (Lieberman 2009). One significant area of work has been in using AI approaches to customize user interface in response to the systems model of the users goals (Bunt, Conati, and McGrenere 2007). Short-term predictability is sacrificed to present the most useful menu/toolbar items for the user at any given time. This approach assumes that user goals may be accurately modeled, a challenge (Fischer 2001).

The term *mixed-initiative* has been proposed to describe systems where AI is integrated with user experience in such a way that the algorithm and the user lead the creative process at different times (Horvitz 1999). The challenge of future work at the crossroads of HCI/UX and AI, then, is to balance the improved convenience of AI approaches with the potential negative side effects (Jameson 2009).

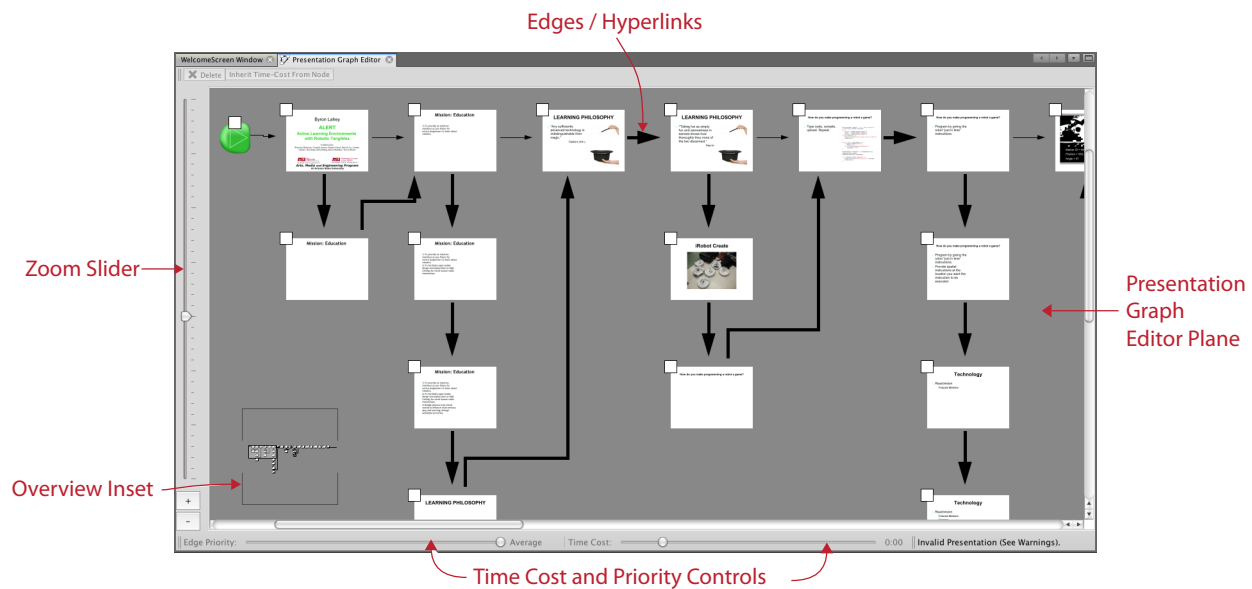


Figure 1: The NextSlidePlease interface uses a 2d directed, weighted graph to encode potential paths through presentation content.

Mixed-Initiative Authoring Support

Refining Layout and Structure

Combining existing content for use in NextSlidePlease presents several challenges in comparison to other slide-ware interfaces. Since existing presentations typically do not make use of hyperlinks and have a linear structure, creating connections between ideas can be a large time burden. To ease this burden, we implemented a clustering algorithm that attempts to segment imported presentations into related sections and lay them out, giving the user a reasonable starting point. The algorithm uses a term frequency/inverse document frequency (tf/idf) approach to classify similar slides, considering each slide as a document and the presentation as the corpus. We believe that this approach is relatively effective for the types of slides frequently found in conference presentations and other slide documents where structure is relatively formulaic — introduction, related work, methods, results, and conclusion. This approach does not take into account image features — frequently the connection between images in presentations is semantic, making standard content-based features like SIFT/SURF challenging to incorporate meaningfully. Although this approach shows promise, several key challenges remain.

First, it may be helpful if users could invoke the support tool to re-analyze a presentation after editing the created graph to de-emphasize unnecessary content or create connections between content in multiple imported presentations. At present, the system invokes this algorithm only when initially importing each linear presentation. This challenge involves both discovering meaningful connections among slides within and among sections, and supporting layout both when slides are initially imported, and over time as the document is revised and expanded.

Adopting such an approach raises the secondary question of how to balance user control, in terms of manual edits to the document structure, and computation-driven updates. The trade-offs in predictability vs. convenience are important to consider. The system should not make edits that the user does not expect, or overwrite changes the user added without permission. The user should be able to specify aspects of the presentation that should not be changed, and be able to review and refine the decisions made by the algorithm. However, this mechanism should not overwhelm the other aspects of the interface.

Refining Time and Priority

Another major challenge in both adapting existing slide decks for NextSlidePlease and in refining NextSlidePlease decks is in refining the time requirement and priority assigned to each edge. In the current implementation, sensible defaults are assigned based on presentation best-practices (eg: 60 seconds per slide) and can be further adjusted by the user. Machine learning approaches could be leveraged to adapt users' time and priority estimates based on actual presentation times and navigation choices, which are already recorded while rehearsing and presenting. Incorporating evidence of the users intent gathered over multiple rehearsal and presentation sessions approaches the goal of applying the algorithmic approach to improve user experience without requiring the user to specifically enter parameters.

One open question here is how to successfully model and generalize the time requirements for different kinds of slides in various presentations by authors with potentially very diverse authoring styles.

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