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Automating the Creation of Advice Based Hypermedia Systems for Task Performance Support

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Expertise is expensive. Becoming an expert is also expensive (and sometimes dangerous) for the company employing a novice and to novices themselves due the mistakes they make. Novices are often in need of expert advice, but experts who could help are not available when they are needed. A type of structured hypermedia systems, called ASK systems have successfully been used to deliver advice on demand. These systems comprise of hundreds of expert video clips containing stories of do's and don'ts of the trade, as well as interesting anecdotes and descriptions of standard procedures. Developing such systems by hand is a very demanding and time consuming task - the most time consuming phase being the creation of hypermedia links. As the number of hypermedia items exceeds a few hundred, the manual indexing process becomes exceedingly error prone: For instance, content indexers get habituated to the content, and thus forget to create links that would be very useful for a novice user of the system. Also, as the amount of content increases, content indexers fail to remember all the content, and thus do not create many, possibly very good links. In order to create large, high quality hypermedia systems, we need to provide support to make this task manageable.

There have been a number of attempts to automate the link creation process. These solutions can be classified in two major categories. On the one end of the spectrum, there are systems that try to fully automate the linking process by eliciting a lot of formal knowledge about each video clip to be linked. Given this large amount of formalized knowledge, these systems use linking rules to find clips that should be linked together. The advantage of these systems is that they can produce very high quality hypermedia systems. Unfortunately, this approach has major flaws: the indexer needs to describe (formalize) each clip, but the size and complexity of the required information can overwhelm the content analyst. To address these problems, systems exploring the other end of the *representation complexity - link quality* trade-off were also developed. These systems do not attempt to fully automate the linking process. Instead, they elicit only a limited amount of knowledge from the content expert about each video clip, and use this knowledge to retrieve other video clips that could be relevant. It is the content analyst's task to filter the proposed clips, and finalize the links. The problem with this approach is that it

still requires the analyst to filter incorrect links, and for large systems this process can be very labor intensive.

Our goal was to develop a methodology that combines the best of both worlds: on the one hand, we wanted to reduce the cognitive load placed on content analysts, but we also wanted to maintain the quality of the proposed hypermedia links. Instead of reducing the complexity of the representation, our approach uses knowledge about the *intended use* of the produced hypermedia system to simplify the representation process itself. Since the users of the created hypermedia system are novices trying to perform some task, we use the model of that task to facilitate the indexing process. The underlying idea is that the task model captures a large amount of background knowledge relevant for making links between stories, thus content indexers do not have to spend time and effort on re-codifying the same knowledge every time.

We are currently developing and evaluating an example implementation for automatically creating ASK systems for novice consultants who work on business process reengineering (BPR) engagements. We developed a large library of task components and used it to build a task model of business process reengineering. The current task model is highly detailed; it contains approximately one hundred task components. We also developed a set of linking rules that use the task model and the represented stories to suggest links between video clips. Content indexers used the tool with the task model of BPR to describe approximately 300 stories. We are still evaluating the quality of resulting links, but the data is promising: approximately 75 % of the links found by the system were also judged correct by content analysts.

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