

Hyper-Hitchcock: Authoring Interactive Videos and Generating Interactive Summaries

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ABSTRACT

To simplify the process of editing interactive video, we developed the concept of “detail-on-demand” video as a subset of general hypervideo. Detail-on-demand video keeps the authoring and viewing interfaces relatively simple while supporting a wide range of interactive video applications. Our editor, Hyper-Hitchcock, provides a direct manipulation environment in which authors can combine video clips and place hyperlinks between them. To summarize a video, Hyper-Hitchcock can also automatically generate a hypervideo composed of multiple video summary levels and navigational links between these summaries and the original video. Viewers may interactively select the amount of detail they see, access more detailed summaries of parts of the source video in which they are interested, and navigate to the entire source video through the summary.

Categories and Subject Descriptors

H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems – *video*. H.5.4 [Information Interfaces and Presentation]: Hypertext/Hypermedia – *navigation, user issues*.

General Terms: Algorithms, Design, Human Factors.

Keywords: Hypervideo, video summarization, video editing.

1. INTRODUCTION

Hypervideo allows viewers to navigate between video chunks. General hypervideo allows multiple simultaneous link anchors [2, 5], e.g., links from actors on the screen to their biographies. We have concentrated on a simpler form of hypervideo, *detail-on-demand* video, where at most one link is available at any given time. Our notion of *detail-on-demand* video has been influenced by interactive video that makes it possible for people viewing the video to make choices that impact what video they see.

We have designed Hyper-Hitchcock [4], an authoring and playing interface that supports authors in creating detail-on-demand video by providing a direct manipulation environment in which authors can combine video clips and place hyperlinks between them.

We also use detail-on-demand video as a representation for an interactive multi-level video summary [3]. This takes the form of a hypervideo comprising multiple video summaries and navigational

links between these summary levels and the original video. Viewers can interactively select the amount of detail they see, access more detailed summaries of parts of the source video in which they are interested, and navigate to the entire source video through the summary.

2. HYPER-HITCHCOCK

Hyper-Hitchcock is an authoring and playing interface that supports authors in creating detail-on-demand video. Hyper-Hitchcock automatically divides video takes (on/off boundaries in source video) into video clips based on camera motion and lighting. These clips are represented by keyframes (top-left of Figure 1) and can be dragged into the workspace (bottom, Figure 1). Clips can be grouped into composites that are represented by keyframe mosaics. Clips and composites can be resized in the workspace to change their play length and the components of composites can be rearranged and resized in a split workspace.

Video clips or composites can have a single navigational link to another element (clip or composite) in the workspace. Unlike traditional hypervideo links that jump to a different part of the video, links in detail-on-demand video also express what should happen when the linked video clip finishes playing or when the user presses the “back” button (see Figure 2). Return behaviors include returning to the point in the source video where the link

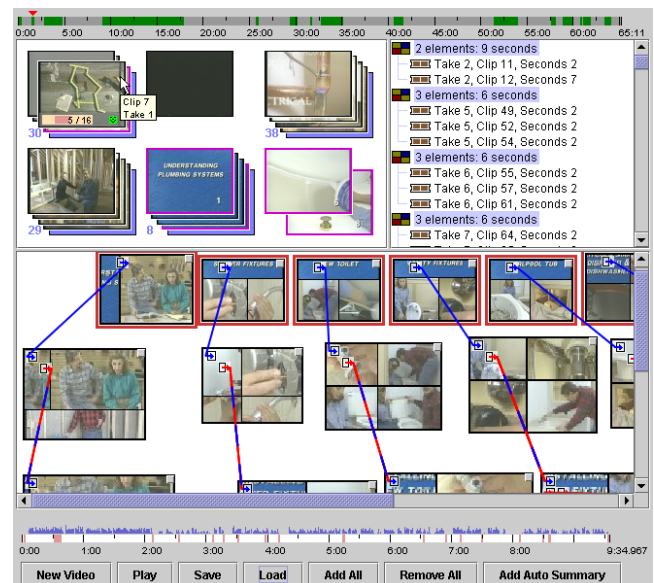


Figure 1: Editing Hypervideo in Hyper-Hitchcock.

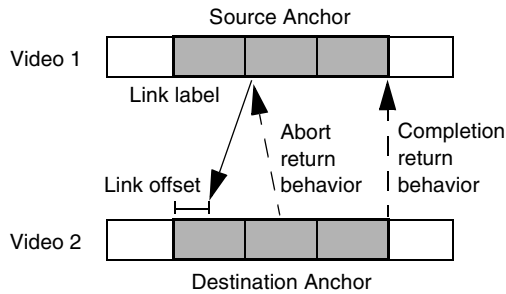


Figure 2: A Detail-on-Demand video link includes source and destination anchors, link label, and return behaviors.

was taken, returning to the beginning of the source anchor, returning to the end of the source anchor, and stopping video playback all together.

Viewing video in Hyper-Hitchcock combines interaction characteristics from browsing the Web and changing channels on TV. As the viewer watches a video, the player indicates when links are available and presents labels for them (see Figure 3). The viewer can follow the link to see the destination video or let the original video keep playing. The destination video will play until completion, at which time the original video will continue as indicated by the link's return behavior. If the destination video is not of interest, the viewer can press a "back" button to return to the source video similar to backtracking in a Web browser.

3. HYPERVIDEO SUMMARIZATIONS

Because watching video is very time-consuming, there have been many approaches for summarizing video. In addition to being an authoring tool for hypervideo, Hyper-Hitchcock includes the ability to automatically generate multi-level hypervideo summaries. For such summaries, video clips are selected for the different levels of the summary such that they both summarize the video at the appropriate level and that they provide good link anchors and destinations. Each level in the hierarchy is similar to a video skim [1] in that it combines relevant video clips. The generation of the multi-level video summary includes three basic decisions: (1) how many levels to generate and of what lengths, (2) which clips from source video to show in each level of the summary, and (3) what links to generate between the levels of the summary and the behaviors of these links.

4. CONCLUSIONS

In this demonstration, we present the notion of detail-on-demand video as a flavor of hypervideo that simplifies authoring and navigation. In detail-on-demand video, a viewer can press a button to get more information about the current video sequence. This interaction style is well-suited for "how to" videos where the main video stream presenting the topic at a more abstract level and the viewer can navigate to view the aspects for which they need more help in greater detail. We have designed Hyper-Hitchcock, an authoring and playing interface that supports authors in creating detail-on-demand video by providing a direct manipulation environment in which authors can combine video clips and place hyperlinks between them.



Figure 3: Player with Navigation Buttons and Link Indicators.

We also use detail-on-demand video as a representation for automatically generating interactive video summaries. The interactive video summaries are generated to include several linear summaries of different lengths and links in between these summaries and the source video. Two goals for the design of hypervideo summaries are to minimize user disorientation resulting from link navigation and minimizing the rewatching of video. Clip selection and link generation algorithms interact in determining the degree to which a hypervideo generation approach will meet these goals.

We will demonstrate the authoring and viewing of detail-on-demand video in Hyper-Hitchcock. Additionally, we will demonstrate the automatic generation of hypervideo summaries, their playback, and the ability to edit these generated summaries.

5. REFERENCES

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