

Home Video Editing Made Easy — Balancing Automation and User Control

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Abstract. Video use is becoming increasingly popular among non-professional users. Many people own video cameras and use them to record personal events such as vacations or weddings. Furthermore, Digital Video (DV), a digital camera format, is becoming more common. With DV cameras, people can easily move their video to the computer. Once on the computer, the video can be edited or converted to a streaming format and published on the Web. However, editing the video is still problematic. With still cameras, it is easy to discard pictures that are of poor quality, that are redundant, or that are simply “boring.” With video, the process is more difficult. This is because (1) you have to find the parts of the video that you want and (2) you have to trim the video in such a way that it is visually appealing when viewed. Finding the part of the video you want requires linear search, and finding the cut points for trimming requires looking at individual frames.

Hitchcock is a system to simplify the process of editing video. Its key features are the use of automatic analysis to find the best quality video clips, an algorithm to cluster those clips into meaningful piles, and an intuitive user interface for combining the desired clips into a final video. We began with the hypothesis that video editing could be made simpler by pre-processing and structuring the video for editing. First, we automatically segment long takes into shorter clips. These clips contain a single event, and are trimmed to cut out “unsuitable” video. By unsuitable video, we mean video where the camera is moving too quickly, the camera is unsteady, or the image is too dark. These regions are found by analyzing the video for camera motion and luminance level. Next, we cluster the clips and arrange the keyframes representing each clip into “piles” based on similarity and/or temporal structure. Finally, we provide an intuitive user interface that allows the user to navigate through the piles, arrange selected clips in the desired order in a timeline, and lengthen and shorten a clip by simply manipulating the size of its keyframe.

We conducted a user study to determine how the automatic clip creation and pile navigation support users in the editing process. The study showed that users liked the ease-of-use afforded by automation, but occasionally had problems navigating and overriding the automated editing decisions. These findings demonstrate the need for a proper balance between automation and user control. Thus, we built a new version of Hitchcock that retains the automatic editing features, but provides additional controls for navigation and for allowing users to modify the system decisions.

Keywords: Video editing, video analysis, video exploration, automatic video clip extraction.