International Remix: Video Editing for the Web

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ABSTRACT

The long-awaited arrival of video as a major medium on the web is here. But in contrast to the textual web, which enables users to author documents with a minimum of technical knowledge, the video web is still read-only for most users. Developed for the 2006 San Francisco International Film Festival, International Remix is a platform for web-based video editing that provides a simple video authoring experience for novice users. Nineteen directors from nine countries agreed to allow their films to be used as raw material for the creation of remixes using the platform. This paper describes the International Remix system, some of its design features, and its potential as a platform for research into community media usage on the web.

Categories and Subject Descriptors

H.5.1 [**Information Interfaces and Presentation (e.g., HCI)**]: Multimedia Information Systems – *Video*; H.3.7 [**Information Storage and Retrieval**] Digital Libraries – *User issues*; J.5 [**Arts and Humanities**].

General Terms

Design, Human Factors.

Keywords

Web video, remix, new media, social software, social media.

1. INTRODUCTION

The past year has seen an explosion in the amount of video on the web, fueled by the debut of a number of sites for uploading and sharing video clips. As of April 2006, the most popular of these sites was receiving over 35,000 videos per day [1]. Yet for the majority of users, web video remains a read-only medium [2]. The International Remix project, a collaboration between Yahoo! Research Berkeley and the San Francisco Film Society, was an attempt to remedy this situation by developing a platform that would allow novice users to experience video authoring by arbitrarily selecting and combining or "remixing" material from professionally produced films.

By asking directors to permit the creation of remixes from their films and providing tools on their website to create these remixes, the Film Society hoped to engage younger audiences in the festival and to prompt them to explore festival content in a new

way. For our research group, this was an opportunity to build a platform for exploring the collaborative annotation, retrieval, sharing and remixing of media content on the web. The system we developed provides the basis for considerable further research on how communities of users can contribute to and leverage sharing tools for time based media, including segmentation of audio and video, annotation and search of media assets, and media reuse.
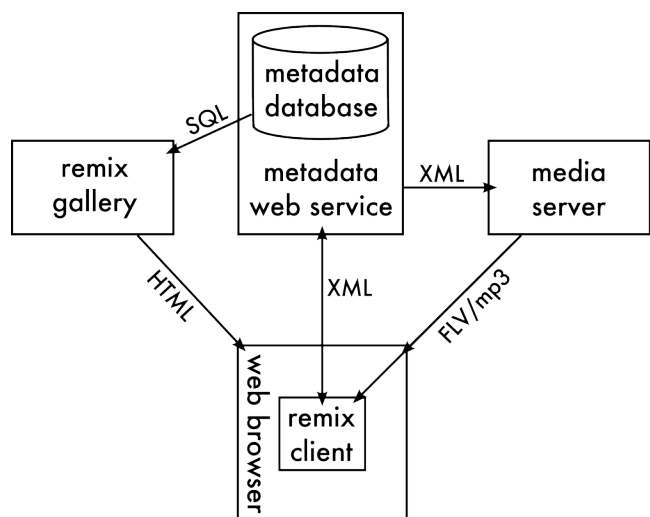
2. SYSTEM DESCRIPTION

Figure 1. Components of the International Remix system.

The International Remix system consists of four components (see Figure 1): a client that runs within the end user's web browser, a web service for persistent storage and query of remix metadata, a video server that handles on-demand splicing and serving of remixed video from multiple sources, and a gallery site for browsing and viewing submitted remixes. The client is a Macromedia Flash application and thus will run within any web browser that supports the Flash Player 8 plug-in. It communicates with the web service using XML messages sent via HTTP. The web service adheres to the REST architectural style for distributed hypermedia systems [3] to ensure scalability and allow the use of standard web intermediaries such as proxy caches. Both the web service and the gallery site are PHP5 applications running on the Apache web server, using a MySQL database for persistence. The video server is a standalone custom C++ application that serves remixed Flash Video files over HTTP.

The client interface allows users to select and view source media objects, and then choose specific segments of the source media files using standard trimming controls. These segments can be saved to a personal clip bin, and then sequenced together on a timeline to create a personal remix. Users can select a background soundtrack (which helps unify the remixed segments), and can then selectively enable or mute the audio for each segment in the remix. The client also supports playback and submission of the remix to a public gallery.

The web service supports queries for and updates to metadata describing source media objects, media segments, and remixes. When the client initializes, it queries the web service for the lists of source media objects, user-defined segments and in-progress remixes. Changes made by end users to segments and remixes are immediately persisted to the server via asynchronous calls to the web service.

The video server handles all requests for video playback and thumbnails shown within the client interface. To serve video for a given remix sequence, the video server first queries the web service for the segments that constitute the remix and then splices the appropriate pieces of the source media objects into a remixed video file. This remixed file is then streamed to the client via standard HTTP.

3. APPLICATION DESIGN

The standard video authoring process presents novice users with a number of obstacles. First, users must obtain some source media, usually by shooting it themselves or copying it from some other source such as DVD. The former requires a video camera and knowledge of how get the captured media onto a PC in an editable form, while the latter generally requires willingness to violate copyright law and knowledge of how to circumvent DRM systems. Assuming the user gets this far, the editing itself can be fairly straightforward using consumer-oriented editing software of the kind bundled with major operating systems. However once the creative process is complete, users often face a difficult technical process to share their edited media. This problem is akin to that faced by non-technical authors who wished to publicly share textual documents, before the advent of blogs. As a result of these obstacles, a relatively small number of computer users have actually had the experience of sharing video they have edited with others.

International Remix addresses this by providing users with a web-based interface for browsing and viewing an archive of video in which they can immediately move to editing that video. Users need no special software other than a web browser, and because, like blogging, the entire editing process is web-native, users can progress smoothly from authoring to sharing. Technical details regarding file formats, compression rates, and storage space are all hidden from the user, enabling her to focus on the task of communicating via video editing.

To publicly share a finished remix, the user submits her work to the remix gallery. This raises the question of how remixes should be represented in the gallery. Since a remix usually includes media from a number of different sources, a single thumbnail image is generally not sufficient for representing remixed content. Our submission interface allows the user to select up to five keyframes from their remix to be displayed in the gallery. Instead of using automated techniques to select thumbnails, we extend the creative act of remix creation to the process of selecting representative images for the remix. This approach also allows us to gather statistics on which frames of video are chosen as most representative by human users, for later use in training algorithms to select representative keyframes.

4. ONGOING AND FUTURE WORK

International Remix was featured on the 2006 San Francisco International Film Festival website for one month [4]. During this time over 1000 visitors used the system, submitting about 150 remixes to the gallery. Though users were anonymous, we were able to gather aggregate data on the system's usage, which we are currently in the process of analyzing.

We are particularly interested in the community's use of individual segments of the original media. Our initial analyses seem to indicate that these usage patterns may be useful for developing segmentations or summarizations of source media items that reflect a community's interest in particular shots or scenes. We are also looking at the syntax of the submitted remixes to see if we can discover any patterns in how a community of users chooses to sequence segments from heterogeneous sources.

Future versions of the remix system will include the ability for users to add descriptive tags to the segments they create. Segments created by individual users will be searchable and usable by other users, allowing collaboration around a shared clip bin. In addition to facilitating our research into media annotation and reuse, we hope that these features will further lower the barriers to creative expression by allowing users to leverage the segmentation and description work of others.

5. ACKNOWLEDGMENTS

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