Collaborative hypervideo editing using MediaWiki

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Abstract
Current wikis cannot be used to host or author rich dynamic hypervideos along with hypertext elements. In this article *vi-wiki* is presented as an approach for seamless and collaborative integration of interactive hypervideos into MediaWiki. *Vi-wiki* combines the wiki metaphor with a direct manipulation user interface for hypervideo authoring and particular markup conventions. The research makes a contribution to collaborative work and learning with wikis. It enables users to annotate spatio-temporal hyperlinks as well as composite sequential video clips through both, a graphical user interface and a generic markup language.

Author Keywords
Hypervideo; Wiki; Video Authoring, Multimedia Wiki;

ACM Classification Keywords
H.5.4 Hypertext/Hypermedia [Hypertext/Hypermedia]: Architectures.

General Terms
Design

WikiSym 12, Aug 2729, 2012, Linz, Austria.
ACM 978-1-4503-1605-7/12/08.

Introduction

Wikis such as Wikipedia are a good example of text-based, collaborative knowledge databases. Its their aim to share stored information with a dedicated but almost broad audience. Information is organized in pages or articles which are interconnected among each other and beyond the wiki by hyperlinks. Page content itself consists of text and encapsulated images or continuous media elements such as video or audio. Editing is as easy as using common word processing software. Due this similarity its reasonable to explain the limitations in compositing and manipulating continuous media elements within wiki systems. Continuous media elements can only be assigned to a certain spatial position and dimension within a predefined layout. Current wiki systems do not address its characteristically temporal peculiarities. This article aims to combine the advantages of text-based collaborative writing and hypervideo authoring under the umbrella of wikis. Its not just an important issue because hypervideo authoring has to become more easily and scalable [7] but also to enrich wikis with moving pictures. The first section gives a brief overview of related works in the field of video and hypervideo authoring regarding wikis. Based on the derived core requirements the second section addresses concepts of hyperlink design, authoring and markup from the perspective of user interaction design.

Related Work

Augmenting wiki pages with a composition of several video clips can be considered as asynchronous incremental collaborative creation. Kaltura [3] as an example of web-based video editing software supports collaborative management, creation and publishing of videos as extension for MediaWiki to encourage video integration, e.g. at Wikipedia. Multiple takes can be composed on parallel time tracks. The result is saved on the server and can be referenced as video inside a wiki page. Neither the wiki markup editor nor the graphical authoring interface offering spatio-temporal annotations or interactions for content hyperlinking. As an integral part of hypervideos hyperlinks promote the audiovisual realization of the hypertext idea. Because of its non linear information structure and its sequential information access hypervideo authoring requires different user interface approaches then typical video editing software with its single or multi track timelines. However, hypervideo authoring is still a challenge if you have to deal with a greater number of videos [7]. In general authoring environments make use of (at least one) of these principles [5]:

- timelines (Mozilla *Popcorn Maker*);
- direct authoring (YouTube);
- graph based interfaces (MediaLoom [8], pipaciti [6]);
- split panels (referring to Memex [2]);
- markup/text editors (Video-Wiki [1]).

Except Video-Wiki [1] non of these authoring applications or concepts include word processing functions and were considered as collaborative web applications. Video-Wiki is “an integrated suite of web applications for collaborative markup and remixing video content” [1]. Analogue to HTML source view of Web browsers closed captions are used to represent the structure of a video. These closed captions can be rearranged in a graphical editor in order to restructure video playback. Spatio-temporal links are not provided.

User Interface Design

From the recipients and developers point of view the current wiki systems match video as inviolable atom, whose user interactions are limited to play, pause, stop, and jumping on the time line. The model-like

Figure 1: Hyperlink design.

```
[[Video:myVideo.ogv myVideo]]
[[Video:myClip.ogv #10 | 140 myClip ]]
[[#myvideo ] #10 | 20 10% 40% ]
[[http://archives.org] #20 | 30 50% 40% ]
[[other page#clip10 ] #66 | 100 ]
```

Figure 2: Markup.

representation of videos as a single node rather than as a continuous sequence of frames is still leading to misconceptions about the *human video interface*. On the other hand desktop video editing software neither enables word processing nor hypermedia production. To achieve a seamless integration of hypervideo into wiki engines four core requirements had to be considered: (1) provide spatio-temporal hyperlinks, (2) concatenate video clips one by one, (3) represent the interplay of video and hyperlink as wiki markup, (4) include hypervideo as part of the word processing environment. The following remarks about the user interface taking these requirements into account.

Hyperlink design According to [4] the design of outgoing hyperlinks can be distinguished in intra page links, inter page links, inter page temporal links as well as external link targets. To facilitate a consistent user interface the link type and its destination is represented by an icon and a short text describing the link target.

Authoring Collaborative hypervideo authoring consists of two main tasks: adding a video to the wiki page and annotating hyperlinks. Correspondingly the rich text editor of the wiki engine has been extended by two buttons to access both authoring task dialogues. In the first dialogue video resources can be selected from a library, uploaded from the users file system or taken from the web. An unique identifier needs to be defined in order to reference one out of many videos within a wiki page. Optionally the user can constrain the video playback by defining its start and end position on a timeline slider. The second dialogue aims to define the spatial and temporal link position inside the video. The base video acts as guidance to indicate the static link position by clicking inside the video frame. Temporal position and dimension of the link anchor can be selected on the timeline slider. Finally the link target needs to be specified by providing an URL and/or unique identifier. Closing the actual dialogue results in the appropriate wiki markup inside the editor text field. Alternatively hyperlinks can be facilitated during playback. In doing so only the link target and link position is requested in the dialogue.

Wiki markup extension To obtain a consistent markup for hypervideo authoring it needs to based on existing markup specification. Additionally human readability is important not just for the purpose of the editing history but also to hook up with expert users in their role as early adopters. Core of the extension is the addition of time-depend parameters considering that current MediaWiki engines only support spatial arrangements. The markup extension allows concatenation of video clips and annotation of spatio-temporal hyperlinks. Subsequently the introduced markup covers all collaborative authoring tasks that have been made accessible through the user interface dialogues.

Implementation & application

Vi-wiki is a free extension of MediaWiki that enables community engagement with video and spatio-temporal hyperlinks. Hypervideo playback and authoring has been build upon a Javascript framework for interactive videos that is called *vi-two*. Authoring is enabled by editing the wiki markup as well as through direct annotation of video scenes. Assets like captured videos, hypertext, media elements and link data is stored within MediaWiki.

In an early development stage five video interviews from holocaust survivals have been meshed up in a MediaWiki together with a text-based documentary about a concentration camp in Lower Silesia [6]. Possible hyperlink

annotations could be added when e.g. certain people, places or incidents were mentioned in the video. These links ware used to explicate associations with other pages where the subject has been explained in more detail or from another perspective. The videos itself could be split up into parts to appear multiple times on different pages.

Further analysis of the link structure illustrated two main application scenarios of hypervideos inside the wiki. First, it has been used as video introduction referring to further information about the covered subjects. While this principle is also be known as *detail on demand* it grants a concurrent purpose by bridging distinguished chapters of the documentary. Second, hypervideos became extended testimonies. Short sequences of a testimonial video stayed connected to its previous and succeeding parts. Thus a further navigational path following the video arose. In that case the paths span across different topics through the individual perspective of the interviewee. As a result the context of the video could be preserved if only a small timespan has been used on the wiki page. This addresses a common problem of using video clips outside its original context.

Conclusion & outlook

The implementation of the presented concepts for a hypervideo wiki resulted in a prototype MediaWiki extension. Video playback and time-related functions such as hyperlinks have been build with the *vi-two* framework. In a first application of the *vi-wiki* hypervideos had been constructed in order to emphasize its relation to other wiki pages. Although four historians and teachers had been involved in development process some design decisions could not be realised by them self because of the lack of sufficient video footage. In the context of the chosen topic this was known in advance so further wiki-based collaborative activities should be based on a larger collection of videographic resources. Finally there are further potential link structures that were technically possible but not useful in that context.

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