

MuVIE: A Multimedia Visualization and Integration Environment

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ABSTRACT

For years video and audio have been combined with other elements such as meta data, photos and text annotations to form what are commonly referred to as *multimedia documents*. This paper presents a tool called MuVIE which provides a unique interface for skimming, managing and repurposing multimedia documents. The MuVIE system can load several multimedia documents simultaneously so that key parts can be extracted and reformatted. Output options include new media streams or printing the contents to paper.

Keywords: multimedia, digital video, audio, video skimming, visualization, paper interface

INTRODUCTION

Over the past few years, researchers have developed many user interfaces for multimedia content [1]. Since multimedia documents can contain a variety of information, such as video, audio, text, images, web links, etc., interfaces for searching and analyzing multimedia data tend to be complex and often hard to learn. Furthermore, users typically want to extract only the key parts of the multimedia document. These information *clips* are then often compiled to form part of a presentation or to supplement documentation for a particular project. Therefore, in order to effectively manipulate and repurpose multimedia content, an authoring application should have characteristics such as the following:

- ability to simultaneously load several media streams,
- easy interface for viewing and skimming contents,
- techniques for integrating the multimedia objects associated with a multimedia file, e.g. presentation slides, whiteboard images, photos, notes, etc.
- methods for performing keyword searches when transcripts are present in the multimedia document,
- methods for designating important areas along timeline,
- methods for extracting the designated areas and converting them to alternate formats, and,
- a media player which can handle multiple media types (e.g. MPEG, WMV, AVI, WAV, MP3, etc.)

MuVIE

We have developed a prototype system called MuVIE (Multimedia Visualization and Integration Environment) because we found no application that implemented all of the characteristics listed above in one package. Figure 1 presents a screenshot of the MuVIE

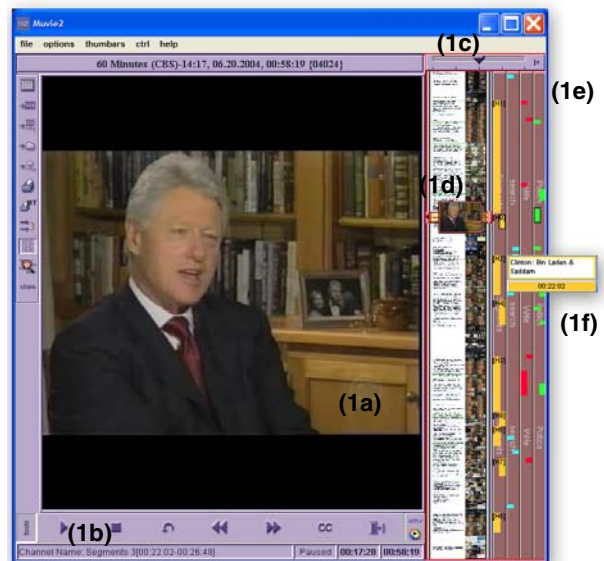


Figure 1 - the MuVIE user interface

interface with one video loaded (1a). Below the video area are the typical media controls (1b): play/pause, rewind, fast-forward, etc. Along the right side of the interface is the timeline (1c). The timeline is represented as a composite thumbnail where the left side depicts the transcript (if present) and the right side depicts video images extracted at the approximate time they occurred in the timeline. A lens with the current video image (1d) is provided for repositioning the media stream. The timeline thumbnail provides a time-based visualization of the multimedia content which promotes skimming and easy navigation. Also shown in figure 1 are four information channels (1e) specified by the user. Each channel represents a different category of information and is rendered using a unique color. Channels can contain a variety of information including text annotations, images, presentation slides, histogram data or photos to be associated with a particular section of a

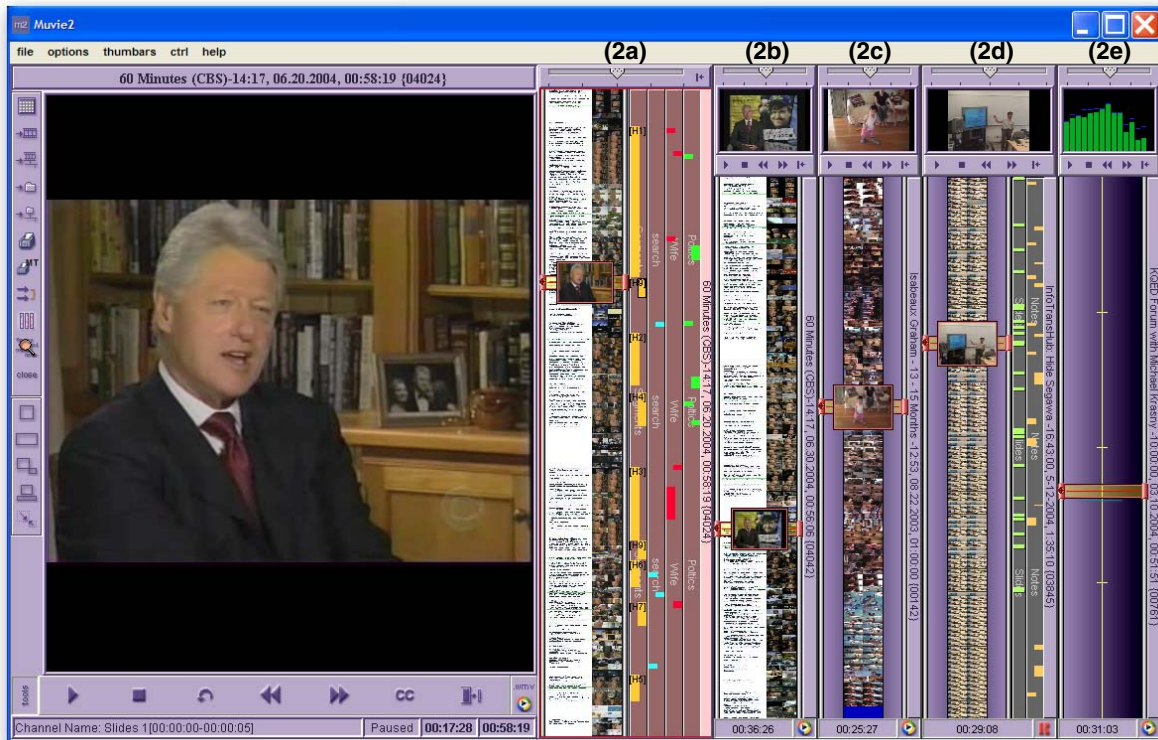


Figure 2 - Five media streams loaded at the same time: (a & b) TV video, (b) home video, (c) a presentation/meeting with presentation slides, and (d) a radio program

multimedia document. These *segments* are defined as start/stop times plus meta data along the timeline. Pointing to a segment in a channel causes a tooltip (1f) to popup revealing the information describing that segment.

As depicted in figure 2, the system can simultaneously load several media streams at one time so they can be compared and annotated. This screenshot shows five multimedia documents representing four *different* types of media: TV video (2a & 2b), a home video (2c), a presentation/meeting (2d), and a radio broadcast (2e). Typically, media timelines are presented horizontally across the bottom of the interface. However, because MuVIE allows multiple media streams to be loaded simultaneously, it is more practical to present the timelines *vertically* to provide full access to each timeline at all times.

With the exception of (2a), each timeline includes a media player at the top of the timeline along with player controls. The player window shows the contents of the media stream at it's current position along the timeline. The media stream depicted as (2a) is currently *docked* and so it's contents are displayed in the large window on the left side of the interface where it uses a common media player and controls. A button is provided in each timeline for docking and undocking timelines. When no transcript is present, as in (2c), (2d), and (2e), the timeline will contain either only the video image thumbnail or in the case of (2d) no thumbnail at all. The informa-

tion channels shown for (2d) depict the temporal locations of both captured presentation slides and notes taken by a participant.

IMPLEMENTATION

The MuVIE system is implemented in Java and built using several existing embeddable applications, e.g. Windows Media Player v9. A unique feature of the system is the ability to *print* paper representations of individual or combined media streams using a technique called Video Paper [2]. The paper representation contains barcodes which are assigned to events in the media stream (e.g. segments in the information channels). We have been using this feature on a regular basis for over 4 months to produce a *media-based* newspaper in our lab. The newspaper looks like a typical newspaper however each story refers to a video or radio story. Using MuVIE, we can load several multimedia documents at the same time and extract only the most interesting stories to be featured in the newspaper.

REFERENCES

1. Li, F., A. Gupta, E. Sanocki, L. He and Y.Rui, "Browsing Digital Video," Conference on Human Factors in Computing Systems (CHI' 2000), April 1-6, 2000.
2. Graham, J. and Hull, J. J., "Video Paper: A Paper based interface for skimming and watching video," International Conference on Consumer Electronics (ICCE), Los Angeles, CA, June 2002, 214-215.