

Cataloging and Search Engine for Video Library

Henry C. Wang, David D. Feng and Jesse S. Jin

Basser Department of Computer Science
The University of Sydney

Email: {henry, feng, jesse}@cs.usyd.edu.au

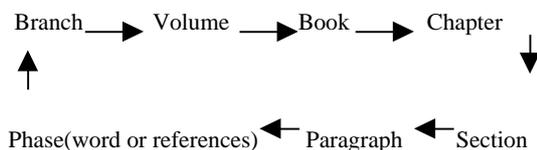
Abstract

The paper describes a prototype of cataloging and search engine for video library, the Video Library Search Engine (VLSE). We propose the system based on our codification of video data. There are two stages to provide a fast and efficient way to search, view and retrieve video information in the system. The first stage is global query videos according to video title, cast and the type of video such as *Classical*, *Action*, *Western* and so on. The second one is that for each video we can use a video metadata cataloging system to view it and provide various query methods such as query-by-feature, query-by-definition, query-by-keyword and structural-browsing.

Key words: Video cataloging, content-based video access, video segmentation, video retrieval, video indexing.

1. Introduction

When we search textual information from a library, the information will be searched through a cycle, i.e.



The information in a book would be searched through the title, a table of content, an index and reference. We can search information by title using branch and then a subject using the content page or by keywords using index pages. Textual information can be retrieved efficiently and accurately. This reminds us that if video could be searched in the same way as text. Currently, video is accessed and retrieved in the traditional way such as manually selecting, fast-forward and fast-backward, or random selecting. The problem of indexing, archiving, searching, browsing and retrieving video information is more complicated than the resource discovery of simple atomic textual documents. Some video systems have been

developed, such as VideoQ, CueVideo, VideoVista, Vane, etc. Their operations have limited capability.

Our video search engine is based on a metadata scheme. The paper describes searching and reorganizing video using a similar approach to handling textual information.

2. Video Metadata

Metadata is information about data that enables intelligent, efficient access and management of data. According to IEEE Mass Storage Systems and Technology Committee's definition [LLNL 1993]. The video metadata we propose includes a multi-layer physical stratum and a five-level semantic paradigm. The physical stratum includes objects, I-frame, frames, takes, shots, plays, scenes, plots and movies. We identify five levels of cinematic codification for the video hierarchy. The five levels are the perceptual level, the diegetic level, the diegetic level, the subtextual level and the subtextual level.

3. Query Content of Video Libraries

The metadata schema of video library is represented as a hierarchical structure, which provides possible categories at the subtextual level, the connotative level and the diegetic level. The video metadata schema is illustrated in Figure 1.

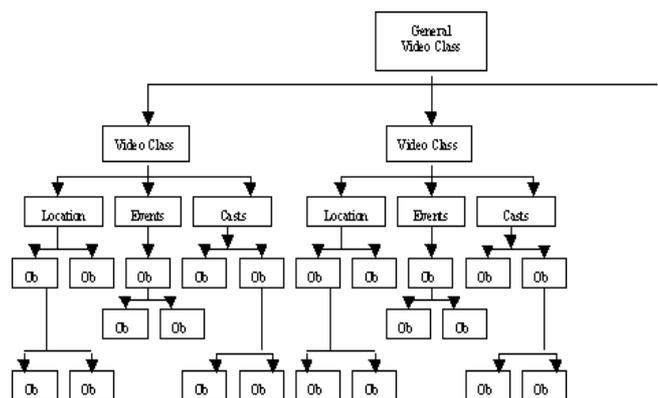


Figure 1. Hierarchy structure of video library

XML (eXtensible Markup language) is a meta language and describes a class of data objects. Our video metadata, shown in Figure 2, would generate an XML documentation complied with the video metadata schema.

The relational database will be used for the library. We decode the XML document to the fields of a relational database.

4. System Architecture

Throughout this paper, the VLSE provides an overall architecture for querying videos on the Internet. The architecture of the Video Library Search Engine is shown in Figure 2. The system applications have a 3-tier architecture.

The Web browser is a browsing and navigation system on the client side. The client may use it to visit our Web server in server side via Internet for querying the video library.

The video metadata information and video data would be stored in the metadata database and a video repository separately.

The Video Metadata Generating System is a tool for generating video metadata, which provides the video metadata to the database. It has been developed by our group. The detail can be seen in Isa [1998].

The Video Cataloging System is a tool implemented in java applet for viewing and searching video metadata.

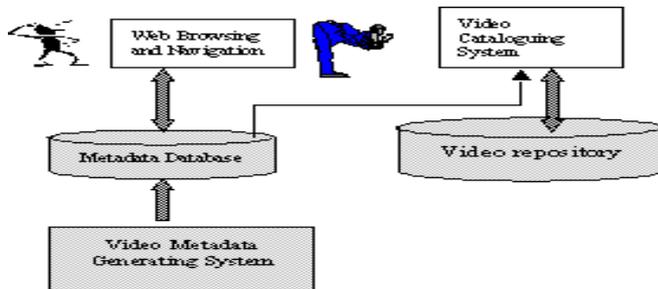


Figure 2. The Architecture of the Video Library Search Engine

Figure 5. Browsing Video Metadata

The VLSE system provides the following query and browsing interfaces. There are three parts in the system, the Main Interface, Video Result Interface and video cataloging system for the video query and view.

The Main Interface, as shown Figure 3, is the first user interface which provides a general query with three query methods on movie title, cast/crew or movie type. Once the search button is clicked the result page will be displayed on the client side, as shown Figure 4.

The Video Catalogue System shown in Figure 5 is for using defined video metadata to represent video content and browse video content. It provides a fast and efficient way to view and retrieve video information. The system is developed as a Java Applet.

Based on our understanding of current video retrieval by humans and our research, we use four more query methods in our system: query-by-feature, query-by-definition, query-by-keyword and structural-browsing as shown in Figure 5.

The system uses a hierarchical structure metadata. It contains three levels of specificity so far.



Figure 3. The Home Page of the Video Library Search Engine

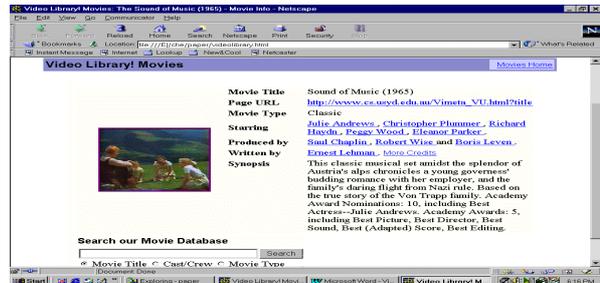


Figure 4. The Result Page of Video Library Search Engine



Figure 5. The Video Cataloguing System

6. Conclusion

We have presented our approach in developing a Video Library Search Engine for video archive and information retrieval. Our current system includes the Video Search Engine and the Video Cataloguing System. We have also defined a video metadata and provide content-based video browsing through our implementation of the Video Cataloguing System.

References

- Isa, W Y H B; Tharmapalan, J; Jin, J S; Phillips, C J E & Lambert, T (1998). Video cataloguing in video archive and information retrieval. *Proc. VIP'98*, November, Sydney, pp.19-26.
- Jin, J S; Lindley, C A; Feng, D D & Wang, H C (2000). Theory and Practice of Video Cataloging, *The 5th Int. Conf. on Information Science*, Atlanta City, pp.685-688.
- LLNL (1993) http://www.llnl.gov/liv_comp/metadata/minutes/minutes-1993-08.html.
- Metz, C (1974). *Film Language: A Semiotics of the Cinema*, trans. by M. Taylor, The U. Chicago Press.