

The Físchlár Digital Library: Networked Access to a Video Archive of TV News

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Abstract: This paper presents an overview of the Físchlár digital library, a collection of over 300 hours of broadcast TV content which has been indexed to allow searching, browsing and playback of video. The system is in daily use by over 1,500 users on our University campus and is used for teaching and learning, for research, and for entertainment. It is shortly to be made available to University libraries elsewhere in Ireland. The infrastructure we use is a Gigabit ETHERNET backbone and a conventional web browser for searching and browsing video content, with a browser plug-in for streaming video. As well as providing an overview of the system, the paper concentrates on the complimentary navigation techniques of browsing and searching which are supported within Físchlár.

Keywords: Digital video browsing; digital video libraries; digital video searching;

1. Introduction to Físchlár

The Físchlár system is a library of digital video information which records, analyses, indexes, stores and provides streamed playback as well as browsing and searching, on broadcast TV materials in a University campus environment. At any point in time there are between 300 and 400 hours of TV content available for playback to a userbase of over 1,500 registered users, though only about 1,000 of those are actually active and regular participants. The video streaming technology behind the Físchlár system, a SUN Enterprise server running the ORACLE video server, is capable of supporting over 250 simultaneous streams of MPEG-1 encoded video, each stream requiring 1.5 Mbps. The networking technology we use is a Gigabit ETHERNET backbone with 100 Mbps links to each desktop machine, though we also have some users to interact with Físchlár using a laptop over a wireless LAN. The interface to Físchlár is via a conventional web browser, either Netscape or Internet Explorer, with an ORACLE plug-in to allow streaming of video.

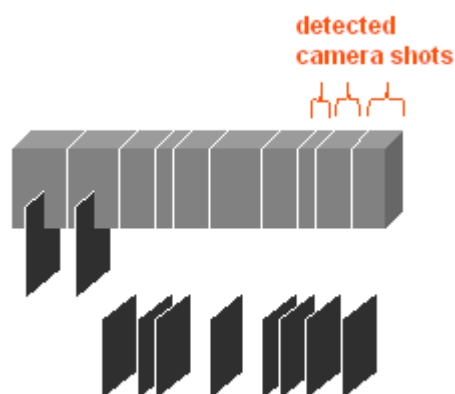


Figure 1: Shot boundary detection and keyframe identification

There are two versions of the Físchlár system in use on our campus... "Físchlár" allows recording, browsing and playback of TV programmes transmitted on any of 8 terrestrial TV channels. "Físchlár-News" automatically records the main evening news on the national broadcaster's main TV station and the archive of TV news has now grown to be almost 1 year in size (c.170 hours of news content). As each program scheduled for recording by Físchlár is transmitted, it is digitised into MPEG-1 format and then submitted to an analysis phase during which we automatically detect the boundaries between different camera shots. For shots over a threshold length we automatically select a single frame as the keyframe whose content is somehow indicative of the content of the whole shot. The entire TV programme can then be presented to a user as a storyboard of keyframes, either the full set of keyframes (perhaps 200-250 such keyframes for a 30

minute episode of a soap opera) or an abstracted subset of 20 or 30. This is illustrated in Figure 1. To support user browsing through these keyframes we have developed several keyframe browser interfaces from which the user can choose, and a screenshot of one of these is shown in Figure 2.

Físchlár is used by a large part of the University community for teaching and learning, for research, and for entertainment. Físchlár is used to record and allow playback of TV programs as part of courses on film and TV production. Students and Faculty use Físchlár-News to access the archive of TV news and of course people living in the University's residences use it for entertainment. However,

while it is useful as web-based video-on-demand with keyframe browsing, what makes it unusual and what is the focus of our research is the way in which users can access video material.

2. Information Access in Físchlár

Keyframe browsing through several hundreds of keyframes for each of several hundreds of archived TV programs offers limited possibilities for navigation through the archive. To compliment the browsing facilities we are developing search tools for video digital libraries. We capture the closed captions associated with 6 TV channels 24x7 and we link these to the archived broadcast. In this way we can support text-based

searching through the text caption archive with relevant video clips as “answers” to queries. However, that’s just the start of our work on analysing video in order to support searching/browsing. We have developed and tested techniques for news story segmentation, segmentation of programmes into scenes which are groups of shots, counting the number of human faces in a shot, speech-music discrimination, speaker identification, camera motion detection and detection of the amount of object motion in shots. We are also

working on sophisticated object and shape detection and have been able to demonstrate this as a detector which recognises the appearance of either Bart or Homer Simpson in “The Simpsons”, in real time.

All these image and audio analysis techniques run completely automatically and as they are developed into robust and effective implementations they open up for us the possibility of linking together related “chunks” of video, just as we have linking between related pieces of text on the www. From the user’s perspective this offers searching, browsing and following hyperlinks as possible navigational tools through a video archive.

The technical challenges associated with the capture, compression, storage, streaming, transmission and playback of video are solved or close to being solved. Our plans are to move to MPEG-4 encoding and playback as soon as players, streamers and compression techniques are more freely available but MPEG-1 has allowed us deploy Físchlár for the last 2-and-a-half years and to build up a userbase and observe, first hand, how people want to do content access to digital video. We have operated in an environment which is a technical luxury when it comes to networking issues with a fast LAN and ignoring the real problems of networking to a larger, more dispersed community. Físchlár is ground-breaking in that it is a real system used by real users who have real information needs but it is also unique for the sophisticated analysis and content navigation tools we’re developing and layering onto an operational system.

Acknowledgement: The support of the Informatics Research Initiative of Enterprise Ireland is gratefully acknowledged.

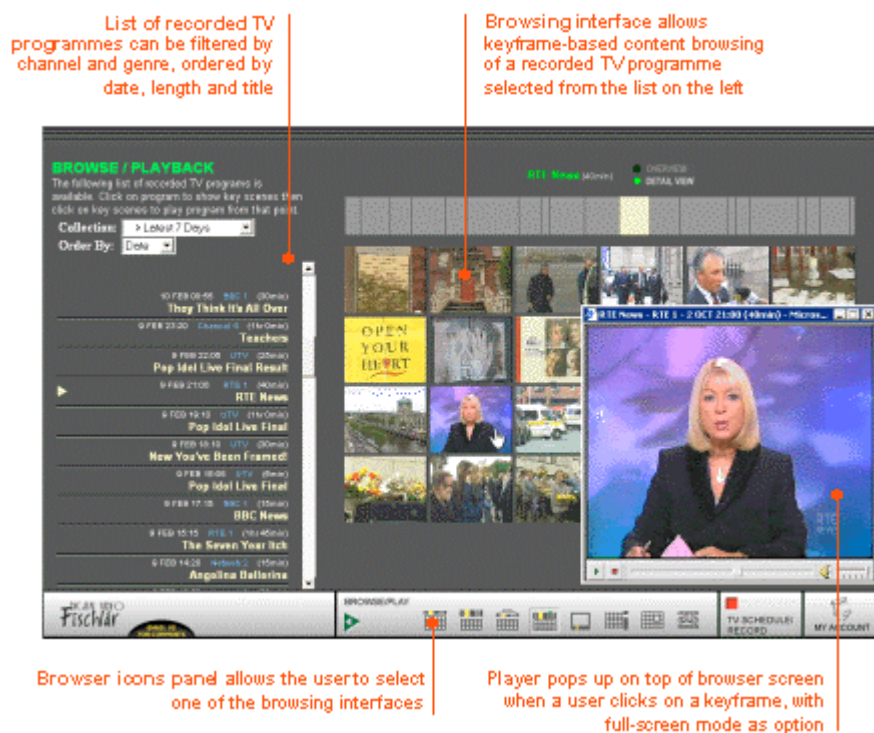


Figure 2: Screenshot of Físchlár browser and playback window