

Students and their videos: Implications for a video digital library

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Abstract. Personal information collections have expanded to include video files but users often organize their content with the same tools they use for other simpler media types. We analyze the 'native' video management behavior expressed in 35 self-interviews and diary studies produced by New Zealand students, to create a 'rich picture' of personal video collection size, formats, organization and intended usage. We consider how conventional digital libraries can better support usage of personal video material.

1 Introduction

Personal information collections have expanded to include a diverse set of multimedia digital objects; in particular users now regularly create and download video files. Video content typically consumes more storage space and bandwidth than other document types although users structure their content with the same organisational tools they use for smaller and simpler items.

In this paper we expand on previous work [2]: briefly reviewing research on video management (Section 2), then describing study methods (Section 3) and the emergent themes around collection size, contents and usage (Section 4). In Section 5, we consider how this nuanced understanding of behavior can inform personal video management systems.

2 Related Work

Users now regularly view video (via sites such as YouTube [7]), download video files and create their own video content (especially via mobile phones [10]). 46% of a sample of Finnish students had downloaded at least one video

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to their personal storage and some users had downloaded over a hundred files [6]. Some users have adopted cloud storage services for their video content [9]. Cushing [3] notes the importance of control over media on online services: remote files are still regarded as theirs by users even if they do not have a local copy. Irrespective of the location or media type of their content, the organisational tools available to users are familiar: filenames, folders and some dedicated applications (e.g. iTunes) [1].

Work on personal digital information management does not usually focus on video content (e.g., [3] [8] [9])—often considering videos when they are primarily used for other purposes such as listening to music (e.g. [6]). The contribution of this paper is to focus specifically on video-centric behaviour using naturalistic methods to explore how users experience video storage, organisation and sharing.

3 Methodology

The data analyzed in this present study was collected in the context of a third-year tertiary university course offered in New Zealand in 2013. As the initial step in user requirements analysis for a video management system, the students first examined their own video collection creation behavior through a written self-interview / autoethnography, and then through a diary study focusing on video document behavior. These are here analyzed for 35 students: 21 (60%) male and 14 (40%) female, with 32 (91%) aged 20 to 24 and 3 (9%) aged 30 to 60. All 35 were New Zealand citizens and permanent residents and are hereafter referred to as P1, P2, ..., P35. Their self-interviews and diary study summaries totalled 175 pages. These were analyzed using grounded theory methods [5]; analysis proceeded through iterative reading, code development, and coding as the categories emerged inductively.

4 Results

We explore four aspects of the students' reported video collection behaviors: the size and formats of their videos, motivations for adding a video to their collection, and techniques for tracking their personal video consumption.

4.1 Collection sizes and formats

The students typically estimated the size of their collections in number of videos and/or in memory usage. Collections ranged from the miniscule (three students had fewer than 20 videos in their collection) to the enormous (1.85 Terabytes on the student’s personal media server, with an additional 2332 videos bookmarked, favorited, or otherwise linked to in online sources). On the other hand, collection size can also be subjective; one collection of approximately 150 Movies, TV episodes, and short clips) was described as “very large” by its owner, while student another believed his 700 gigabyte collection to be “rather small for this day and age” [P20].

To store or track these videos, the students used a wide variety of storage devices and techniques (Table 1). An initial, striking finding is that the students’ personal collections are highly diverse and not limited to video files stored on physical devices under the students’ control (Physical storage, Table 1) or stored by the student ‘in the cloud’ (e.g., Virtual storage, Table 1); students also ‘saved’ videos virtually (Virtual storage, Table 1) by, for example, posting them to Facebook. Students also considered videos that they had viewed through large online collections such as YouTube (through channel subscriptions) as being in some sense ‘their’ videos, in that the students could access the videos for re-viewing. We note the obvious difficulties with maintaining a record of previously viewed videos, trusting that the video will not be removed from the collection, and maintaining a subscription for continued access.

Physical storage		Virtual storage		Personal record	
Laptop / desktop	28	Facebook, social media	14	Bookmarks, favorites, ‘likes’	23
External drive	18	YouTube subscription	6	Open browser tabs	2
Mobile	7	Cloud	5	Word document	1
USB memory stick	7	Personal YouTube channel	3	Email message with links	1
CD-ROM / DVD	4	iTunes	2	Links posted on blog	1
SD card	2	Netflix	1	Pinterest	1
Video camera	1			Memory	9
Gaming console	1				

Table 1. Number of students utilizing each collection storage method or technique.

Students often relied on their memory to be able to re-find videos, rather than storing the file or a link. This option is generally taken for videos that they have no great attachment to. Contextual cues may make it easier to recall a video's location (e.g., associating a video with the friend who posted it on Facebook). Students are generally confident that they can easily re-find videos—though it is not clear how well founded that confidence is.

No student in the study stored his/her collection using only a single mechanism from Table 1; instead, their collections were scattered across an average of five. This can make it difficult to access a particular video in the collection: "It can get frustrating having to log in and use the different conventions on all of these apps" [P4].

4.2 Motivations for adding a video to a collection

This section explores the two most commonly reported motives for adding videos:

To Watch Later (28 students). The primary reason for saving a video is, of course, 'to watch later'. This motivation can be teased apart to mean: to watch in the future, as watching now is inconvenient; to watch the video again, as it has been watched once and enjoyed, and the student anticipates that they will want to re-watch it in the future; to watch at a more appropriate time, given that the video appears interesting but the student does not presently have the time free to watch it in its entirety; to have something to watch when the internet can't be accessed or access is prohibitively expensive; to look more deeply into previously enjoyed videos; to 'use' the video, in the sense of gaining information from it; and to support the *possibility* of watching or re-watching the video, at some indeterminate future time. Given that collections can run to tens of thousands of hours of video footage, it seems unlikely that every video in a large collection will be watched ("...most people I know including myself just store videos because we can" [P28]).

For Sharing (26 students). Sharing is also a multi-faceted activity. Sometimes it is driven by practical issues, such as trying to minimize data usage in a home Internet connection. Sharing can also be an expression of closeness; the sharer knows enough about the others' tastes to be able to predict that they

will enjoy it (“Most of my YouTube likes have been from friends sharing the videos to me or on their pages on Facebook” [P33]), or the video is shared to express something about the sharer (“these are videos that I enjoy and are a reflection of my personality” [P29]). The fact that two friends have viewed the same video can provide an opportunity to bring them closer: “once I share a video with people I can talk to them about it later.” [P4]

4.3 “Keeping track”

Another common task in managing a personal video collection is maintaining a record of one’s interactions with it. Students reported a variety of interactions that they attempted to track, with varying degrees of success: marking their viewing progress through a sequence of videos (eg, episodes in a season of a TV series.); marking the place to begin watching again in a video whose viewing has been interrupted; keeping a list of videos that have been added to the collection but that have not yet been viewed; differentiating between watched and unwatched videos in a video stream; tracking which videos have already been downloaded / added to the collection; marking one’s viewing position in a partially watched video, to be able to pick up viewing again at that spot; and selecting brief clips of interest embedded in longer videos.

These tasks are not well-supported in the file systems used to store video files, so the students with collections on their own devices (hard drives, external drives, etc.) either had to rely on memory to track their viewing, or had to develop their own tracking system. Given that metadata for downloaded videos is not saved with the file and that filenames often vary between download sites, it can be difficult even to know which videos are already in the collection. A major difficulty lies in the absence of a detailed viewing/usage history supported directly by the file system (beyond the date of modification, which is often too crude a measure). Simple work-arounds could only handle one or two of the tracking tasks above (e.g., “I also mark files with a (M) at the end of the file name to mark my place in a series of videos.” [P18]). More complex schemes rely on the student’s diligence in recording the relevant aspects of their viewing history—and these management techniques are often not rigorously applied.

Tracking video consumption in online video collections (e.g., YouTube) is also surprisingly fraught. If videos that the user intends to collect are stored in a list—for example, a YouTube playlist—then as the list grows one can ‘lose’

videos as they move off-screen. Though YouTube does maintain a history list, it is easily clogged with videos that the user does not intend to track (“I will click on videos then decide not to watch them, the annoyance of this for me is that these videos will automatically be added to my history playlist...” [P22]). Vimeo’s ‘watch later’ function is useful, but is only available within that system. The solution to tracking short segments of interest embedded within longer videos is to extract the interesting clips and save them as new videos. In the process, however, all context and metadata from the source video are stripped and must be manually re-entered.

5 Discussion

Many of the participants’ problems with managing video content stems from the large file sizes which leads to users distributing their content over local, removable, online and cloud storage. This in turn creates new problems for finding and retrieving videos, with many of the study participants stating that they rely largely on their memory for re-locating items they have saved or in some way bookmarked or referenced. A common response is to simply store links to online content; which can lead to issues of persistence where the bookmarks are subject to link rot. The various forms of storage fragmentation (device, platform, local v. remote, content v. link) create challenges for users as their existing tools do not cross these boundaries.

The *Memsy* prototype [4] provides a cross-device and cross-service approach to addressing some of the fragmentation issues reported by our participants. Although *Memsy* supports cloud services such as Dropbox it does not appear to support the integration of links to online collections (such as YouTube) which were used to cope with storage limitations. The preservation of time markers (to support viewing across sessions) is not supported by native operating system file management (or by a system such as *Memsy*). Online video platforms such as YouTube and Twitch do support ‘keeping track’ of previous viewing (via cookies) but other systems need to add additional functionality to meet this user need. A broader conclusion might be that file management systems that have evolved for non-temporal documents (images, text files, ...) need specific augmentation to support temporal media.

Other aspects that emerge from our study that increase the challenges of managing videos include the fact that the concept of ‘ownership’ is often

blurred, with many participants feeling they have ownership of videos that they have accessed, but also being aware of the impermanence of some online files (again leading to link rot) which in turn drives behaviours around downloading and sharing which become ways of preserving and 'owning'.

The videos themselves are multi-dimensional as they exist in different formats and can be categorised across multiple genres which lead to different usage patterns. Not only do we suspect that a light-weight and flexible management solution is required to support all of these aspects, but also that any solution needs to enable users to incorporate concepts of memory and sharing without the need to enter detailed metadata. Users appear wedded to light-weight mechanisms such as instant bookmarking, sharing etc. irrespective of the fact that they do not necessarily serve them well.

6 Conclusions

The key factors that emerge from our study are need for video management solutions that incorporate aspects of: indexing—supporting users in keeping track of what content they have, where it is located and how to access it; bookmarking—supporting users in finding sub-content at specific points in videos or keeping track of how far through a video has been viewed; and sharing—enabling users to share video, and keep track of what is shared. While some of these video functionalities can be supported in a straight-forward manner in the context of single-owner content providers (for example streaming services) it is more difficult to design tools for the real world, ad-hoc collections and behaviours described by the study participants.

References

1. Copeland, A J.: Analysis of public library users' digital preservation practices. *Journal of the Am. Soc. for Inf. Sci. and Tech.*, 62(7) 1288–1300 (2011)
2. Cunningham, S.J., Nichols, D.M., Bowen, J.: Personal Video Collection Management Behavior. In *Proceedings of JCDL '16*. ACM. 219-220 (2016)
3. Cushing, A.L.: "It's stuff that speaks to me": Exploring the characteristics of digital possessions. *Journal of the Am. Soc. for Inf. Sci. and Tech.*, 64(8) 1723–1734 (2013)
4. Geel, M., Norrie, M.C.: Memsy: Keeping track of personal digital resources across devices and services. *Proceedings of TPD'15* (pp. 71-83). Springer. (2015)
5. Glaser, B., Strauss, A.: *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Chicago. (1967)

6. Liikkanen, L.A., Åman, P.: Shuffling Services: Current Trends in Interacting with Digital Music. *Interacting with Computers*. (2015)doi:10.1093/iwc/iwv004
7. Liikkanen, L.A., Salovaara, A.: Music on YouTube: User engagement with traditional, user-appropriated and derivative videos, *Comput. Hum. Behav.*, 50, 108-124. (2015)
8. Marshall, C.C.: Rethinking Personal Digital Archiving, Part 1: Four Challenges from the Field, *D-Lib Magazine*, 14(3/4) (2008) doi:10.1045/march2008-marshall-pt1
9. Odom, W., Zimmerman, J., Forlizzi, J.: Teenagers and their virtual possessions: design opportunities and issues. In *Proceedings of SIGCHI '11*. ACM. 1491-1500 (2011)
10. Puikkonen, A., Häkkinen, J., Ballagas, R., Mäntyjärvi, J.: Practices in creating videos with mobile phones. In *Proceedings of MobileHCI '09*. ACM. Article 3, 10 pages. (2009) doi:10.1145/1613858.1613862