

# Identifying VHS Recording Artifacts in the Age of Online Video Platforms

Thomas Steiner  
Univ. Politècnica de Catalunya  
Department LSI  
Barcelona, Spain  
tsteiner@lsi.upc.edu

Seth van Hooland  
Université Libre de Bruxelles  
Information and C.S. Dept.  
Brussels, Belgium  
svhooland@ulb.ac.be

Ruben Verborgh  
Ghent University  
iMinds – Multimedia Lab  
Ghent, Belgium  
ruben.verborgh@ugent.be

Joseph Tennis  
Information School  
University of Washington  
Washington, D.C., USA  
jtennis@uw.edu

Rik Van de Walle  
Ghent University  
iMinds – Multimedia Lab  
Ghent, Belgium  
rik.vandewalle@ugent.be

## ABSTRACT

In this position paper, we describe how analogue recording artifacts stemming from digitalized VHS tapes such as grainy noises, ghosting, or synchronization issues can be identified at Web-scale via crowdsourcing in order to identify adult content digitalized by amateurs.

## Categories and Subject Descriptors

H.4 [Information Systems Applications]: Miscellaneous

## Keywords

Amateur Video Digitalization, VHS, Online Video Platforms

## 1. INTRODUCTION

Online adult video is one of the fastest growing Internet industries as recent statistics of a large meta search engine for adult content show<sup>1</sup>. Since its launch in 2006, the search engine has indexed the amount of overall 735,000 videos at a growth rate of 22,000 videos per month with overall 93 billion views. Over this period, 158 million user ratings were collected. It becomes evident that efficient search, recommendation, and navigation capabilities are required in order to use adult video platforms in a meaningful way. Online adult video platforms typically allow their users (i) to search for content based on full-text query terms that are matched against textual descriptions of the video like its title or description, or (ii) to browse the archive of a platform by category or channel, usually based on video tags. Users are presented a top-*n* ranked list of videos that match a given

<sup>1</sup><http://www.pornwatchers.com/content/statistics11-2012/>

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

SEXI '13 Rome, Italy  
Copyright 2013 ACM ...\$15.00.

category or query term, ranked by criteria such as *relevancy*, *view count*, *user rating*, or *upload date*. The default ranking criterion normally is *relevancy*—a platform-specific *black box* concept. Advanced and frequently returning power-users may prefer more transparent and traceable ranking criteria such as the popularity-based *view count* and *user rating*, or the LIFO (last in, first out) ranking criterion *upload date*.

In this position paper, we suggest a computer vision-based approach to automatically identify VHS adult content that has been digitalized in a non-professional manner. This type of niche adult content is characterized by analogue recording artifacts stemming from VHS tapes. Common issues include ghosting, brightness and color channel interferences, chaotic line shift at the end of frames (Figure 1a), and wide horizontal noise strips (Figure 1b).

## 2. PROBLEM STATEMENT

The publication of online content produced by *amateurs*, or non-professionals, has received a substantial amount of attention. This position paper raises the question: to what extent can the identification of content as VHS ADULT CONTENT DIGITALIZED BY AMATEURS offer a useful parameter? Exploiting the fact that an individual invested time and resources for the digitalization of content from a VHS tape can hold a unique value both for information retrieval and research purposes. Especially in the context of the long tail of niche content, automatically identifying VHS ADULT CONTENT DIGITALIZED BY AMATEURS can help identify more quickly unique content items.

Uploaders of this type of content occasionally add tags such as “vintage” or “retro” but these practices are not standardized and sparse. On the aforementioned adult content platform, out of overall 735,000 videos, there were 23,427 tagged as “vintage”, 95 as “VHS”, and only 50 as “vintage” and “VHS”. Automated means to aggregate this type of content are needed. In this paper, we propose a scalable, crowdsourced way to identify adult content digitalized by amateurs.

## 3. PROPOSED METHODOLOGY

In [5], we have introduced a generic crowdsourcing framework for the automatic and scalable annotation of HTML5 video. The term *crowdsourcing* was first coined by Jeff Howe in an article in the magazine Wired [1]. It is a *portmanteau*



(a) Chaotic line shift at the bottom of frames (green)



(b) Wide horizontal noise strip distortions

Figure 1: Typical vhs artifacts and distortions after amateurish digitalization.

of “crowd” and “outsourcing”. Howe writes: “*The new pool of cheap labor: everyday people using their spare cycles to create content, solve problems, even do corporate R&D*”. The difference to outsourcing is that the crowd is undefined by design. For our specific use case, any adult video platform user could be part of that crowd.

While a user watches a video, the framework in the background unobtrusively annotates it, *e.g.*, as demonstrated in the concrete case in [5], to extract events. The annotation framework being generic, we can imagine a video denoising algorithm as presented by Yang in [8] being applied to a video that is currently played to detect if it suffers from vhs artifacts. Over time, *individual* users watching low quality digitalized videos create enough signals to eventually filter out the corpus of content digitalized by amateurs.

#### 4. RELATED WORK

The plethora of online videos can effectively be tackled with the driving force behind it: an enormous community of users. The aim is to make the annotation task as easy and as less time-consuming as possible, in order to avoid disturbing a user’s experience. Soleymani and Larson describe the use of crowdsourcing for annotating the effective response to video [3]. They discuss the design of such a crowdsourcing task and list best practices to employ crowdsourcing. The trade-off between the required effort versus the accuracy and the cost of annotating has been described by Vondrick *et al.* [6]. The quality of annotations generated by a crowdsourcing process has been assessed by Nowak and R uger [2]. Welinder and Perona [7] devise a model that includes the degree of uncertainty and a measure of the annotators’ ability. The usefulness of annotations also depends on their envisioned functional value, *i.e.*, what purpose they should serve in the application.

#### 5. FUTURE WORK AND CONCLUSION

Given the streaming nature of online video, our approach inherits the speed and accuracy challenges described in [4]. The solution here is to work with lower resolution versions of the video files in the background. In order to evaluate the accuracy of the generated vhs artifacts annotations, A/B tests with different video resolutions can be used.

In this position paper, we have presented a crowdsourced,

scalable approach to detect vhs digitalization artifacts, where users by watching videos do useful work such as detecting vhs artifacts as a by-product of viewing, and thus over time allowing video platforms to identify this type of niche content.

#### 6. REFERENCES

- [1] Howe, J.: The Rise of Crowdsourcing. *Wired* 14(6) (2006), <http://www.wired.com/wired/archive/14.06/-crowds.html>
- [2] Nowak, S., R uger, S.: How reliable are annotations via crowdsourcing: a study about inter-annotator agreement for multi-label image annotation. In: *Proc. of the Int. Conf. on Multimedia Information Retrieval*. pp. 557–566. *MIR ’10*, ACM, New York, NY, USA (2010)
- [3] Soleymani, M., Larson, M.: Crowdsourcing for Affective Annotation of Video: Development of a Viewer-reported Boredom Corpus. In: *Proc. of the SIGIR 2010 Workshop on Crowdsourcing for Search Evaluation (CSE 2010)*. ACM SIGIR, ACM (Jul 2010)
- [4] Steiner, T., Verborgh, R., Gabarr  Vall s, J., Hausenblas, M., Troncy, R., Van de Walle, R.: Enabling on-the-fly video shot detection on YouTube. In: *Proceedings of the 21st International Conference on World Wide Web*. ACM (Apr 2012)
- [5] Steiner, T., Verborgh, R., Van de Walle, R., et al.: Crowdsourcing Event Detection in YouTube Videos. In: *Proceedings of the Workshop on Detection, Representation, and Exploitation of Events in the Semantic Web (DeRiVE 2011)* (Oct 2011)
- [6] Vondrick, C., Ramanan, D., Patterson, D.: Efficiently scaling up video annotation with crowdsourced marketplaces. In: *Computer Vision – ECCV 2010*, *Lecture Notes in Computer Science*, vol. 6314, pp. 610–623. Springer (2010)
- [7] Welinder, P., Perona, P.: Online crowdsourcing: rating annotators and obtaining cost-effective labels. In: *Proc. of the 2010 IEEE Computer Society Conf. on Computer Vision and Pattern Recognition Workshops (CVPRW)*. IEEE, San Francisco, CA, USA (Jun 2010)
- [8] Yang, C.: Video Noise Reduction based on Motion Complexity Classification. In: *Asia-Pacific Conference on Computational Intelligence and Industrial Applications*, 2009. *PACIIA 2009*. vol. 2, pp. 176–179 (Nov 2009)