Semi-Automated Rediscovery of Lost YouTube Music Videos

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ABSTRACT
Users frequently post popular material to YouTube, and in response, others link to these videos from social media, blogs, forums, and email. However, this content may be removed for numerous reasons, only to resurface again at another URL. This continuous movement and breaking of the web graph makes it difficult for users to relocate content that has moved in YouTube. We present Volitrax, an add-on for Firefox which redirects users to YouTube music videos that have moved to a different URL within YouTube. Volitrax acts as an intermediary that corrects the web graph transparently so YouTube links continue to work even after the content has changed locations.

Categories and Subject Descriptors

General Terms
Design, Experimentation.

Keywords
Music video, web graph, linkrot, web browser add-on.

1. INTRODUCTION
YouTube is one of the world’s largest and most popular video digital libraries, and it is home to millions of music videos. Many of the videos posted to YouTube garner a great number of links by music fans in social media, blogs, forums, and email. However, many of the music videos are subsequently inaccessible from YouTube for a number of reasons: users delete videos or close their accounts, or copyright owners petition for the removal of copyrighted work. Copies of the removed music videos can often be found at other URLs or resurface later as music lovers and copyright owners engage in a game of cat-and-mouse. This continuous movement and breaking of the web graph requires users to manually relocate content that has moved in YouTube.

In order to extend the life of links to YouTube music videos, we have created Volitrax, a Firefox add-on that redirects users to YouTube music videos that have moved locations within YouTube. (Volitrax is a combination of “volatile” and “tracks”, as in music tracks.) Volitrax acts as an intermediary that corrects the web graph transparently so YouTube links continue to work even after the content has changed locations.

2. BACKGROUND & RELATED WORK
YouTube has been the source of study in a number of contexts including characterization [2], video sharing [1], video discovery [3], and preservation [5][8]. In previous work [7], we have shown that the half-life for a music video in YouTube ranges from 9 to 18 months, depending on the publication date of the video, and there are frequently hundreds if not thousands of copies of the same music videos within YouTube at any one time. This work is an extension of [7] where we make use of the fact that multiple copies of music videos are available at other URLs, and we have built a tool to aid in the discovery of these new URLs. This work fits into a larger framework of rediscovering lost web resources [4] and correcting broken links in the web graph [6].

3. FINDMOBILE TOOL
3.1 Overview
Volitrax works in a client-server environment where clients (those with the Firefox add-on installed) make use of central server which stores music metadata locally and pushes the data out to the Web Infrastructure where it may outlive the lifetime of the service. Figure 1 shows the Volitrax server interfacing with the Volitrax add-ons and various services like Blogger, tumblr, and delicious. These services all offer APIs which make pushing and pulling information straightforward. Data is supplied to Volitrax from volunteer user input and from the last.fm API.

Figure 1. Volitrax clients interact with server which stores long-term data with Blogger, tumblr, & delicious

The Volitrax add-on examines the HTTP traffic when the user is visiting URLs on youtube.com. The add-on uses the YouTube API to obtain information about the video being viewed, and when it suspects the user is viewing a music video (by examining
the categorization and video title), it will use the last.fm service to find additional metadata about the song and perform spell corrections. The user may also be asked to verify the metadata (see Figure 2) although this option can be turned off easily. Metadata about the music video is stored on the server and is pushed to long-term data storage (the Web Infrastructure).

When the user accesses a YouTube music video that has been removed (as shown in Figure 3), the YouTube API will return a 404 http status code. When this happens, Volitrax will look for an alternate location in its database of music videos so it can automatically redirect the user to another copy. If this is the first time the URL has been seen by Volitrax, it will prompt the user for information about the missing video. The user is able to provide the title and artist if they know it and a new URL if they can discover a copy themselves.

3.2 Voting on User Input
Volitrax makes use of information supplied by users to improve the redirection experience for all users. Any system that relies on the collective anonymous input of the public will ultimately require separating out good input from bad input. Volitrax uses a voting system to determine which inputs are better than others. For example, if more users agree that a song’s title is A instead of B, then A will be the selected title. Users are also given the chance to confirm if an automated redirect is resulting in a “good enough” copy of the requested video. Of course this voting method is not full-proof, but it is an adequate light-weight solution that does not require user authentication. In the future, other trust metrics could be employed such as giving new users less weight when issuing votes.

3.3 Long-term Storage
As mentioned earlier, Volitrax stores data in a number of commercial services that are not originally designed for such purposes. However, storing music video information in these services will significantly increase the chance of such information surviving well past the lifetime of the Volitrax application. Because these services were not intended to be used as a database, their APIs are throttled to at best one request per second. This makes starting a new server with no local information very slow.

4. ACKNOWLEDGMENTS
Thank you to Vivens Ndatinya who laid some of the groundwork for the Volitrax add-on. This research was supported by the National Science Foundation (IIS 1008492 and 1009392).

5. REFERENCES