

# The “Pros” and “Cons” of Reverse Image Lookup as an Assessment Tool for Digitized Cultural Heritage Images

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## Session Type

- Presentation

## Abstract

This presentation introduces and builds upon the application of content-based image retrieval (CBIR) and reverse image lookup (RIL), a graduated form of CBIR, as a potential assessment tool for cultural heritage repository managers. The presenters will focus their conversation around five topics: (1) CBIR and RIL definitions and history; (2) RIL case studies; (3) methods and results of presenters’ RIL study; (4) RIL benefits and limitations; and (5) implications of RIL on digital repository assessment. The presentation concludes by proposing that RIL offers benefits for cultural heritage repository managers in the assessment of users and the reuses of their collections. Audience members will gain insight into how the software can be used as another viable option in their assessment toolkit.

## Conference Themes

- Repositories and Cultural Heritage
- Exploring Metrics, Assessment, and Impact

## Keywords

assessment; digital library; reuse; reverse image lookup; users

## Audience

This presentation will explain the “pros” and “cons” of reverse image lookup as an assessment tool for understanding the users and reuses of digitized cultural heritage material. As such, the presentation is best suited for those managing and/or assessing cultural heritage repositories, irrespective of their official title.

## Background

The presentation will draw upon the growing interest in assessing digital cultural heritage image reuse by implementing reverse image lookup as our assessment instrument. This innovative approach, to date, has only been employed by a handful of researchers per the published literature (Kousha, Thelwall, and Rezaie 2010; Terras and Kirton 2013; Kelly 2015). This presentation topic will offer audience members an additional method for assessing digital image use and reuse.

## Content

In a 2008 article, “Content-Based Information Retrieval and Digital Libraries,” Gary (Gang) Wan and Zao Liu (2008) introduced alternative search techniques to text-based searching, including those that search using audio, video, 3-D objects, and still images, known as content-based image retrieval (CBIR). Since that time, a handful of information professionals have utilized CBIR for the following two purposes: discovering digital library content on the web and understanding how digital library images are reused on the web.

The presentation will focus on the application of CBIR and reverse image lookup (RIL), a graduated form of CBIR, as an assessment instrument for understanding digital cultural heritage users and reuses. The

presentation is organized into five sections: (1) CBIR and RIL definitions and history; (2) RIL case studies; (3) methods and results of presenters' RIL study; (4) RIL benefits and limitations; and (5) implications of RIL on digital repository assessment.

### CBIR and RIL Definitions and History

First, the presenters will briefly explain and contextualize CBIR and RIL to set a foundation for the rest of the presentation. CBIR searches an image's attributes, such as the color, shape, and texture within an image, and retrieves exact or similar images found on the web (Eakins and Graham 1999). Its "underlying search algorithms" provide users with a variety of ways to search for images, including pre-existing or user drawn images, semantic retrieval, and relevance feedback (Wikipedia 2016). Derived from CBIR, RIL is a web interface that uses a specific image as its search query to find exact replicas, similar types of images, the "popularity of an image," (Chutel and Sakhare 2014) or "manipulated versions and derivative works" (Chutel and Sakhare 2014) over the web (Wikipedia 2016; Chutel and Sakhare 2014). Examples of RIL platforms include TinEye, Google Images, Bing Image Match, and Pinterest Visual Search Tool (Ajinkye 2016).

CBIR, popularly believed to be conceived at a 1992 National Science Foundation (NSF) workshop as "image query matching" (Eakins and Graham 1999), has traditionally been used to identify unauthorized uses of commercially-licensed images or brands (Kelly 2015; Chutel and Sakhare 2014). Early adoption among digital libraries centered around image discovery. Wan and Liu (2008) offer several examples of those libraries whose interfaces integrated CBIR search functionality, including the State Hermitage Museum in Russia and the NSF's International Digital Library Project. Only in the last five years has digital library literature noted the application of RIL technology for the assessment of digital library image reuse.

### RIL Case Studies

Second, presenters will highlight previous RIL studies from the LIS literature to demonstrate how others have used it as an assessment tool. Using the TinEye search engine, Kousha et al., (2010) evaluated how 260 images from both the National Aeronautics and Space Administration (NASA) and popular artwork from around the world are copied and reused on the internet, what "apparent motivations" caused one to reuse images online, and whether the type of image selected generated reuse (2010). The authors concluded that, "it is reasonable to use TinEye for assessing the value of digital images of different types" (2010).

Selecting 32 paintings, Terras and Kirton (2013) designed a study using two RIL tools, TinEye and Google Image Search to understand reuse on the web and the effectiveness of these tools as assessment instruments. They concluded that RIL can be of value to those assessing reuse on the web if "anyone who undertakes a study using these tools takes care when creating a framework for collecting information and directs their research questions accordingly" (2013).

Using a smaller, lesser known collection of digital images, Kelly (2015) compared the effectiveness of two RIL tools, TinEye and Google Image Search. She concluded that Google Image Search was the most accurate RIL tool considering that TinEye did not produce results for her study (2015). She also concluded that RIL techniques were not the most productive approach to understanding reuse. She writes, "RIL was not a particularly time-efficient method for determining reuse of this image collection, although occasional application to find reuse of specific images may be beneficial for collections like this" (2015).

### Methods and Results of Our Study

Third, the presenters will discuss the study they conducted using RIL technology to assess the users and reuses of images from the Library of Congress's Teaching with Primary Resources (LCTPR) digital collection. This portion of the presentation will address the study's methodology and results, and will conclude that, "RIL is one innovative tool that can be used in conjunction with others to better assess digital library users and reuses" (Reilly and Thompson 2016). This adoption "as an assessment mechanism should entice librarians and information professional to look outside the box for other unorthodox tools that could be part of a robust toolkit for assessing digital libraries" (2016).

### RIL Benefits and Limitations

Fourth, the presenters will share benefits and limitations of using RIL as an assessment tool.

Benefits	Limitations
Ease of use: many RIL platforms offer a user-friendly interface, such as Google Image Search, which decreases the barriers to use. This software is accessible to a wide range of users without needing extensive training.	Search result: some search results yield images that are no longer accessible to users for a variety of reasons, including links that are not active; additionally, search engine optimization and indexing may impact results.
Scope of reach: RIL leverages the world wide web, allowing users to search across vast amounts of HTML data, including social media sites (Pinterest, Tumblr, Flickr, and Twitter).	Search functionality: RIL queries only HTML data at this time, overlooking other popular image files/carriers, including PDF, PowerPoint, etc.
Relies on image attributes: RIL software offers users the ability to discover an image by using image attributes instead of descriptive metadata.	Image quality: images with less than 300 pixels per inch may produce inconsistent RIL search results.

## Conclusion

RIL technology offers benefits for the administration and the use of digital image repositories. Its reliance on image attributes enables it to search broadly across the web, promoting a greater understanding of whom and for what purposes digital images are being reused. Similar kinds of reuse assessment methods do not match the scale and scope of RIL because these techniques are limited by the number of participants or the amount of raw data collected in traditional assessment instruments, such as surveys and focus groups. Audience members will take away a greater understanding RIL, including its history and evolution over time, benefits, and limitations. They will also gain insight into how the software can be used as another viable option in their assessment toolkit.

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