Exploring Requirements for Online Art Collections

Irene Lopatovska, Ph.D.
School of Library and Information Science, Pratt Institute
144 w. 14th street, 6th floor, New York, NY 10011-7301
ilopatov@pratt.edu

Iris Bierlein
School of Library and Information Science, Pratt Institute
144 w. 14th street, 6th floor, New York, NY 10011-7301
ibierlei@pratt.edu

Heather Lember
School of Library and Information Science, Pratt Institute
144 w. 14th street, 6th floor, New York, NY 10011-7301
hlemler@pratt.edu

Eleanor Meyer
School of Library and Information Science, Pratt Institute
144 w. 14th street, 6th floor, New York, NY 10011-7301
emeier@pratt.edu

ABSTRACT
While standards for textual retrieval systems are well established, similar standards for the design of visual retrieval systems, specifically for digital art collections, are lacking. The following study extends previous lines of research in developing guidelines for the design and evaluation of museum websites and, specifically, retrieval interfaces for digital art objects. Based on analysis of novice art users’ evaluations of several digital art interfaces, this study developed a list of required features that contribute to the users’ perception of the overall website quality. The article includes discussion of the survey’s findings and directions for future work.

Keywords
Digital collections, image collections, art museums, website design, usability.

INTRODUCTION
At a time when a great number of art collections are seeking to reach out to novice and expert art enthusiasts through their online interfaces, there are no clear guidelines to aid museums and similar institutions in developing engaging and informative websites. This paper discusses the results of a pilot study that explored traditional and innovative features of six digital art collections in order to develop a framework of user requirements for successful online image retrieval systems, with special attention to art museum websites.

PREVIOUS RESEARCH
Much has been written about the importance of an online presence to further the mission of art museums (Honeysett, 2007; Jones, 2008). Several studies have examined various aspects of museum websites, including their functionality, usability, and engagement. Hayes and Zambonini (2007) and Fantoni, Stien and Bowman (2012) used analytics programs to record user interactions with museum websites and classify users and their activities on the site. More specific to image collections, Walz and Brenny (2005) conducted a heuristic self-inspection evaluation of the University of Minnesota Architecture and Landscape visual resources collection. The authors observed how participants performed a set of tasks using the collection and gathered additional data in post-test questionnaires. The authors identified specific areas of weakness, such as navigation and labeling conventions but also used the survey to establish a baseline evaluation for future alterations to the system.

Fewer studies have surveyed site design across multiple image collection interfaces. One early example of such a study is the work of Dyson and Moran (2001) who analyzed seven websites with the aim of generating specific recommendations for the design of the Rural History Centre website at the University of Reading as well as developing a general framework for evaluating digital visual collections. The study developed a set of recommendations for design of museum websites, including the importance of guided browsing, as well as clear and consistent website architecture. More recently, Lin, Gregor and Ewing (2009) proposed a website evaluation framework that focused on assessing user enjoyment associated with the use of virtual museum collections. Their assessment attempted to quantitatively evaluate the enjoyment value of multimedia content, interactive elements and game-based features on museum websites.

The present study extends the previous research by a) identifying museum website features that virtual visitors value in their use of digital collections and b) designing an instrument to evaluate overall website quality. The proposed guidelines can be useful in the development and evaluation of retrieval systems for digital art objects.
METHODS
The described study investigated relationships between art collections’ website features, specifically traditional and innovative image retrieval tools and users’ judgments of the overall website quality.

Six online art collections of various types and sizes were selected for the study. The main selection criterion for all the websites was presence of traditional (e.g., search, browse) and innovative search and content description features (e.g., content tagging). Two third-party aggregator sites (Google Art and Artsy) were added due to their pioneering use of the innovative browsing and discovery features (Beil, 2013). Table 1 below lists the digital art image systems used in the study along with their characteristics and innovative design features.

   **Innovative features:** Museum View allows users to view art in situ via virtual museum walk-through experience using Google’s Street View technology. Image comparison and powerful zoom tools. Supports “favorites” folder for registered users and image sharing via social media and email

   **Innovative features:** Discovery tools such as The Art Genome Project, which uses expert tagging to associate works of art across genres. Search filters based on color, location and price. Powerful image zoom technology. Business model based on connecting users to galleries. Required membership enables “favorites” feature and sharing of content via social media.

   **Innovative features:** Crowd sourced tagging with a competitive game interface, unique inclusion of exhibition data as a separate, searchable, cataloging unit and a comments section for each object. The “posse” program allows users to cultivate a profile and participate in the website as an online community. Image manipulation features include downloading and sharing via social media.

4. Los Angeles County Museum of Art (LACMA), www.collections.lacma.org: comprehensive digital representation of the collection of art and artifacts held by LACMA.

   **Innovative features:** Advanced and faceted search combined with browsing features enable collection exploration. 20,000+ images have been placed in the public domain and are available for download. Tools include zoom, tagging, and commenting. Sharing images via social networks is enabled.

5. Museum of Fine Arts, Boston (MFA), www.mfa.org: comprehensive digital representation of the large art and artifact collections held by the MFA.
   **Innovative features:** Natural language searching, image sharing via e-cards and/or social media, website membership with personal favorites feature and ability to create image tags.

6. Stedelijk Museum Amsterdam, www.stedelijk.nl: digital representation the modern and contemporary art and design collection held by the Stedelijk.
   **Innovative features:** Images link to library catalog entries for related material. Clean visual design.

Table 1. Sample of online art collections.

The selected websites were evaluated by eight art novice participants, using a modified version of Nielsen’s (1993) usability evaluation framework. Since our exploratory study was designed as a usability test, deemed the low number of study participants to be acceptable (Nielsen 2000). Participants were asked to identify and rate content retrieval functionality supported by the websites using the following criteria:

- **Learnability:** degree of difficulty in accomplishing basic tasks [e.g., search, browse, review and manipulation of results, etc.] during the first encounter with the interface.
- **Efficiency:** after gaining familiarity with a system, speed with which basic tasks can be performed.
- **Aesthetics:** perceived attractiveness of the interface.
- **Errors:** number and severity of errors encountered while using the system, and ease of recovery from the errors.
- **Memorability:** after a period of non-use, the degree of difficulty in re-establishing proficiency.
- **Reflection:** the quality and polarity of memories associated with the use of the interface.
- **Satisfaction:** degree of satisfaction with the interface design based on the overall evaluation of task-specific, aesthetic and other features.

After each participant individually evaluated the six websites, all participants attended a focus group to share their impressions of the sites and identify general themes in their evaluations. The study produced two groups of findings:

1. Findings pertaining to participants ratings of the reviewed sites using the Neilson’s framework, and
2. The list of interface features participants identified as desirable across all reviewed digital image collections.

**FINDINGS**

Study participants evaluated six online art collections using learnability, efficiency, aesthetics, errors, memorability, reflections and satisfaction criteria (Table 2). Brooklyn Museum received the highest ratings in learnability, efficiency and satisfaction; Artsy received the highest scores for the aesthetic design of the site, LACMA’s website received the highest number of positive reflections; while Artsy and Google Art received the highest memorability scores.

<table>
<thead>
<tr>
<th>Evaluation Criteria/Scores</th>
<th>Brooklyn</th>
<th>MFA</th>
<th>Artsy</th>
<th>Google Art</th>
<th>LACMA</th>
<th>Stedelijk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learnability*</td>
<td>4.63</td>
<td>3.8</td>
<td>4.19</td>
<td>3</td>
<td>4</td>
<td>3.13</td>
</tr>
<tr>
<td>Efficiency*</td>
<td>4.75</td>
<td>4</td>
<td>4</td>
<td>3.63</td>
<td>4.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Aesthetics*</td>
<td>4</td>
<td>4</td>
<td>4.75</td>
<td>3.4</td>
<td>3.94</td>
<td>3.6</td>
</tr>
<tr>
<td>Errors**</td>
<td>-2</td>
<td>-3</td>
<td>-3</td>
<td>-1</td>
<td>-2</td>
<td>-3</td>
</tr>
<tr>
<td>Memorability**</td>
<td>+4</td>
<td>+3</td>
<td>+5</td>
<td>+5</td>
<td>+2</td>
<td></td>
</tr>
<tr>
<td>Reflection**</td>
<td>+4</td>
<td>+5</td>
<td>+5</td>
<td>+1</td>
<td>+7</td>
<td>+2/3</td>
</tr>
<tr>
<td>Satisfaction*</td>
<td>4.5</td>
<td>4.33</td>
<td>4.1</td>
<td>4</td>
<td>4</td>
<td>3.33</td>
</tr>
</tbody>
</table>

*specific features within these criteria were rated on a 5-point Likert scale where 5 was the highest possible score

** the number of positive(+) and negative(-) instances

Table 2. Website ratings using Nielson criteria.

Analysis of participants’ evaluations revealed five main clusters of design features that the users found valuable for completing search tasks and engaging with the collections: search/browse, image manipulation, interactive features, website aesthetics, usability and website architecture.

Table 3 compares specific features within the five mentioned above clusters that the participants found valuable in their use of virtual collections.

Search/browse features were considered essential by all users. Advanced browsing, supported by hierarchical, well-structured navigation, was reported to be highly useful for obtaining precise results without conducting a formal keyword search. Search filters enabled users to refine search results, a feature that was useful in large digital collections, such as LACMA, MFA and Google Art. Most sites, except Stedelijk, offered some form of image manipulation. Saving images to membership accounts for future reference was common for sites; zooming functionality provided a more lifelike viewing experience. While considered important to participants, an image download feature was only supported by three of the sites.

<table>
<thead>
<tr>
<th>Features on Art Websites</th>
<th>Brooklyn</th>
<th>MFA</th>
<th>Artsy</th>
<th>Google Art</th>
<th>LACMA</th>
<th>Stedelijk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search/Browse</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>Advanced Browse</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>Suggestive Spelling</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>Advanced Search</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>Refine Search Filters</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>Return to search/replicate search</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>Image Manipulation</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
</tbody>
</table>

| Interactive Features     | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |
| Site Membership          | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |
| Sharing via Social Media, Email | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ |
| Comment                  | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |
| Tagging                  | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |
| Games                    | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |

Aesthetics/Interface

| Simplicity               | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |
| Image Emphasis vs. Text  | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |

Usability/Site Architecture

| Intuitive Design         | ✦        | ✦   | ✦     | ✦          | ✦     | ✦         |
| Links to related material (internal & external) | ✦ | ✦ | ✦ | ✦ | ✦ | ✦ |

TOTAL NUMBER OF FEATURES 16 14 14.5 13.5 18 6

* ✦ indicates full and satisfactory presence of a feature;
* ✦ indicates only a partial application of the feature; blanks indicate the absence of the feature.

Table 3. Features on Art Websites

Five out of six sites offered free site memberships, and image sharing via social network or email.

Other interactive features, such as tagging, commenting and games were less common, but were deemed valuable by
participants as ways to engage users. Four out of six sites offered links to additional content hosted internally or externally, a feature that supported research and was highly praised by participants.

All websites were considered to have placed an emphasis on visual simplicity with heavy image content. LACMA, Brooklyn Museum and the MFA/Boston used the highest number of features (18, 16 and 14 respectively). The collection aggregators (Google Art Project, Artsy) also performed strongly but lacked in image manipulation and interactive features. Stedelijk, the only international site, provided six out of 19 features, proving to be somewhat of an outlier in the group.

**DISCUSSION AND CONCLUSION**

Application of the Nielsen’s (1993) usability framework to online art collections proved useful for differentiating between these collections on the criteria of learnability, efficiency, aesthetics, errors, memorability, reflections and satisfaction criteria. Use of the flexible evaluation tool allowed participants to explore the interfaces and identify features they deemed important for content retrieval and use.

Analysis of the online collections features favored the website of The Los Angeles County Museum of Art (LACMA), which supported 18 out of the 19 features, followed by Brooklyn Museum and Artsy. As Table 3 illustrates, the LACMA interface offered the most features for searching/browsing, image manipulation, and user interactions as well as pleasing aesthetics, usability and website architecture. However, in the total satisfaction scores, LACMA was rated fourth: while participants acknowledged the richness of the site’s content and search features, they also identified difficulties with “overwhelming” navigation options. The Brooklyn Museum received the highest overall satisfaction, learnability and efficiency scores (Table 2), despite the absence of partial availability of certain search/browse and interactive features. Participants indicated that compared to LACMA, Brooklyn Museum provided a “clean” interface, though less “professional looking” when compared to Artsy or Google Art.

Further investigation is needed to understand the connection between availability and usability of specific website features and users’ overall satisfaction with the site. Users’ evaluation of the MFA’s site offers a good illustration of “inconsistencies” in users’ judgments: despite average ratings on the Nielson’s criteria and limited functionality, the site received the second highest overall satisfaction score. Additional research is also needed to extend and enhance the list of the features users expect to see on digital art collection sites. We hope that our work advances knowledge of users’ expectations and preferences and brings us closer to the development of more usable and enjoyable virtual collections.

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**REFERENCES**


