AMARA: An Affective Agent to Enhance Users’ Enjoyment and Engagement with Online Art Collections

Craig M. MacDonald
Pratt Institute
144 West 14th Street, 6th Floor
New York, NY 10011 USA
cmacdona@pratt.edu

S. Joon Park
The iSchool at Drexel University
3141 Chestnut Street
Philadelphia, PA 19104 USA
sp347@drexel.edu

Gunho Chae
KAIST
291 Daehak-ro, Yuseong-gu,
Daejeon 305-701, Korea
agarpe@kaist.ac.kr

ABSTRACT
This demonstration presents AMARA, a novel interactive system to help novice art enthusiasts browse online art collections. Currently being developed for the Indianapolis Museum of Art website, the system uses an embedded interactive agent who asks users a series of simple and straightforward multiple-choice questions regarding users’ current feelings, preferences, and interests in art. The answers to each question are mapped to social tags, which are then used to retrieve and display relevant artworks the user may find interesting or appealing. Using AMARA, users can easily browse or search through online art collections without having to use a traditional keyword search, which requires extensive knowledge of art terminology or advanced subject expertise. Thus, AMARA was designed to enhance users’ enjoyment and engagement with online art collections and assist users in discovering their known and unknown preferences in art.

Keywords
Agents, affective computing, social tags, online art museum

INTRODUCTION
Art museums have spent a tremendous amount of time and resources digitizing their art collections with the intention of providing an online alternative for art enthusiasts who wish to browse or search for artworks without, prior to, or after visiting the brick and mortar museum (Jones, 2007). Typically, museums provide technology-mediated access to their collections to increase accessibility and visitor engagement (Rayward & Twidale, 1999; Trant & Wyman, 2006), but there is little evidence that this is the case. In a survey of over 1200 users of museum websites, Marty (2008) found that over 90% of respondents said they either “preferred” or “strongly preferred” viewing artifacts or collections at the physical museum compared to online although a majority of respondents (64.1%) said they were either “likely” or “very likely” to view online images of artifacts/collections. In response to this trend, museum websites typically focus on providing information and services designed to assist users with planning their museum visit (Haynes & Zambonini, 2007), and little time is spent designing enjoyable and usable online art collections. Most online art collections thus offer a poor user experience due to the unnecessary complexity of hierarchical browsing combined with an over-reliance on the keyword search box.

More recently, museums are seeing an influx of novice art enthusiasts who wish to spend their leisure time visiting online collections to browse or search for artworks they find interesting or appealing (Marty, Sayre, & Fantoni, 2011). Unfortunately, these users do not spend much time on the museum website and show relatively low levels of engagement with the online content (Fantoni & Stein, 2012). Many of these users lack deep knowledge of art and art terminology, which makes it difficult for them to formulate effective search queries for a keyword search. Since browsing art collections is an emotional process, particularly for non-experts (Leder, et al., 2012), online art museums can address the needs of this user group by providing emotional interactions (Blythe, et al., 2006).

This paper describes a novel artwork search system called AMARA (Affective Museum of Art Resource Agent). AMARA is an embedded interactive agent (see Figure 1)
designed to make the process of browsing online art collections more enjoyable and interactive for novice art enthusiasts. More details about the design and implementation of AMARA are presented in the following sections.

DESIGN
Rather than replace the traditional browse or search interface, AMARA provides an additional type of interaction that can be added to any existing online art collection. The AMARA system consists of three components: an embedded agent, an image retrieval database with social tags, and a question-based search interface. Each of these components will be described separately.

Embedded Agent
The embedded agent consists of three parts: a graphical agent, a text-based interaction window, and navigation buttons (see Figure 2). Previous studies have shown that designers can induce positive emotional reactions and increase users' aesthetic judgments through the use of simple affective cues (Park, MacDonald, & Khoo, 2012). Therefore, AMARA uses a graphical agent to increase users' emotional engagement and make the searching/browsing experience more affective and enjoyable. An animated female docent was designed to represent AMARA since previous studies have also shown that female agents and animation increase perceptions of empathy, interest, and enjoyment (Dehn & van Mulken, 2000; Beale & Creed, 2009). To make AMARA appear friendlier and less intrusive, subtle animations were included, such as smiling, blinking, winking, and tilting her head (see Figure 3). In addition to the graphical agent, AMARA interacts with users by displaying text-based multiple-choice or open-ended questions that users can answer using the keyboard and mouse. Finally, two navigation buttons provide additional control to users by allowing them to go back to the beginning (Reset) or skip to the next question (Skip) at any time during the search process.

Image Retrieval Database with Social Tags
AMARA retrieves relevant images by utilizing social tags provided by users of the Indianapolis Museum of Art (IMA) website. Research has shown that the terms used by non-experts to describe artworks are significantly different from the terms used by professional catalogers (Trant & Wyman, 2006). Therefore, novice art enthusiasts, who often lack adequate knowledge of art terminology and/or metadata, may be better served by taking advantage of social tags provided by other users rather than metadata ascribed by museum experts. A second benefit of social tags is that they offer a rough consensus about the content of the artworks (Smith, 2008), which can be used to improve the accuracy of search results. Therefore, an image retrieval system built around social tags may help novice users to discover and refine their interests without having to learn art terminology or understand the details of the underlying metadata schema. In short, when using AMARA, users do not need to know what they are looking for, which allows AMARA to help them uncover their known and unknown preferences in art.

Question-based Search Interface
As discussed previously, browsing art collections is an inherently emotional process (Leder, et al., 2012). Therefore, we designed AMARA to provide an affective interactive experience by using a simple, question-based approach. We developed 190 questions that address users’ affective states, preferences, interests, and tastes. We had two goals when developing these questions: first, answering the questions needed to provide a simple but engaging interaction; second, the answers to each question had to map to the existing social tags in the IMA database. To achieve the first goal, we focused on developing questions that were interesting and/or easy to answer. Although some questions specifically address art (e.g., “Do you like abstract art?”), other questions cover a wide variety of aesthetic tastes and interests, ranging from mundane (e.g., “What kind of color do you like?”) to provocative (e.g., “What do you find sexy?”) and humorous (e.g., “What type of food do you like to pig out on?”) or philosophical (“What do you think is the most interesting about human nature?”). The second goal was achieved by ensuring that
the questions represented the six facets of museum tags: background, identification, theme, association, emotion, and figure (Chae & Kim, 2011). A majority of questions were multiple-choice with 2-4 possible answers, and each answer was mapped to a subset of relevant social tags from the IMA database. This process was done manually in order to increase the likelihood that AMARA produces meaningful and relevant results. Some open-ended questions were also included to give users more control and freedom.

INTERACTION
When a user first interacts with AMARA, she introduces herself in natural language and asks the user if s/he would like to get started. Next, she asks a series of questions through the question-based interface starting with a question about the user’s current affective state. AMARA refreshes the image results after each question is answered; to increase relevance, artworks with the most frequently occurring tags are filtered to the top of the results. Each search results page consists of 15 images and the number of pages varies depending on the query. Users can reset the process at any point or skip any question if they don’t wish to answer it. A complete session consists of three multiple choice questions and one open-ended question; once a session is complete, users have the option to go back to beginning and start again. An overview of how AMARA works is presented in Figure 4.

IMPLEMENTATION
AMARA is currently being developed for the Indianapolis Museum of Art website but the system is currently in the research and development stage and is not yet visible to the public. At this time, the alpha version of AMARA has been implemented on a replicated version of the IMA website so that further experiments and modifications can be conducted in a realistic context but without disrupting IMA’s current users. The backend functionality of AMARA was built using PHP, MySQL, and Apache web server. The front-end interface was created using Adobe Flash for the animated graphical agent and HTML, CSS, and JavaScript for the question-based search interaction. The system is currently optimized for the Chrome and Safari web browsers.

FUTURE WORK
Initial pilot tests showed that users found AMARA to be more pleasurable, engaging, and meaningful than a traditional keyword search (Chae, et al., 2012). In addition, early results from a more thorough evaluation show that users believe using AMARA provides a more aesthetically appealing, pleasurable, trust-worthy, engaging, and meaningful experience than using only a traditional keyword search.

While early results are positive, we plan to continue adding additional features and functionality to make AMARA more effective (and affective). Future research topics include improving the search algorithms to produce more relevant results, increasing speed and performance, exploring ways to combine social tags with museum-level metadata, adding artificial intelligence and machine learning components to improve search and retrieval, exploring the educational value of AMARA for assisting novice users in learning art terminology and/or history, refining the question-based search interface by evaluating the effectiveness of different types of questions, and exploring the application of AMARA in additional contexts, including different content areas (music, movies, books, tourism, etc.) and different devices (mobile, tablet, kiosk, etc.).
SUPPORTING EQUIPMENT
The demonstration will give conference attendees an opportunity to interact with a live, working version of the AMARA system. A laptop will be provided by the authors to run the demonstration. As the system is currently hosted on an external web server, an internet connection is required to provide access to AMARA. A high-speed Ethernet connection would be preferred due to the image-intensive nature of the demonstration, but a wireless connection should suffice.

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