Personalized Cultural Heritage Experience outside the Museum

Connecting the outside world to the museum experience

Alan J.Wecker[1,2], Tsvika Kuflik[1] and Oliviero Stock[3]
[1]University of Haifa, [2]University of Trento, [3]FBK-irst
ajwecker@gmail.com, kuflik@is.haifa.ac.il, ostock@fbk.eu

Abstract. We propose a new area to focus upon as a research challenge: How to use personalized technology to connect our cultural heritage experiences to our "daily" lives. In particular we want to connect the visitor's museum experiences with outside relevant mobile cultural heritage experiences. We begin to examine what processes and technologies will be necessary to accomplish the when, what and how of this challenge.

Keywords: lifelong user models, museum applications

1 Introduction

Museums, as a cultural heritage site, have long been a primary showground for the exploration of new technologies. This combination of museum and technologies has led to conferences such as Museum and Web and workshops such as this one (PATCH). A plethora of museum guides have been developed and explored. Recent new directions for research in this field, have concerned themselves with 1) expanding the on-site visit with prior and post experiences, normally at a desktop computer at home;1 2) expanding the visit from a onetime experience to an experience that may repeat itself multiple times over a lifetime, including the reuse of the information elicited from experience gained onsite (e.g. a user model) at multiple sites [1]. Personalization is deemed a key factor in the success of such objectives. Our proposed third direction for research, is **examining how to enhance other experiences outside the museum site based on experiences at that site**. By doing this we can connect our cultural heritage experiences to our "daily" lives.

To illustrate such an experience, consider the following scenario: A user, who have shown an interest in bible studies is traveling near Emek HaElah in Israel, the user gets an SMS or short verbal message, that the user is nearing the site of the biblical battle between Goliath and David. While driving, the user can be presented with either classical music or modern Israeli music connected with this theme. When she gets out of her car she can be presented with information (either short videos or pictures) presenting some information on the history of the area and of weaponry from the time of King David which she had seen in a museum exhibition some time ago. Alternatively consider another scenario: A user is reading a text (or alternatively

[1] We are in the process of submitting a paper on this topic for publication. Interested persons can contact the authors for a pre-publication draft.

browsing the web), which contains references to Rome, on an electronic mobile reader (such as Kindle) while auxiliary information, i.e. pictures from past visits to the Coliseum, are presented on a large display (TV, wall display), not only pictures taken by the user, but pictures of historic significance personally related, such as the visitor's parents standing by the Arch of Titus can be shown. In this case the specific text the user is reading is augmented by relevant personal information and additional relevant information that may be available on-line filtered by the user's model.

From our example scenario emerge three processes which we feel are worthy of further examination: 1) **identification** of ***contextual opportunities*** outside the museum site, which are suitable to present cultural heritage information (primarily from museums, that the user has visited or may visit in the future), 2) **selection** of material which may interest the user in this particular contextual opportunity 3) **delivery** of such material given the context (devices, displays) and user preferences (user profile).

2 Related Work

As noted, museums have been the site of personalization research, mainly focusing on new technologies. There has been considerable research done in this area (PEACH, PIL, CHIP)[2-4] however the industry has not yet widely adapted personalization. Primarily in the past, personalization (via user models) has been used for cultural heritage frameworks for single visits. Challenges and a roadmap are discussed in [1].

The field of Pervasive Computing, due to the huge amounts of data involved has developed a number of different methodologies to work with context.[6-10]. Dealing with context can be viewed as a method to obtain personalized services, for example using contextual services based on location. Some thought has also been given to personalization of pervasive applications [10,11] .

User Models have been used as a vehicle for personalization and adaptation. In the field of user modeling a great deal of thought has been placed recently on the reuse of models for a number of applications [12,13]. GUMO, UserML and UbisWorld [14] are examples of efforts to achieve some sort of agreed upon interchange format in this area. Another effort to encourage reuse of user models is the Personis user modeling server that suggest the reuse of data stored centrally by a variety of different applications by applying specific resolvers [15,16]. All of the above point to the issue of user models which evolve over time (lifelong user models), this issue has been examined extensively for the area of lifelong learning models [17]. The importance of context to user models and how to represent and reason with such models is an emerging issue. The milieu of what group the user is visiting with can affect his preferences and hence the model.

In order to accomplish our goals, it is clear, that we will need to make use of nascent standards and methodologies such as: TourML[18] which is a standard to connect digital assets to cultural heritage items, UserML and Personis (discussed above).

3 Proposal

As mentioned above in trying to think about how to connect the museum to the "outside" world we are concerned with three processes 1) opportunity identification 2)

content selection 3) contextual delivery. Each of the processes described below heavily depend on technologies of personalization and context, and their interplay as delineated in the Related Works section

- **Opportunity Identification**: In considering when to bring cultural heritage information, from for example a prior museum visit, to enhance experiences outside the cultural heritage site, one should exploit opportunities as they arise. Opportunities can be triggered by explicit requests for information while on the "go" outside the cultural heritage site, or implicitly, when certain conditions are met. Examples of implicit opportunities include: being in certain locations connected with cultural heritage, meeting people associated with cultural heritage, certain key historical dates and browsing of content that can be associated with cultural heritage.
- **Content Selection**: In today's digital world, during the museum visit one may have access to a large number of digital assets. The assets can be made available by the museum, through the use of guides (both stationary and mobile). Not only does the visitor encounter digital assets previously prepared by others, the visitor may be directly responsible for creating new assets (for example: pictures, video, recording, written impressions). These assets can also take the shape and form of music, poetry and can be stored in a variety of multimedia formats ranging from video to audio to text. This content may not necessarily be of an informative nature, but can be of a social nature, which may evoke emotions to bind the visitor to his cultural heritage experience. In addition one may need to filter and order these vast quantities of information in order that user not be overwhelmed and get material that is suitable to their individual preferences (personalization).
- **Contextual Delivery:** These assets can also be utilized to enhance a number of other user experiences, not only during a visit to a cultural heritage site (which should probably be primarily dedicated to experiencing the site itself). However a user, while mobile, will not necessarily have access to devices that can display or play these assets. Hence, the system must make choices using the current context and user model to decide which and how to present these assets given the users mobile context. Alternatively, when reading a text with references to cultural heritage sites, information from a person's past experience (both the user model and the digital assets) which is related can be brought to bear on his present experiences using a variety of secondary displays according to the user's model (preferences).

4 Summary

Given the above, the major research question we wish to propose exploration of is:

How can we apply technology, enhanced with accumulated experiences at cultural heritage sites (e.g., museums), to opportunities for delivering contextual information in settings external to such sites?

This question can be broken down to three phases (opportunity identification, content search and recommendation, contextual delivery) each one with a more specific question: 1) How can cultural heritage opportunities be identified? 2) When an opportunity presents itself; how can relevant content (informative, emotional, social) be

identified/found? 3) How can this content (personalized) be presented within the context of the specific user?

5 References

1. L Ardissono, T Kuflik, D Petrelli. Personalization in cultural heritage: the road travelled and the one ahead, User Modeling and User-Adapted Interaction. 22 (2011) 1-27.
2. T Kuflik, O Stock, M Zancanaro, A Gorfinkel, S Jbara, S Kats, et al. Visitor's Guide in an "Active Museum": Presentations, Communications, and Reflection. Journal of Computers and Cultural Heritage. (2011).
3. O Stock, M Zancanaro, PEACH: Intelligent Interfaces for Museum Visits, Springer-Verlag New York Inc 2007.
4. L Aroyo, N Stash, Y Wang, P Gorgels, L Rutledge. Chip demonstrator: Semantics-driven recommendations and museum tour generation, The Semantic Web. (2008) 879-886.
5. O Stock, M Zancanaro, P Busetta, C Callaway, A Krüger, M Kruppa, et al. Adaptive, intelligent presentation of information for the museum visitor in PEACH, User Modeling and User-Adapted Interaction. 17 (2007) 257-304.
6. K Sheikh, M Wegdam, M van Sinderen, Middleware support for quality of context in pervasive context-aware systems, (2007) 461-466.
7. J Soldatos, N Dimakis, K Stamatis, L Polymenakos. A breadboard architecture for pervasive context-aware services in smart spaces: middleware components and prototype applications, Personal and Ubiquitous Computing. 11 (2007) 193-212.
8. JE Bardram. The Java Context Awareness Framework (JCAF)–a service infrastructure and programming framework for context-aware applications, Pervasive Computing. (2005) 98-115.
9. N Davies, J Landay, S Hudson, A Schmidt. Guest Editors' Introduction: Rapid Prototyping for Ubiquitous Computing, IEEE Pervasive Computing. (2005) 15-17.
10. K Henricksen, J Indulska, A Rakotonirainy. Modeling context information in pervasive computing systems, Pervasive Computing. (2002) 79-117.
11. A Held, S Buchholz, A Schill. Modeling of context information for pervasive computing applications, Procceding of the World Multiconference on Systemics, Cybernetics and Informatics. (2002).
12. T Kuflik, J Kay, B Kummerfeld. Lifelong Personalized Museum Experiences, Proc.Pervasive User Modeling and Personalization (PUMP'10). (2010).
13. A Kobsa. Generic user modeling systems, The adaptive web. (2007) 136-154.
14. D Heckmann, T Schwartz, B Brandherm, M Schmitz, M von Wilamowitz-Moellendorff. Gumo–the general user model ontology, User modeling 2005. (2005) 149-149.
15. S Gerber, M Fry, J Kay, B Kummerfeld, G Pink, R Wasinger. PersonisJ: mobile, client-side user modelling, User Modeling, Adaptation, and Personalization. (2010) 111-122.
16. M Assad, D Carmichael, J Kay, B Kummerfeld. PersonisAD: Distributed, active, scrutable model framework for context-aware services, Pervasive Computing. (2007) 55-72.
17. J Kay. Lifelong learner modeling for lifelong personalized pervasive learning, Learning Technologies, IEEE Transactions on. 1 (2008) 215-228.
18. R Watson, S Akselsen, E Monod, L Pitt. The Open Tourism Consortium::: Laying The Foundations for the Future of Tourism, European Management Journal. 22 (2004) 315-326.