Open Research Online

The Open University's repository of research publications
and other research outputs

Cultural learning across the smart city

Conference or Workshop Item

oro.open.ac.uk

Cultural learning across the Smart City

Annika Wolff[1] and Paul Mulholland[1]

[1] Knowledge Media Institute, The Open University, Milton Keynes, UK
(annika.wolff, paul.mulholland)@open.ac.uk

Abstract. Public involvement in defining and interpreting cultural heritage of-fers many benefits, including improved learning opportunities for individuals and a broader base of knowledge about art and heritage. This knowledge can in turn be used for better, smarter, information provision in the future. This paper proposes how to capture, analyse and present cultural information from differ-ent viewpoints, using narrative principles to uncover important settings (place and time) themes and people and using these to support both physical and con-ceptual navigation. We propose novel methods to provide and capture 'in the moment' information, via mobile devices, for both formal and lifelong cultural learning within a smart city.

Keywords. culture, smart city, learning, narrative, navigation

Key Terms. Machine Intelligence, Methodology

1 Introduction

Cities evolve over many years and develop a rich history and cultural legacy. This can be manifest through the tangible buildings and environment, and the public artworks placed within it, or through the intangible heritage of the local customs, memories and stories of inhabitants or visitors. To understand a city is to understand its culture. To this end, a multitude of visitor information is produced and made available in differ-ent formats both for individual points of interest and for heritage trails.

Recently there has been a shift away from expert led definition and interpretation of art and heritage towards a people-oriented community approach [1, 2]. This construc-tivist approach to cultural learning offers the possibility that during active engagement the individual can both learn and contribute to the body of knowledge on art and her-itage, explore differing viewpoints, potentially discover new perspectives from which to view it, find previously unexplored connections, or even use local knowledge to identify 'overlooked' but culturally important buildings or artefacts. This information can, in turn, be used to provide richer and smarter information for future city visitors.

While inviting multiple contributions has clear benefits, it also poses a number of challenges. Key among these are:

- How to represent and analyse a large volume of visitor-contributed data and identify the most important concepts, consensus or differing viewpoints and use these for smarter information provision.
- How to provoke curiosity to engage with the content.
- How to encourage visitors to offer their own contributions and benefit of their knowledge.

This paper explores whether a 'citizen culture' approach to capturing public contributions can be used to provide increasingly smarter information to formal and lifelong learners and visitors as they engage with cultural points of interest around a city.

2   Physical and conceptual neighbourhoods and trails

Within the city, each point of interest exists within a physical space. A visitor, following the constraints of layout or access permissions, can physically move around to view a cultural site from different viewpoints, in some cases both inside and outside. Whilst ostensibly the same place, an immediate physical neighbourhood can be experienced differently by each visitor: for example, if visiting at different times of the day, or in different seasons (especially true if visiting a garden), or if selecting different ways to move around a space.

A visitor can also move from one cultural site of interest to another. Physical navigation between nearby items might be facilitated if one is in line of sight of another, or aided by signposts if close by but out of sight. More distant sites are often navigated to using maps, either on paper or a mobile device. Physical trails between points of interest tend to be planned to have physical coherence, i.e. to take in sites without doubling back.

Each point of interest also exists within a conceptual space, often conveyed through stories and made available – at the time of a visit - through printed literature that can be carried around by the visitor, information plaques, audio tours, or more recently via mobile applications. Included in an immediate conceptual neighbourhood are stories that convey the history of buildings and public spaces: famous people who built or visited the place, the use of the building over time, activities and customs associated with it. Stories of public art might tell when an artwork was made, who by and of which materials or art period it belongs to. What these stories have in common is that, like other forms of story, they occur within a *story setting* (the time and place of story events, which can differ to the physical setting) are often about *people* and contain *themes,* such as similar activities, architectural or art periods. This gives the possibility to apply narrative principles to understanding, expanding and organising them. Since each visitor brings their own background knowledge and personal preferences to the interpretation of art and heritage, the perspectives that can be chosen for exploring within a conceptual space are even more plentiful than within the physical one.

A visitor can also conceptually move from one site of interest to another, where aspects of the neighbourhoods of each are shared. We propose the use of narrative dimensions of *setting*, *people* and *themes* derived from associated stories to calculate conceptual proximity and construct coherent trails of conceptually related sites of interest. In this view a coherent storyline is one in which either setting or theme remain fairly constant across the story - varying both at the same time leads to a loss of coherence. It has been demonstrated that better narrative coherence leads to better learning outcomes [3]. Through representing themes, people and settings as Linked Data it has been demonstrated that it is possible to query external data sources, namely Freebase and Factforge, to expand a conceptual neighbourhood and find additional relationships [4]. The physical and conceptual interaction space around a point of interest is referred to by Giovannella et al. [5] as the Museal Field.

3   Supporting cultural learning

In order to support cultural visitors as active learners and constructors of cultural knowledge, we suggest to reveal the differing perspectives through which both physical and conceptual neighbourhoods can be explored and to encourage learners to contribute their own perspective, whether it somehow confirms the view of other visitors or offers something new. Mobile devices can be used to deliver and capture new content. Many of these principles have been developed and tested using Storyscope, a web-based environment to support museum professionals in telling cultural stories across a set of objects. Storyscope reflects the curate ontology [6] for representing and storing cultural stories and their connections to each other, to cultural objects and to external data sources that contain additional cultural information, such as Freebase. Storyscope was used to develop coherent trails of conceptually related artworks in the grounds of a museum. Conceptual trails were accessed through a mobile device using QR codes. This version used machine learning to discover coherent trails but did not take into account the physical neighbourhood (this information was added by the authors). Content was provided by museum professionals and whilst visitor interpretations were elicited this data was not formally represented or used. However, we propose that this framework could be extended to support visitor engagement with and learning about culture across a city by supporting the following activities through mobile technology, utilising APIs to existing services such as google maps for some additional functionality:

1. Exploring an immediate physical neighbourhood and understanding alternative perspectives through which it can be viewed: user-contributed pictures of a location are geo-tagged and time-stamped. Pictures that provide the most contrast (opposite time of day or season) are presented first.
2. Navigating between points of interest in a physical space. Calculating coherent routes between places that are identified as cultural points of interest.
3. Exploring an immediate conceptual neighbourhood and understanding alternative perspectives through which it can be viewed. Analysing stories to dis-

cover the different thematic perspectives with which the cultural site can be viewed.

4. Navigating between points of interest in a conceptual space. Using story theme, setting and notions of coherence to calculate proximity and to create trails.

5. Balancing a preference for conceptual and physical proximity and coherence. Supporting a visitor to choose to view/follow trails constructed taking only physical context into account (thus creating potentially a trail of unrelated sites that are simply near to one another) or conversely only conceptual context, potentially creating trails of sites which are highly conceptually related but physically distant, possibly even in different countries. In between are 'thematic' trails within a close physical neighbourhood.

6. Contributing own perspective. Support a visitor in submitting stories (whether text or more lightweight tags), and photos. Contributed content must be assigned to a physical setting to be most usable. Using geo-tagging, content can be added to a site even where nothing yet exists. Existing social media streams can be utilised so that people may contribute according to their own preferences, such as uploading photos, tweets, blogging or submitting reviews.

4   Conclusion

This paper outlines an approach to support cultural learning. It can support visitors who are freely exploring a city or who are following a specified route. In either case the aim is to provide a coherent experience, both physically and conceptually. Future work will investigate how to prompt visitors to engage with existing content - and how to bring it to their attention when they might not be expecting it - for example using alerts on a mobile phone.

References

1. Simpson, F. and Williams, H. 2008. Evaluating Community Archaeology in the UK. Public Archaeology 7: 69-90.
2. Thomas, S. 2008. Supporting community archaeology. CBA North Newsletter 4: 8.
3. Wolff, A., Mulholland, P., Zdrahal, Z. and Joiner, R. (2007) Re-using digital narrative content in interactive games, International Journal of Human-Computer Studies, 65, 3, pp. 244-272
4. Wolff, A., Mulholland, P. and Collins, T. (2013) Storyscope: Using Theme and Setting to Guide Story Enrichment from External Data Sources, Hypertext and Social Media
5. Giovannella, C., Iosue, A. Tancredi, A., Cicola, F. Camusi, A. Moggio, F. Baraniello, V., Carcone, S and Coco, S. (2013) Scenarios for active learning in smart territories, IxD&A, N. 16, 2013, pp. 7-16
6. Mulholland, P., Wolff, A. and Collins, T. (2012) Curate and Storyspace: An ontology and web-based environment for describing curatorial narratives, 9th Extended Semantic Web Conference (ESWC 2012), Heraklion, Greece