

Towards technology-mediated CH experiences: some open challenges*

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1 Introduction

The mediation chosen by a Cultural Heritage (CH) venue to transmit its message to the visitors has always been of primary importance. Indeed, this is through the lens of this mediation that visitors interpret, understand, reflect or learn about CH, having emotions, and building finally their own personal experience. Modern technologies seem to have an infinite potential to enhance this experience, however it comes with its own challenges, the main ones being related to their integration within the mediation, mixing then technological with social issues.

At the Luxembourg Institute of Science and Technology, the ADAPT (Knowledge based and Context-aware Adaptive Systems) research group focuses on the adaptation of computer systems in cognitive environments and Cyber-Physical and Social Systems. Our experience in user modeling and personalisation (especially personalised recommender systems) is applied to the cultural Heritage domain since 2015, in particular with participations to the FP7 Experimedia and H2020 CrossCult European projects (see, e.g. [7][8][3]). After having worked with humanity scientists, including museologists, built and experimented two smart museum guides embedding different user profiling approaches and recommendation algorithms, we are aware of the specificity and complexity of building efficient IT-supported mediation for Cultural Heritage venues.

In this communication, we raise the main points related to this complexity, taking the perspective of Personalisation and more specifically personalised recommendations and guidance.

2 Issues in Humanities and Technology: open challenges

Personalisation of Cultural Heritage venues to their visitors remains a tricky problem because it concerns mainly two entities, having potentially contradictory objectives: the visitor and the venue. If everyone would agree that it relates to offering a personal tailor-made visit to satisfy as much as possible visitors, it

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has to be understood that user experience is not only about the user, but rather about the user in context. We take here the perspective of recommender systems, often used as a basis for visit Personalisation to guide users through collections or venues. In CH venues, the classical approach of recommending items transforms into a more complex mediation where items and associated narratives should be presented in a coherent way.

Problem 1: Personalisation focusing only on user satisfaction can miss the goal of the museum or CH venue. How to satisfy both? The quality of the mediation in CH venues drives clearly the visitor's quality of experience. However it depends equally on both the visitors' satisfaction and the way it drives them across the venue.

Problem 2: Recommender systems are usually evaluated regarding their efficiency and how well their propositions match user interests. However, the theoretically best algorithms might sometimes not satisfy the users, because interests can be volatile and are context-dependent, because diversity and surprise are sometimes expected, maybe also because the interface is not well designed... This is true from a generic perspective, but also in particular in the CH context. The question is thus: **should we not measure the quality of user experience only, instead of trying to have the best predictors of the user behavior?**

3 Discussion

Research over the last fifty years has shown that the visitor is not always pleased with their visit in museums: they do not necessarily understand the exhibitions meaning, see the collections that would have been interesting, may suffer from a lack of information about the artworks etc. Furthermore, the visitor populations are aging and museums find it more and more difficult to attract young people. Along with this alarming situation, we witness the development of a screen culture, where visitors (especially younger generations) expect cultural practices to revolve around or be connected to mobile devices.

Historically the museum has always sought personalisation, which is one of the ways to tackle the issues above. The rise of digital devices, and now Mixed Reality, can make it real and provide actual personal mediation and visits to each visitor. From the perspective of Cultural Heritage professionals, it is recognised that modern personalisation approaches allow perceiving the link with the visitor not as a customer relationship, "but rather as a dialogue between an institution and a public cultural facility user [5]. Personalisation approaches do not share the classical logic of audience segmentation (one offer per audience type: young, adults, general public, etc.) but try instead to take into account the interests of the individuals, their identity or their diversity [2]. It is in line with the role of the museums, which is to promote the expression and sense of control of the visitors rather than to be a voice of authority, like it was in the past [5].

3.1 Problem 1

The trending goal of personalisation is the satisfaction of the visitor, with the strong hypothesis that this will happen by satisfying his interests and preferences. However from a museology point of view, the question is rather how to build a great experience for the visitor, both bringing him satisfaction and taking into account the museum stakes and the philosophy of today's museum. On site, personalisation is still often reduced to simple predefined or stereotypical scenarios proposed to visitors, and is rarely implemented out of research projects. Apart from technical and ethical barriers for its implementation, this could also be explained by the fact a museum is a place of discovery and surprise, which is opposed to the prevailing perception of satisfying the visitors' expectations [1].

State of the art recommendation and personalisation techniques work well with e-commerce platforms, as the objective is to identify a set of items that fit the users' expectation. E.g, "I expect my next pair of sneakers to be of a specific colour, size, and to be within a specific price range". Following a similar characteristics-based approach, a smart system could identify that a visitor likes impressionist paintings and depiction of plants and thus recommends all the impressionist paintings on display in the venue that depict plants. This sounds like a good first step as the visitor will be taken straight to the things he effectively likes/expects.

These traditional personalisation approaches do not consider the venue's own effort to create a coherent narrative or to convey a specific message while designing the exhibit, as it might completely take the visitor away from the initial intention of the venue. As such, while they can bring satisfaction to the visitor, those approaches can thus be harmful to the overall experience, as they do not take into account the museum stakes. On the other hand, the human guide creates a visit experience that fulfills both the museum stakes and the visitor expectations. This is achieved by telling stories related to the artefacts the visitors can see, adapting the visit to the visitors and their questions, while keeping the discussion within the boundaries set by the venue.

In order to create a better and coherent user experience, a good CH personalisation system cannot simply recommend objects to see but should instead create a true mediation offering coherent stories built from sequences of object-narrative couples, which are organised in such a way the museum stake is taken into account and adapted to the visitor's profile and expectations. Building on this, we propose to name such a system a *smart mediation system*.

3.2 Problem 2

Experiments realized so far highlight the benefits of Personalisation, illustrating that: visitors like to receive propositions of exhibits to see; they tend to spend more time in the museum [4]; the Personalisation tends to drive them to more diverse points of interest and makes them discover more off the beaten track items [9]; and in case the visit path is matched to appropriate content visitors tend to demonstrate an increased interest for exhibits [6] (even if they do not

necessarily follow them [9]). More recently personalised guiding was used to trigger reflection by visitors [3]. However today, even if our bibliography is certainly not exhaustive, very few evaluations have been made on the true effectiveness of personalisation, and its relationship with the user experience and satisfaction.

The problem that the application of personalisation to CH sites reveals is that a recommender system is always coupled with an interface allowing human-machine interactions in a specific context. The user experience is then logically dependent not only on the quality of recommendations, but also on the quality of the associated HMI, regarding the user's expectations and the context. It is especially true when using a smart guide in a museum, but also with historical recommendation providers like Amazon or Netflix: when the interface does not fit your needs or preferences, the recommendation algorithm can be the best of the world, your user experience is bad.

Another important aspect to consider, as we highlighted before, is the level of context awareness of the smart mediation system. For example, experiments at the National Gallery of London have indicated that the positioning feature of the guide we tested was perceived as of very high value. It is thus clear that classical evaluation methods used for recommender systems fail to really assess the user experience, and will thus never work in the CH context. Instead, we believe that a holistic approach must be followed where the system is evaluated as a whole and not just as a sum of parts.

To support such an approach, we propose that a smart mediation system should be evaluated on the three following dimensions:

- quality of the system UI/UX.
- level of context awareness of the system.
- the quality of the personalised recommendations.

Failing to deliver the appropriate quality on one of these three dimensions will inevitably result in a poor user experience quality regardless of the quality of the other dimensions.

Regarding the quality of the personalised recommendations, we suggest to evaluate, at least, the following things:

- The relevance of the selected physical artifacts selected by the system.
- The relevance of the narrative element associated to these artifacts.
- The relevance of the selected overarching narrative connecting the different elements.
- The perceived consistency of the generated tour.

And it is important to stress out that we define here the concept of relevance as the alignment with the visitor's expectations and preferences without contradicting the venue's own objective and constraints.

4 Conclusion

We have highlighted here two important challenges for the building of meaningful technology-mediated CH experiences, related to personalised recommendations.

These are only a few among a lot which will need to be tackled as well. Especially, a very important one that has not been discussed is certainly the user profiling problem, which is a common issue for all CPSS environments where people are observed and tracked by technology. This for sure raises ethical and data protection issues and requires a complete understanding and acceptance by the user. The mediation should then comprise a dialog with the user, but is the traditional user disclaimer really enough?

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