AVI-CH 2018 - Advanced Visual Interfaces for Cultural Heritage

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ABSTRACT

Cultural Heritage (CH) is a challenging domain of application for novel Information and Communication Technologies (ICT), where visualization plays a major role in enhancing visitors' experience, either onsite or online. Technology-supported natural human-computer interaction is a key factor in enabling access to CH assets. Advances in ICT ease visitors to access collections online and better experience CH onsite. The range of visualization devices - from tiny smart watch screens and wall-size large situated public displays to the latest generation of immersive head-mounted displays - together with the increasing availability of real-time 3D rendering technologies for online and mobile devices and, recently, Internet of Things (IoT) approaches, require exploring how they can be applied successfully in CH. Following the successful workshop at AVI 2016 and the large numbers of recent events and projects focusing on CH and, considering that 2018 has been declared the European Year of Cultural Heritage, the goal of the workshop is to bring together researchers and practitioners interested in presenting and discussing the potential use of state-of-the-art advanced visual interfaces in enhancing our daily CH experience.

CCS CONCEPTS

• **Human-centered computing** → **Visualization**;

KEYWORDS

Advanced Visualization, Cultural Heritage, Workshop

1 INTRODUCTION

The rapid development of Information and Communication Technologies (ICT) and Internet has enabled Cultural Heritage (CH) institutions to provide access to their collections in multiple and varying ways, both onsite and online, aiming to attract even wider audiences than those that visit the physical sites. Considering the enormous growth in information visualization technologies and the wide range of user interfaces (from tiny smart watch screens to wall-size large public displays and augmented/virtual-reality worlds), CH institutions could exploit such novel visualization interfaces to improve CH content presentation and enhance visitors' experience.

Advanced visualization interfaces, such as web-based 3D environments, are used by CH institutions both for content promotion and preservation purposes. The use of web 3D in CH promotion allows the general public to live immersive experiences in virtual, reconstructed locations, like ancient towns and locations, and to visit existent, but remotely located sites, such as world-wide CH institutions (e.g., Google Arts & Culture [1]). For preservation purposes, web 3D provides scholars and CH professionals with a way to consult and maintain visual repositories of real exhibits, with the possibility of visualizing, comparing and studying 3D digital equivalents of real artworks physically situated in different locations. CH is a challenging domain of application for such novel ICT technology.

Nowadays, there is an abundance of CH related information available, about almost every object we can think of. Handling and presenting such huge amounts of information is a challenging task for CH institutions, which could influence the way we access and enjoy CH information in ubiquitous computing scenarios. Advanced and natural human-computer interaction is a key factor in enabling access to cultural heritage. Visual interfaces, whether they are tiny mobile screens or large wall mounted displays, can all be part of a ubiquitous CH infrastructure, where information can displayed/projected on screens or overlaid on real objects and advanced forms of interaction could be experimented with (e.g., gestural interaction, augmented interaction, vocal interaction, etc.), providing personalization schemes to CH visitors.

[1] https://artsandculture.google.com

Following the wealth of studies and publications in recent years, which focus on exploring the potential of novel technology to enhance CH experience, the success of AVI-CH 2016 [9], which yielded a follow-up special issue focused on advanced visual interfaces for cultural heritage [6], and considering that 2018 has been declared the European Year of Cultural Heritage, the goal of the workshop was to bring together researchers and practitioners interested in exploring the potential use of state-of-the-art advanced visual interfaces in enhancing our daily CH experience.

2 ACCEPTED PAPERS

Nine (9) papers on applying and investigating advanced visualization techniques on CH contexts were accepted to AVI-CH 2018. The accepted papers ranged in type (position paper, short paper, long paper) and topic. A brief discussion on them follows.

2.1 Onsite interaction

Abbattista et al. [1] present *BrainArt* which detects visitors' interest on museum exhibits during the visit. Aiming to model the visitors' interests and preferences implicitly, the paper reports a two-step experimental study. In the first step, a learning model, based on brain signal processing, was created to identify whether a museum exhibit was intriguing to a visitor. In the second step, the proposed model was evaluated in a real-life CH scenario. The results revealed that visitors' interests can be inferred transparently with high accuracy when analyzing EEG signals, collected by a low-cost and commercial wearable device, in run-time. Therefore, the results underpin the value of implicit elicitation of visitors' preferences and interests to provide run-time personalized CH experiences during visits at CH institutions.

Ardito et al. [2] present three paradigms of advanced visualization methods (tangible, pervasive, tactile) that can be used by non-technical CH stakeholders (e.g., museum curators and guides in CH sites) to create smart visit experiences. Through the proposed visualization methods and task-automation tools, the non-technical CH stakeholders can create event-condition-action (ECA) rules that are tailored to CH contexts and define meaningful attributes to CH smart-objects. Therefore, the proposed visualization techniques could help CH experts to deploy seamless and customizable visit-experiences within CH institutions (e.g., museums, archaeological sites), enhancing visitors' engagement and immersion.

In their position paper, Balbi and Marasco [3] propose a conceptual user-experience (UX) model to design wearable visual interfaces based on augmented reality. The design of the conceptual model and the definition of the user- and technology-specific requirements were based on varying data collection and analysis techniques (e.g., interviews, ethnographic analysis, personas) and pre-, during-, and post-visit sessions.

Boella et al. [5] present *FirstLife*, which is used by CH stakeholders as a tool to co-organize and co-produce CH related information in a specific territory. It is an innovative ICT platform based on advanced information visualization technologies, which integrates a map-based civic social network that enables communities to collaborate in creating dynamic and public contents related to a specific area through the use of geo-referenced representation of open and crowd-sourced data. *FirstLife* allows the sharing, representation, and management of geo-referenced data, temporalized, crowd-sourced by different types of users, referred to complex social entities (places, events, work groups linked to specific projects, news and stories, initiatives). The use of the platform by CH stakeholders, such as coordinators, cultural workers and citizens, is expected to benefit both the internal management (at the level of single territory and regional system) and the interaction with the outside (public and private subjects of the territory they belong to, citizens users of the cultural tourism offer of the sites).

2.2 Online interaction

Bassani et al. [4] present an overview of the visualization components of CrossCult project [2] which are used to display interactive visualizations of cultural and historical facts. Three different visualization components are discussed: i)*Visualization of associations*: visualizations of the interrelationships among cultural and historical facts, ii) *Visualization of timelines*: visualizations of varying type of information (e.g., text, image, audio, video) linked to events and periods of a timeline , and iii) *Visualization of maps*: visualizations of information linked to specific locations or regions on a map.

Forlastro et al. [8] present the preliminary results of the evaluation study of a playful storytelling application that aims to bring the young audiences closer to the knowledge of the CH of Friuli Venezia. The evaluation was based on the "in the wild" approach and the results indicated that children interacted successfully with the application. Hence, CH institutions could benefit from the integration of digital narrative techniques and gamification elements to promote CH content to young visitors.

Cera et al. [7] present the data collection and annotation procedure used in the CHROME project[3] to semantically annotate 3D architectural models. Such semantically annotated 3D models contain a significant amount of data that can be used by non-expert CH stakeholders to promote CH content through interactive technologies. To exploit such technologies and better support the large amount and varying types of CH information (e.g., texts, images, 3D models), the paper discusses the use of conversational agents, in the form of 3D avatars, integrated in the digital representations of CH artifacts. The use of diverse semantic processing techniques leads to associations of separate sources of CH information and generates consistent CH presentations. Therefore, such 3D avatars can act as virtual guides to present inaccessible places, prepare people for the upcoming visit, or detect specific interests to adjust the cultural experience.

Origlia et al. [10] present the data collection and annotations protocols on an audiovisual corpus, documenting how CH stakeholders support visitors in accessing architectural CH. Both video- and audio-based material was used for this purpose, capturing the social interaction process taking place between the CH stakeholder (i.e., group guide) and the end-users (i.e., attending audience). The developed annotation levels covered both linguistic and multimodal aspects of communication, enabling the multi-faceted investigation of the communicative process. Regarding the practical implication of the work, the gathered material could be used as a reference

point to build the computational model of a 3D virtual conversational agent (e.g., 3D virtual avatar) to present reconstructions of architectural heritage sites, as discussed in [7].

Raptis et al. [11] present CH visualizations tailored to the users' cognitive characteristics. In particular, the paper discusses the necessity of considering individual cognitive characteristics as an important personalization factor in CH contexts . The authors follow a two-step experimental approach. In the first step, they performed an exploratory study, investigating whether and how the visual behavior of individuals who have different cognitive style (in terms of Visualizer-Verbalizer) influenced the comprehension of the CH content, when visiting a virtual art-gallery. The results verified that visualizers have an inherent preference to pictorial content, while verbalizers have an inherent preference to textual content. Hence, the authors proposed a *cognition-based visualization* to trigger the visualizers' attention to textual content and the verbalizers' attention to pictorial content. To evaluate the proposed visualization mechanism, they performed a small-scale eye-tracking study, which revealed that the cognition-based visualization helped both user types to perform better regarding CH content comprehension. Therefore, the results underpin the necessity of adopting a cognition-centered approach to deliver personalized CH experiences, tailored to the users' individual cognitive preferences and needs.

3 CONCLUSION

The papers that were accepted in AVI-CH 2018 demonstrate the wide diversity of aspects and the resulting technologies and their combination that are applied and experimented with in CH context. The rich information that is available and the need to deliver it in compact and attractive manner continue to draw research attention and practically, any novel technology is being experimented with in this area.

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REFERENCES

[1] Fabio Abbattista, Valeria Carofiglio, and Berardina Nadja De Carolis. 2018. BrainArt: a BCI-based Assessment of User's Interests in a Virtual Museum Visit. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 1. http://ceur-ws.org/Vol-2091/paper1.pdf

[2] Carmelo Ardito, Paolo Buono, Maria Francesca Costabile, Giuseppe Desolda, Rosa Lanzilotti, Maristella Matera, and Antonio Piccinno. 2018. Towards Enabling Cultural-Heritage Experts to Create Customizable Visit Experiences. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 2. http://ceur-ws.org/Vol-2091/paper2.pdf

[3] Barbara Balbi and Alessandra Marasco. 2018. "Ora sì ch'io son contenta: sembra fatto inver per me". Mapping User Requirements for Wearable Augmented Reality at Opera. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 3. http://ceur-ws.org/Vol-2091/paper3.pdf

[4] Maddalena Bassani, Martín López-Nores, Ahmed Dahroug, Abdullah Daif, Silvia González-Soutelo, Paola Zanovello, Susana Reboreda-Morillo, and Omar Gustavo Bravo Quezada. 2018. Advanced Visual Interfaces to Represent Cultural and Historical Facts and Associations in the CrossCult EU Project. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 5. http://ceur-ws.org/Vol-2091/paper5.pdf

[5] Guido Boella, Luigi Sanasi, Claudio Schifanella, and Cristina Viano. 2018. Culturaturismo.piemonte: Coordinating Cultural and Touristic Operators via the Georeferenced Civic Social Network FirstLife. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 4. http://ceur-ws.org/Vol-2091/paper4.pdf

[6] Berardina De Carolis, Cristina Gena, Tsvi Kuflik, and Joel Lanir. 2018. Special issue on advanced interfaces for cultural heritage. *International Journal of Human-Computer Studies* 114 (2018), 1 − 2. https://doi.org/10.1016/j.ijhcs.2018.02.007 Advanced User Interfaces for Cultural Heritage.

[7] Valeria Cera, Antonio Origlia, Francesco Cutugno, and Massimiliano Campi. 2018. Semantically Annotated 3D Material Supporting the Design of Natural User Interfaces for Architectural Heritage. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 7. http://ceur-ws.org/Vol-2091/paper7.pdf

[8] Giovanni Forlastro, Cristina Gena, Claudio Mattutino, and Elena Quiri. 2018. Swiping in the Wild: An Evaluation in the Wild of a Storytelling App for Children. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 6. http://ceur-ws.org/Vol-2091/paper6.pdf

[9] Cristina Gena, Berardina De Carolis, Tsvi Kuflik, and Fabrizio Nunnari. 2016. Advanced Visual Interfaces for Cultural Heritage. In *Proceedings of the International Working Conference on Advanced Visual Interfaces (AVI '16)*. ACM, New York, NY, USA, 360−362. https://doi.org/10.1145/2909132.2927470

[10] Antonio Origlia, Renata Savy, Isabella Poggi, Francesco Cutugno, Iolanda Alfano, Francesca D'Errico, Laura Vincze, and Violetta Cataldo. 2018. An Audiovisual Corpus of Guided Tours in Cultural Sites: Data Collection Protocols in the CHROME Project. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 8. http://ceur-ws.org/Vol-2091/paper8.pdf

[11] George E. Raptis, Christina Katsini, Christos Fidas, and Nikolaos Avouris. 2018. Visualization of Cultural-Heritage Content based on Individual Cognitive Differences. In *Proceedings of the 2018 AVI-CH Workshop on Advanced Visual Interfaces for Cultural Heritage*, Vol. 2091. CEUR-WS.org, Article 9. http://ceur-ws.org/Vol-2091/paper9.pdf