



AVI-CH 2024 summary

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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 the visitors' experience, whether onsite or online. Technology-supported natural human-computer interaction is a key factor in enabling access, both on-site and online, to CH assets. Recent advances in ICT enhance visitors' access to online collections as well as their CH experience onsite, bringing even wider audiences than those who visit the physical museums. The range of visualization devices – from tiny smartwatch screens, through 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, Social Robotics, requires exploring how they can be applied successfully in CH. Following the successful workshops at AVI 2016, AVI 2018, AVI 2020, AVI 2022 and AVI 2024 and a large number of recent events and projects focusing on CH, the goal of the workshop is to bring together researchers and practitioners interested in presenting and discussing the potential of state of the art advanced visual interfaces in enhancing our daily cultural heritage experience. This year the workshop theme will be: AVI for accessibility in CH.

CCS CONCEPTS

• **Human-centered computing** → Ubiquitous and mobile computing; Accessibility.

KEYWORDS

Advanced Visual Interfaces for Cultural Heritage, Augmented Reality, Virtual Reality, Accessibility in Cultural Heritage

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1 INTRODUCTION

The rapid development of Information and communication technologies (ICT) and the Internet has enabled cultural heritage (CH) institutions to provide access to their collections in multiple ways, both on-site and online, and to attract even wider audiences than those that visit the physical museums. In parallel, there is an enormous growth in user interfaces and in information visualization technologies. The range of interfaces is growing by the day – from tiny smart watch screens to wall-size large public displays.

Regarding virtual advanced interfaces, there are several successful examples, for instance, applications of 3D technologies for virtual museums. The use of (web) 3D in cultural heritage 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 locations, such as world-wide cultural institutions (such as Google Art Project). For preservation purposes, web 3D provides scholars and cultural heritage 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.

Cultural heritage is one challenging domain of application for such novel ICT technology. CH is ubiquitous – just look around you. There is abundance of CH related information available, about almost every object we can think of. How can we access and enjoy this information in Ubiquitous Computing scenario?

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 be personalized and displayed/projected, on screens or overlaid on real objects and advanced form of interaction could be experimented with (i.e., gestural interaction, augmented interaction, vocal interaction, social robotics, etc.).

Following the wealth of studies and publications in recent years focusing on exploring the potential of novel technology to enhance CH experience and the success of AVI-CH 2016 [6] (that yielded a follow-up special issue focused on advances visual interfaces for cultural heritage) AVI-CH 2018 [7], AVI-CH 2020 [1] and AVI-CH 2022 [2], the goal of the workshop is again to bring together researchers and practitioners interested in exploring the potential of state of the art, advanced visual interfaces in enhancing our daily cultural heritage experience, but this time with an emphasis on AVI for accessibility in CH.

Specifically, any work that is relevant to AVI 2024 general list of topics applied in cultural heritage is relevant to the workshop. Specific topics of interest are:

- Adaptive and Context-Aware Interfaces
- Personalized User Interfaces
- Information Visualization
- Interface Metaphors
- Interfaces for e-Culture and e-Tourism
- Mobile Interaction
- Multimodal Interfaces (Voice-based interaction, Brain-Computer Interaction, etc.)
- Augmented reality
- (Multi) Sensory Interfaces
- (Multi) Touch Interaction
- Natural Interaction (gestural and touchless interaction, interaction with IoT, etc)
- Virtual Reality
- Head-Mounted Displays
- Conversational Interfaces
- Human-Robot Interaction
- AVI for accessibility in CH
- AVI for CH in the era of post=COVID-19 (virtual tours, remote attendance etc)

2 SUBMISSIONS

AVI-CH 2024 got a rich set of submissions. 13 papers were accepted for publication, spanning a diverse set of topics. Out of them, four were long papers and nine were short/position papers. Most of the papers presented ideas for applying novel information and computation technologies to enhance the visit experience to cultural heritage sites. These included augmented and virtual reality, information visualization, 3d scanning and printing and even image-based indoor positioning, all these with a focus on interactivity and involving visitors in creating the experience.

The prevailing technologies considered by the authors were augmented reality (AR) and virtual reality (VR). Sheidin et al. [15] suggested "bringing the sea back to life - integrating AR navigation and gamification into museum settings, seeking to attract new visitors while fostering immersive, engaging experiences and facilitating knowledge acquisition. Unkelos-Shpigel [17] suggested a novel AR course developed for implementing AR technology at five iconic monuments to allow users to interact with the monuments using their mobile devices. Russo et al. [14] presented the use of VR as a way to document the reactivation of an interactive art installation. Shikhri and Lanir [16] presented a work that continues past research on virtual tours, investigating user experiences across diverse platforms and devices and different navigation types. In addition to the use of AR and VR, additional work explored the potential of tangible user interfaces. When considering combination of technologies discussed earlier, it is interesting to note the work presented by Konstantakis et al. [11] That combines including 3D scanning, photography, videography and sound recording in an infrastructure for preparing cultural presentations. Another interesting research direction is enhancing the CH experience for people with disabilities. Daniel-Saad et al. [5] suggest developing a course for training developers on developing inclusive experience

for visitors with cognitive disability while Castellano et al. [3] suggest the use of mobile robots for an inclusive CH experience for children with ASD. Yet another different direction was taken by Goud et al. [10], focusing on applying Information visualization for presenting semantically enhanced ancient manuscripts and books in digital libraries and the work of Damiano et al. [4] that considered also semantic CH data representation by suggesting an interface for querying a prosopographic dataset encoded in a knowledge graph. Somewhat related is also the work of Origlia and Di Maro [13], suggesting a theoretically motivated approach to generate animated virtual humans and environments. In addition to the above, there were three more submissions, focusing on specific aspects of CH – Dix and Jones [8] suggested a solution that enables to easily and dynamically update information that is accessible via QR-code. Egbaria et al. [9] addressed the challenge of indoor positioning using image processing and finally Montanelli et al. [12] suggested engaging visitors by writing imaginary conversations on CH paintings.

3 SUMMARY

The submissions to AVI-CH 2024 demonstrate once more the multifaceted nature of CH and the need for interdisciplinary approaches when considering ways to enhance the CH visit experience. This year, in addition to the expected ideas about VR and AR-based applications, it was interesting to see applications that focused on enhancing the CH experience for people with disabilities and of applications aimed at educating developers and infrastructures for developing CH experiences.

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