Editorial

Special Issue on AI and HCI Methods and Techniques for Cultural Heritage Curation, Exploration and Fruition

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The richness of tangible and intangible cultural heritage (CH) poses great opportunities and challenges in the development of successful information and communications technology (ICT) tools for its curation, exploration and fruition. On the one hand, information digitalization is not enough to support a rich presentation of CH content if it is not sustained by curation methods enhancing information discovery, analysis and interactive visualization. On the other hand, as CH sites are extremely rich in objects and data, they expose people to much more information than might be realistically experienced. Thus, efficient methods for information searching and filtering, and rich presentation methods, are needed to help users find the items they are interested in, and to explore them online and onsite.

This Special Issue collects leading research at the intersection of artificial intelligence, human–computer interactions, information visualization and cultural heritage in an effort to highlight the latest exciting developments in this field and to discuss methods and techniques for designing, implementing and evaluating digital services for cultural heritage curation, exploration and fruition. The Special Issue includes seven articles that cover a wide variety of topics related to the creation and authoring of CH information, the context-aware adaptation of information to visitors, the smart organization of the layout of physical CH exhibitions and the management of accessible and/or advanced user interfaces for online CH sites. In detail, the following papers are included in this Special Issue:

- De Benedictis et al. [1] integrate machine learning techniques to automatically generate content for an intelligent tutoring system. They present a solution, based on automated planning techniques, for the semantic, intelligent creation of personalized cultural contents, born as a lesson-making assistant, but developed to become a multifunctional "cultural crossover" tool, which is useful in the frame of a wide range of planning, dissemination and managing activities for CH content.

- Michalakis et al. [2] propose a context-aware middleware system deployed in a CH space, which integrates context modeling and reasoning techniques providing abstraction and supporting heterogeneous context streams. The proposed context-aware middleware system was used in a real-life CH space, with a case study exploring the benefits of context modeling and hybrid reasoning in a scenario of preventive conservation. The results of the study provide evidence that smart and interconnected CH space can benefit from such context-aware middleware systems in terms of both conceptual and implementation aspects.

- Colla et al. [3] present a method to support the automated annotation of documents for historical archives by detecting and filling in information about the entities to be described (properties, events concerning such entities, etc.). Data are extracted from open information sources such as Wikidata. Specifically, they describe the

automatic algorithm devised to support the definition of mappings between the Wikidata semantic model and the ontology describing the domain knowledge, as well as the process to extract information from Wikidata and generate suggestions based on the defined mappings.

- Elsharkawy et al. [4] present an interactive system which the users can customize and interact with through a projected screen utilizing the surrounding surfaces of an indoor CH space (e.g., museum). The system is based on an ultra-wideband wireless sensor network and aims to enhance interaction capabilities using commercial, affordable and portable technology. The results of the evaluation study provide evidence regarding the efficiency of such systems and insights regarding the visitor experience when using projection-based technologies (e.g., augmented reality) to overcome the limitations introduced by traditional techniques.

- Raptis et al. [5] present the design and evaluation of an interactive CH system that aims to support visitors in building a better understanding of art contexts through the use of multimodal interfaces, based on visual–audio interactions. They highlight the dimensions of evoking natural interactions within CH environments, using micro-narratives for self-exploration and understanding of cultural content, and the intersection between human–computer interaction and artificial intelligence within CH spaces.

- Fan and Chu [6] introduce an innovative strategy to integrate the domain knowledge of exhibit displaying, spatial planning and machine learning to establish a customized recommendation scheme. Guided by an interactive experience model and the morphology of point–line–plane–stereo, the authors obtained 3 aspects (visitors, objects and space), 12 dimensions (orientation, visiting time, visual distance, centrality, main path, etc.), 30 physical principles, 24 suggestions, and 5 main procedures to implement layout patterns and templates to create an exhibit layout guide for the National Railway Museum of Taiwan, which is currently being transferred from the railway workshop for the sake of preserving rail cultural heritage.

- Pisoni et al. [7] review the literature concerning technology used for creating and delivering accessible museum and CH sites experiences. They highlight the importance of the delivery suited for everyone from different areas of expertise, namely interaction, pedagogical and participatory design, and they present how recent and future artificial intelligence developments can be used for this aim, i.e., improving and widening online and on-site accessibility. Moreover, from the literature review analysis, they articulate a conceptual framework that incorporates the key elements constituting museum and CH online experiences, and how these elements are related to each other.

We hope you enjoy reading the articles included in this Special Issue, and that they will be fruitful for your research activities.

Conflicts of Interest: The authors declare no conflict of interest.

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Liliana Ardissono, Ph.D., is a full Professor at the Computer Science Department of the University of Torino, Italy. Her research interests are User Modeling, Recommender Systems, and Information exploration support, with specific attention to geographic information search. She is a member of the Editorial Board of the international journal User Modeling and User-Adapted Interaction (www.umuai.org/boards.html, accessed on 1 September 2022, Springer) and a member of the Advisory Board of User Modeling Inc.

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Noemi Mauro, Ph.D., is an Assistant Professor at the Computer Science Department of the University of Torino, Italy where she obtained a Ph.D. in Computer Science with Honors. Her research interests concern user modeling, recommender systems, cultural heritage, information filtering, and information visualization. She is a program committee member of the top conferences in her research areas and reviewer for several related journals. She has been co-chair of several editions of the Workshop on Personalized Access to Cultural Heritage (PATCH) and she is a member of the Editorial Board of the international journal User Modeling and User-Adapted Interaction.