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Visual Computing for Cultural Heritage

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ISSN 2195-9056

ISSN 2195-9064 (electronic)

Springer Series on Cultural Computing

ISBN 978-3-030-37190-6

ISBN 978-3-030-37191-3 (eBook)

<https://doi.org/10.1007/978-3-030-37191-3>

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This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Cultural heritage is a priceless, non-renewable resource, which constitutes one of the core elements of peoples' identities. As such, the preservation, archival, comprehension, and study of cultural heritage is of utmost significance at local, national, and international levels and a key to the deeper understanding of our contemporary cultural and societal context. The advent of affordable imaging devices combined with the technological advancements in terms of computing and storage capabilities has contributed to the soaring interest of the broader scientific community of visual computing in cultural heritage. In the last decades, visual computing researchers have contributed a growing set of tools for cultural heritage, thereby offering valuable support to the preservation and promotion of cultural heritage. This interest has in turn uncovered a new series of research challenges to be addressed by the community.

Visual computing encompasses all computer science disciplines dealing with digital images and 3D models. In fact, image and video processing, computer vision and photogrammetry, 3D modeling, computer graphics, virtual and augmented reality technologies are nowadays widely employed to capture, analyze, conserve, virtually or physically restore, document, classify, recognize, and render cultural artifacts. These include historic buildings and monuments, archaeological sites and finds, artworks such as paintings, sculptures, etc., manuscripts, photograph, films, and other entities of artistic, historical, or archaeological importance.

The aim of this edited volume is to provide a point of reference for the latest advancements in the different fields of visual computing applied in Digital Cultural Heritage research, covering a broad range from visual data acquisition, classification, analysis and synthesis, 3D modeling and reconstruction, to new forms of interactive presentation, visualization and immersive experience provision via VR/AR, serious games, and digital storytelling. This book brings together and targets researchers, professionals, and students from the domains of computing, engineering, archaeology, and arts, and aims at underscoring the potential for cross-fertilization and collaboration among these communities.

In particular, the book reviews comprehensively the key recent research into visual computing for both tangible and intangible cultural heritage. It goes into details to explain how to make use of visual computing for both tangible and intangible cultural heritage. To illustrate the capabilities as well as the limitations of digital heritage technologies, the book provides a number of case studies.

The chapters of this book are organized in six main parts: Computer Graphics, Computer Vision and Photogrammetry, Extended Reality, Serious Games, Storytelling, and Preservation and Reconstruction.

In terms of computer graphics and visualization, three chapters illustrate ways that computer graphics and visualization can be leveraged to showcase cultural heritage assets and delve into the past. In respect to computer vision and photogrammetry methods are provided to interpret, represent, classify, summarize, and comprehend cultural heritage content. AR, VR, games, and storytelling demonstrate innovative examples of accessing and interacting with cultural assets. Finally, in terms of preservation and reconstruction, different approaches are presented showcasing the effectiveness of the techniques in both tangible and intangible cultural heritage.

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