Foreword to the Special Section on 3D Object Retrieval (3DOR2018)

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Editorial

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The increase of 3D media as a key player across the wealth of information sources in the digital arena has continued its upwards trend in the last years. On the one hand, increasingly more powerful, fast, accurate, and affordable technologies and techniques for acquiring 3D content from the physical world, such as 3D scanners, 3D sensors, and depth cameras, have become available to both researchers and the grand public. On the other hand, the importance and interest in analyzing large databases of 3D shapes has spread from traditional applications in computer graphics to a wider spectrum of domains including medicine, bioinformatics, chemistry, security, serious gaming and urban planning.

3D content-based retrieval has evolved from a niche technical area to a multidisciplinary application area involving researchers at the crossroads of computer graphics, shape modeling and processing, computer vision, machine learning, information systems, and practitioners in application-specific domains.

Since 2008, Eurographics has hosted the 3D Object Retrieval (3DOR) workshop series dedicated to topics in the above field. The eleventh edition of the 3DOR workshop was organized on April 16th, 2018 in Delft, Netherlands, in co-location with the Eurographics annual conference on Computer Graphics. Following the call for papers, the workshop received 11 submissions and 6 track reports. All these were reviewed by at least three members of the International Program Committee (IPC). Following the reviews, 8 submissions were accepted as full presentations and 2 papers were accepted as short (poster) presentations. The papers cover a wide range of topics including mixed-modality retrieval, retrieval based on partial local shape information, and the usage of machine learning techniques to support shape retrieval.

The authors of the full papers were then invited to submit extended versions of their papers for this Special Section of C&G on 3D Object Retrieval. A new round of reviews was taken and 4 papers were finally accepted. Each paper received at least 3 reviews. Accepted papers include at least 40% additional material, thereby consolidating and refining the initial insights presented at the 3DOR workshop. A brief description of the accepted papers follows.

Pala et al. [1] present a new methodology for person re-identification, the task of identifying a person over long periods of time and under the effect of potentially large changes in appearance, pose, and types of activities performed. They demonstrate how 3D depth information, extracted from low-cost Kinect sensors, can be analyzed and summarized using 3D skeleton descriptors, leading to high-quality re-identification results, as tested on three benchmark datasets.

Biasotti et al. [2] address the important problem of searching large 3D shape collections in the context of faceted queries and automatic search relaxation in content-based shape retrieval. They show how search results can be improved by considering richer, more complex, ten-dimensional descriptors. They also present extensive evaluations of their search mechanisms on shape repositories containing generic 3D objects and present quantitative evidence on the search performance.

In a similar context, Luciano and Ben Hamza [3] propose the use of deep learning, implemented as autoencoder networks, to extract high-dimensional descriptors from 3D shapes. The descriptors can be next used in a traditional content-based shape retrieval pipeline. Experiments on four standard shape benchmarks show the speed and accuracy advantages of this approach as compared to existing shape retrieval approaches.

Finally, Thompson and Biasotti [4] extend the tasks of texture image retrieval and classification to their application on decorations and textures on 3D surfaces. To this end, they propose a new descriptor and show its effectiveness in retrieving (detecting) and classifying a range of simple-to-complex patterns applied on both clean and degraded surfaces, including the case of surfaces covered by mixtures of patterns.

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Alexandru Telea received his Ph.D. (2000) in Computer Science from the Eindhoven University of Technology, the Netherlands, in the area of visualization system design. Until 2007, he was assistant professor in visualization and computer graphics at the same university. Since 2007, he is professor of multiscale visual analytics at the Faculty of Science and Engineering, University of Groningen, the Netherlands. His interests include multiscale shape analysis and processing using skeletal descriptors, information visualization, and visual analytics. He has published over 250 papers in the above fields, and is the author of the textbook "Data Visualization – Principles and Practice" (CRC Press, 2nd edition, 2014).

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