Guest Editorial: Special Issue on Discrete Geometry for Computer Imagery

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This special issue is focused on recent developments in the fields of Discrete Geometry for Computer Imagery, which is also called Digital Geometry. Digital Geometry is indeed a subfield of discrete geometry in the sense that it focuses on geometrical objects defined on lattices and grids, in addition to the unavoidable fact that treated data are discrete. Digital Geometry aims at dealing with geometrical and topological definitions of digitized objects or digitized images and providing both theoretical and computational frameworks for image computing. In particular, it is intended to develop efficient algorithms for geometry and topology processing of digital objects. Naturally, Digital Geometry plays an essential role in various fields related to digital images, such as image analysis, computer graphics, pattern recognition, shape modeling and computer vision.

Although this domain emerged during the second half of the twentieth century with the birth of computer graphics and digital image processing, many links have been demonstrated between methods and results from the Digital Geometry domain and fundamental theorems in mathematics (arithmetic, geometry, topology, etc.), discrete mathematics (word theory, combinatorics, graph theory, etc.) or computer science (algorithmic, computational geometry, image processing, discrete tomography, computer graphics, etc.).

The center of gravity of the international Digital Geometry community lies in Europe, but there are also research groups from Australia, Brazil, India, Japan and the USA contributing to the community. In association with the International Association for Pattern Recognition (IAPR), the community collaborates within the "Discrete Geometry and Mathematical Morphology" Technical Committee, TC18. The TC18 website (http://tc18.org) also provides interested readers with a platform, which gathers useful resources such as datasets, source codes and bibliographies.

The special issue comprises eight articles covering a wide range of topics in the Digital Geometry domain, some of which are also in overlapping areas, such as Mathematical Morphology and Computational Topology. The presented articles use or develop discrete geometric and topological models, including graph and simplicial complex models, which are aimed at geometric shape digitization, distance transform computation, image segmentation, discrete optimization, digital shape analysis and geometric object recognition.

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