

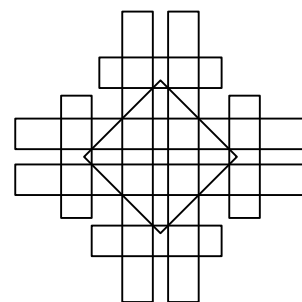
34th International Symposium on Computational Geometry

SoCG 2018, June 11–14, 2018, Budapest, Hungary

Edited by

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■ Foreword

The 34th International Symposium on Computational Geometry (SoCG) will be held in Budapest, Hungary, June 11–14, 2018, as part of the Computational Geometry Week. A record number of 206 papers have been submitted to SoCG 2018. After a thorough review process, in which each paper has been evaluated by three or more independent reviewers, the Program Committee accepted 73 papers for presentation at SoCG. These proceedings contain extended abstracts of the accepted papers, limited to 13 pages plus references. If any supporting material (e.g., proofs or experimental details) does not fit in the page limit, the full paper is available at a public repository, which is referenced in the extended abstract.

The Best Paper Award goes to the paper “Shellability is NP-complete” by Xavier Goaoc, Pavel Paták, Zuzana Patáková, Martin Tancer, and Uli Wagner. The Best Student Presentation Award will be determined and announced at the symposium, based on ballots cast by the attendees.

A selection of papers, recommended by the Program Committee, have been invited to forthcoming special issues of *Discrete & Computational Geometry* and the *Journal of Computational Geometry*, dedicated to the best papers of the symposium.

In addition to the technical papers, there were five submissions to the multimedia exposition (three videos and two applets). All five were reviewed and four were accepted for presentation. The extended abstracts that describe these submissions are included in this proceedings volume. The multimedia content can be found at <http://www.computational-geometry.org>.

We thank the authors of all submitted papers and multimedia presentations. We are grateful to the members of the SoCG Program Committee, the Multimedia Committee, and 340 additional reviewers for their dedication and expertise that ensure the high quality of the papers in these proceedings. We would also like to thank the Proceedings Chair, Wouter Meulemans, for his meticulous work preparing the final proceedings. Many other people contributed to the success of SoCG 2018 and the entire CG Week. We especially thank the local organizers, all members of the Workshop and YRF Committees, and the Computational Geometry Steering Committee.

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Anastasios Stefanou	Máté Vizer	Joshua Zahl
Miloš Stojaković	Hubert Wagner	Alireza Zarei
Darren Strash	Uli Wagner	Frank de Zeeuw
Christopher Sukhu	Bartosz Walczak	Meirav Zehavi
He Sun	Haitao Wang	Ahad N. Zehmakan
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■ Invited Talk

Stories Are Not Just Words: How Visualization Helps Us to Explain, Reason, Explore and Remember

Jo Wood

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Abstract

From Euclid's *Elements* and Liu Hui's *The Sea Island Mathematical Manual* through Descartes and Euler to Mandelbrot and Wolfram, we have always used images to assist telling stories about geometry. The long history of *proof without words* demonstrates that images alone can sometimes tell convincing mathematical stories. In a parallel history we have for millennia used careful geometric projection onto a plane to tell cartographic stories of discoveries made, lands yet visited and battles to be fought. In this talk I explore some of the examples and theory of storytelling using visualization and cartography in order to evaluate whether computational geometers have anything to gain through visual storytelling and whether some problems that persist in visual storytelling might be solvable by computational geometers.

I explore the coupling of textual narrative and visualization to support explanation and reasoning as well as more open-ended exploration by considering the *literate programming* approach advocated by Donald Knuth, the *computational essays* of Stephen Wolfram and the newly emerging paradigm of *literate visualization*. These are most readily seen in notebook environments of data science such as *R-Notebook*, *Jupyter Lab* and most recently *Observable*. I illustrate literate visualization with examples from these environments as well as one newly developed by the giCentre – *litvis*. I argue that visual approaches to computation are valuable as they support a shift from a dialogue between person and computer to one between people.

2012 ACM Subject Classification Human-centered computing → Information visualization

Keywords and phrases Literate visualization, geovisualization, storytelling, literate programming



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■ Invited Talk

Circle Squaring and Other Combinatorial Problems in Geometric Measure Theory

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Abstract

I will survey some results and open problems in geometric measure theory of combinatorial flavour.

The famous Banach-Tarski paradox states that in the three dimensional space a ball of radius one can be partitioned into finitely many (non-measurable) pieces that can be rearranged (applying rotations and translations) to obtain a ball of radius 2. On the other hand, Tarski's circle squaring problem asked if it was possible to partition a disc in the plane into finitely many pieces and rearrange these to obtain the square (of the same area). This was shown to be possible by Laczkovich in 1990. I will talk about the recent results that show that this "circle squaring" is possible by using pieces that are Lebesgue measurable, or even Borel (by Marks and Unger).

I will also mention some results and questions about patterns in fractal sets and a problem about the fractal analogue of the Szemerédi-Trotter theorem of point-line incidences.

2012 ACM Subject Classification Mathematics of computing → Mathematical analysis, Mathematics of computing → Matchings and factors, Mathematics of computing → Graph algorithms

Keywords and phrases circle squaring, equidecompositions, fractals, point-line incidences



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