

Preface

It is a great pleasure to welcome you to the proceedings of the 18th International Workshop on Combinatorial Image Analysis (IWCIA 2017) held in Plovdiv, Bulgaria, June 19–21, 2017.

Image analysis is a scientific discipline providing theoretical foundations and methods for solving real-life problems that appear in various, often societally sensitive, areas of human practice, such as medicine, robotics, defense, and security. Since typically the input data to be processed are discrete, the “discrete” or “combinatorial” approach to image analysis appears to be a natural one and therefore its applicability is expanding. The fact is that combinatorial image analysis often provides various advantages in terms of efficiency and accuracy over the more traditional approaches based on continuous models and requiring numeric computation.

For over 25 years, the IWCIA workshop series has been providing a forum for researchers throughout the world to present cutting-edge results in combinatorial image analysis, to discuss recent advances and new challenges in this research field, and to promote interaction with researchers from other countries. IWCIA had successful prior meetings in Paris (France) 1991, Ube (Japan) 1992, Washington DC (USA) 1994, Lyon (France) 1995, Hiroshima (Japan) 1997, Madras (India) 1999, Caen (France) 2000, Philadelphia, PA (USA) 2001, Palermo (Italy) 2003, Auckland (New Zealand) 2004, Berlin (Germany) 2006, Buffalo, NY (USA) 2008, Playa del Carmen (Mexico) 2009, Madrid (Spain) 2011, Austin, TX (USA) 2012, Brno (Czech Republic) 2014, and Kolkata (India) 2015. The workshop in Plovdiv retained and enriched the international spirit of these workshops. The IWCIA 2017 Program Committee was very international; its members are renowned experts coming from 17 different countries from Asia, Australia and Oceania, Europe, North and South America. Submissions came from 19 different countries from Africa, Asia, Europe, and North America.

Each submitted paper was sent to three reviewers. EasyChair provided a convenient platform for smoothly carrying out the review process, which was quite rigorous, conducted in a double-blind review mode. The most important selection criterion for acceptance or rejection of a paper was the overall score received. Other criteria included: relevance to the workshop topics, correctness, originality, mathematical depth, clarity, and presentation quality. We believe that as a result, only high-quality papers were accepted for presentation at IWCIA 2017 and for publication in the present volume.

The program of the workshop included presentations of contributed papers and keynote talks by five distinguished scientists. Alfred (Freddy) Bruckstein (Technion, IIT, Israel) surveyed some models of stochastic multi-agent interactions, involving simple ant-like a(ge)nts moving in grid or general planar graph environments, leading to interesting results concerning the average number of visits to various sites and to connections between Euclidean and discrete geometry. Edwin Hancock (University of York, UK) presented the edge-based Laplacian and quantum graphs and their use for

developing more sophisticated heat diffusion and wave propagation. He also discussed possible applications to shape modeling and recognition. Marc van Kreveld (Utrecht University, The Netherlands) addressed questions related to geometric representations. He showed that a simple polygon can always be represented on the grid with constant Hausdorff distance and sometimes with constant Frechet distance, and discussed relations to certain mathematical games, such as the Japanese picture puzzles. Christian Ronse (Université de Strasbourg, France) investigated partial order relations on partial partitions of a set. He discussed their usefulness to guiding image analysis operations, such as filtering, reduction, or segmentation. Günter Rote (Freie Universität Berlin, Germany) first reviewed the existing congruence testing algorithms in two and three dimensions. Then he presented new algorithmic techniques and geometric insights that lead to fast algorithms in four dimensions.

The contributed papers are grouped into two parts. The first part includes 17 papers devoted to theoretical foundations of combinatorial image analysis, in particular studies on discrete geometry and topology, tilings and patterns, array grammars and languages, graphical models, and other technical tools for image analysis. The second part includes ten papers presenting application-driven research on topics such as image segmentation, classification, reconstruction, and compression, texture analysis, and bioimaging. We believe that all presented works were of high quality and the workshop participants benefited from the scientific program. We hope that many of these papers are of interest to a broader audience, including researchers in scientific areas such as pattern analysis and recognition, computer vision, shape modeling, and computer graphics.

A poster session provided some authors with the opportunity to present their ongoing research projects and original works in progress. The texts of these works are not included in this volume.

Many individuals and organizations contributed to the success of IWCIA 2017. First of all, the chairs are indebted to IWCIA's Steering Committee for endorsing the candidacy of Plovdiv for the 18th edition of the workshop. We wish to thank everybody who submitted their work to IWCIA 2017. Thanks to their contributions, we succeeded in having a technical program of high scientific quality. We are indebted to all participants and especially to the contributors of this volume. Our most sincere thanks go to the IWCIA 2017 Program Committee whose cooperation in carrying out high-quality reviews was essential in establishing a strong scientific program. We express our sincere gratitude to the keynote speakers, Alfred Bruckstein, Edwin Hancock, Marc van Kreveld, Christian Ronse, and Günter Rote, for their remarkable talks and overall contribution to the workshop program.

The success of the workshop would not be possible without the hard work of the local Organizing Committee. Special thanks go to the co-chair of the Organizing Committee, Georgi Vragov (Bulgarian Academy of Sciences) for the considerable amount of time and effort he devoted to the workshop organization, and to the other committee members, Veselin Igrachev (Rakursy, Plovdiv), Marian Iliev (Union of Bulgarian Scientists), Ivan Koychev (University of Sofia St. Kliment Ohridski), Ilia Kozhukharov (AMDFA, Plovdiv), Simeon Marlov (Milara Int., Plovdiv), and Georgi Totkov (University of Plovdiv Paisii Hilendarski), for their valuable work. We remember with gratitude the assistance provided by the three students of Vessela

Statkova from the Academy of Music, Dance and Fine Arts in Plovdiv and by the students from the Plovdiv Mathematical High School Acad. K. Popov, who helped make this conference an enjoyable and fruitful event. We appreciate the support of Plovdiv Municipality and the personal involvement of Mr. Stefan Stoyanov, Deputy Mayor of the City of Plovdiv. We also acknowledge with gratitude the help we received from the Association for Development of the Information Society and its chair, Ivan Koychev. Thanks go to SUNY Fredonia and SUNY Buffalo State for their support. Finally, we wish to thank Springer, Computer Science Editorial, and especially Alfred Hofmann and Anna Kramer, for their efficient and kind cooperation in the timely production of this book.

June 2017

Valentin E. Brimkov
Reneta P. Barneva

Combinatorial Image Analysis

18th International Workshop, IWCI 2017, Plovdiv,

Bulgaria, June 19-21, 2017, Proceedings

Brimkov, V.; Barneva, R. (Eds.)

2017, XV, 357 p. 147 illus., Softcover

ISBN: 978-3-319-59107-0