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Combinatorial Image Analysis

16th International Workshop, IWCIA 2014
Brno, Czech Republic, May 28-30, 2014
Proceedings

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Preface

The present volume includes the articles presented at the 16th International Workshop on Combinatorial Image Analysis, IWCIA 2014, which was held in Brno (Czech Republic), May 28–30, 2014. The 15 previous meetings were held in Paris (France) 1991, Ube (Japan) 1992, Washington DC (USA) 1994, Lyon (France) 1995, Hiroshima (Japan) 1997, Madras (India) 1999, Caen (France) 2000, Philadelphia (USA) 2001, Palermo (Italy) 2003, Auckland (New Zealand) 2004, Berlin (Germany) 2006, Buffalo, NY (USA) 2008, Playa del Carmen (Mexico) 2009, Madrid (Spain) 2011, and Austin, TX (USA) 2012.

Image analysis provides theoretical foundations and methods for solving problems from various areas of human practice. In combinatorial image analysis the models are discrete and integer arithmetic is used. The developed algorithms rely on combinatorial properties of digital images and often outperform algorithms based on continuous models, float arithmetic, and rounding.

The submission and review process of the workshop was carried out through the OpenConf conference management system. The reviewing process was quite rigorous, including double-blind reviews by at least three highly qualified members of the international Program Committee. As a result, 20 papers authored by researchers from 11 different countries were accepted for presentation at the workshop and for inclusion in this volume. The most important selection criterion was the overall score received. Other criteria included relevance to the workshop scope, correctness, novelty, clarity, and presentation quality. We believe that as a result only papers of very high quality were accepted for publication in the workshop proceedings and for presentation at IWCIA 2014.

The program of the workshop included presentations of contributed papers and keynote talks given by three distinguished scholars. An opening talk given by Gabor Herman (Graduate Center, City University of New York) presented the recently developed (by him and others) superiorization methodology. The methodology provides an optimization criterion that helps to distinguish the “better” among a large set of constraints-compatible solutions, which are typically available when solving constrained optimization problems related to scientific, engineering, and medical applications of image analysis.

Valentin Brimkov (Buffalo State College, State University of New York) discussed parallel computation techniques for two-dimensional combinatorial pattern matching problems, the latter being relevant to pattern recognition, low level image processing, computer vision, and multimedia. He illustrated some key ideas by his recent results on detection of two-dimensional repetitions in a two-dimensional array.

Shadia Rifai Habbal (Institute for Astronomy, University of Hawaii) presented recently developed (by her and others) new methods that yield artifact-free images and uncover details that are hidden in the original unprocessed

images. This has led to the discovery of new features that are essential for exploring the dynamics and thermodynamics of structures in the solar corona.

Extended abstracts of the keynote talks are included at the beginning of this volume.

The contributed papers included in the volume are grouped into three sections. Seven of them are devoted to problems of discrete geometry and topology and their use in imaging science; six papers present new results on image representation, segmentation, grouping, and reconstruction; and seven works present applications in medical image processing and other fields.

We believe that the attendees have benefited from the scientific program. We also hope that many of the papers can be of interest to a broader audience, including researchers in the areas of computer graphics and computer vision.

In addition to the main track of the workshop, a Special Track for Applications took place at IWCIA 2014. It provided researchers with the opportunity to present their last developments and implementations.

We would like to thank everyone who contributed to the success of IWCIA 2014. First of all, the workshop chair is indebted to IWCIA's Steering Committee for endorsing the candidacy of Brno for the 16th edition of the workshop, and to the keynote speakers Gabor Herman, Valentin Brimkov, and Shadia Rifai Habbal for their excellent talks and overall contribution to the workshop.

Sincere thanks go to the members of IWCIA's Program Committee whose timely and high-quality reviews were essential in establishing a strong workshop program. We thank all researchers who submitted works to IWCIA 2014. Thanks to their contributions we succeeded in having a technical program of high scientific quality. We wish to thank the participants and all who contributed to making this workshop an enjoyable and fruitful scientific event. We also thank the organizers for the excellent conditions and the pleasant time we all had in Brno. Finally, we express our gratitude to Springer and especially to Alfred Hofmann and Anna Kramer, for the efficient and kind cooperation in the timely production of this book.

May 2014

Reneta P. Barneva
Valentin E. Brimkov
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IWCIA 2014 was held at Brno University of Technology, Czech Republic, May 28–30, 2014.

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