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Combinatorial Image Analysis

12th International Workshop, IWCIA 2008
Buffalo, NY, USA, April 7-9, 2008
Proceedings

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Preface

It is indeed a great pleasure to welcome you to the proceedings of the 12th International Workshop on Combinatorial Image Analysis (IWCIA 2008) held in Buffalo, NY, April 7–9, 2008.

Image analysis is a scientific discipline providing theoretical foundations and methods for solving problems that appear in various areas of human practice, as diverse as medicine, robotics, defense, and security. As a rule, the processed data are discrete; thus, the “discrete,” or “combinatorial” approach to image analysis appears to be a natural one and therefore its importance is increasing. In fact, combinatorial image analysis often provides various advantages (in terms of efficiency and accuracy) over the more traditional approaches based on continuous models requiring numeric computation.

The IWCIA workshop series provides a forum for researchers throughout the world to present cutting-edge results in combinatorial image analysis, to discuss recent advances in this research field, and to promote interaction with researchers from other countries. In fact, IWCIA 2008 retained and even enriched the international spirit of these workshops, that 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 (USA) 2001, Palermo (Italy) 2003, Auckland (New Zealand) 2004, and Berlin (Germany) 2006. The IWCIA 2008 Program Committee was highly international as its members are renowned experts coming from 23 different countries, and submissions came from 24 countries from Africa, Asia, Europe, North and South America.

The present volume includes the papers presented at the workshop. Following the call for papers, IWCIA 2008 received 117 submissions. After a preliminary screening of all submissions by the Workshop Chairs, 82 of these were reviewed by Program Committee members or additional reviewers (the others being obviously unacceptable in view of IWCIA standards and technical requirements). Of these 82 papers, 28 were accepted for oral presentation and 10 for poster presentation. The review process was quite rigorous, involving three to four independent double-blind reviews. *OpenConf* provided a convenient platform for smoothly carrying out the review process. 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 2008 and for publication in the present volume. We also hope that many of these papers are of interest to a broader audience, including researchers working in areas such as computer vision, image processing, and computer graphics.

The program of the workshop was arranged into ten sessions. These included presentations of contributed papers, as well as invited talks by five distinguished scientists.

An opening talk was given by Herbert Hauptman, Nobel Laureate. He shared with the audience his vision about science in general, and specifically of mathematics and its amazing applicability to other sciences and human practice. Hauptman supported his theses by a number of interesting examples, in particular from his own scientific contributions. “The history of science shows that advances in science, particularly progress in its more basic aspects, including mathematics, have had the most profound influence in serving to improve the quality of life and making possible development of a modern advanced technological society,” Hauptman said.

“Can a computer recognize the activities of a person, e.g., one fighting another person or one climbing a fence? Can a computer recognize an illegally parked car?” Jake Aggarwal asked, and continued: “Computer vision has matured to a discipline that addresses societal problems: monitoring public places—what is a person doing? Leaving an unattended bag, climbing a fence or breaking into a car are examples of action recognition.” In his invited talk, the speaker presented his recent research on human motion understanding, modeling and recognition of human faces, actions and interactions, as well as human-object interactions.

Polina Golland considered the problem of identifying large co-activating networks in brain based on dynamical imaging, and proposed an approach leading to hierarchical, anatomically meaningful representations of brain activity across experiments and across subjects. “This way we are able to effectively decompose the four-dimensional collection of the activation values into spatial maps that align with our notion of anatomical structure of the brain and the dynamics associated with these maps,” Golland said.

Arie Kaufman presented a new research area known as virtual colonoscopy. It is a combination of computed tomography scanning and volume visualization technology, and incorporates a novel pipeline of computer-aided detection of colonic polyps employing segmentation, electronic cleansing, conformal colon flattening, volume rendering with texture, and shape analysis. “Virtual colonoscopy is poised to become the procedure of choice in lieu of the conventional optical colonoscopy for mass screening for colon polyps—the precursor of colorectal cancer,” Kaufman said.

The workshop scientific program was completed by the invited closing talk of Gabor Herman. He presented a methodology for translating the problem of classification of heterogeneous microscopic projections into homogeneous subsets into an optimization problem on a graph. He also provided a combinatorial algorithm that achieves a useful solution at a low computational cost. “The proposed methodology makes it possible to visualize the functioning of a biological molecular machine,” Herman said.

In addition to the main theoretical track of IWCMIA 2008, for the first time a Special Track on Applications was organized. It provided researchers and

software developers with the opportunity to present their work and demonstrate working computer systems for image analysis.

Many individuals and organizations contributed to the success of IWCIA 2008. First of all, the Chairs are indebted to IWCIA's Steering Committee for endorsing the candidacy of Buffalo for the 12th edition of the Workshop. Our most sincere thanks go to the IWCIA 2008 Program Committee whose cooperation in carrying out high-quality reviews was essential in establishing a very strong workshop program. We also appreciate the assistance of the additional reviewers who helped us maintain the timeline for the review process and author notification. We express our sincere gratitude to the invited speakers Jake Aggarwal, Polina Golland, Herbert Hauptman, Gabor Herman, and Arie Kaufman for their remarkable talks and overall contribution to the workshop program. We wish to thank everybody who submitted their work to IWCIA 2008. 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.

The success of the workshop would not be possible without the hard work of the local Organizing Committee. We are grateful to Joaquin Carbonara, Dan Cunningham, François de Vieilleville, Peter Mercer, Mike Szocki, Khalid Siddiqui, and João Tavares for their valuable work. We are obliged to SUNY Buffalo State College and SUNY Fredonia for the continuous support through their designated offices. Special thanks go to Muriel Howard, President of SUNY Buffalo State, and Dennis Hefner, President of SUNY Fredonia, for endorsing IWCIA 2008, to Dennis Ponton, Provost of Buffalo State, for his strong support, and to Larry Flood, Dean of the School of Natural and Social Sciences at Buffalo State, for continuously promoting the workshop since its very early stages. We also remember with gratitude the assistance provided by several students from Buffalo State and all who made this conference an enjoyable and fruitful scientific event. Finally, we wish to thank Springer for the pleasant cooperation in the timely production of this volume.

April 2008

Valentin E. Brimkov
Reneta P. Barneva
Herbert A. Hauptman

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IWCIA 2008 was held in Buffalo, NY, USA, April 7–9, 2008.

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