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in Computer and Information Science

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Preface

This book includes extended versions of the selected papers from VISIGRAPP 2012, the International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications, which was held in Rome, Italy, during February 24–26, 2012, and organized by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC).

VISIGRAPP comprises three conferences, namely, the International Conference on Computer Vision Theory and Applications (VISAPP), the International Conference on Computer Graphics Theory and Applications (GRAPP), and the International Conference on Information Visualization Theory and Applications (IVAPP).

VISIGRAPP received a total of 483 paper submissions from more than 50 countries. After a rigorous double-blind evaluation, only 16% of the papers were accepted and published as full papers. These numbers clearly show that this conference is aiming at high-quality standards and is now an established venue for researchers in the broad fields of computer vision, image analysis, computer graphics, and information visualization. From the set of full papers, 28 were selected for inclusion in this book. The selection process was based on quantitative and qualitative evaluation results provided by the Program Committee reviewers as well as the feedback on paper presentations provided by the Session Chairs during the conference. After selection, the accepted papers were further revised and extended by the authors. Our gratitude goes to all contributors and reviewers, without whom this book would not have been possible. Apart from the full papers, 28% of the papers were accepted for short presentations and 17% accepted for poster presentations. These works were not considered for the present book.

As VISAPP constitutes the largest part of VISIGRAPP with 301 submissions, we decided to select and integrate 16 full papers aiming to cover different aspects and areas related to computer vision such as image formation and preprocessing, image and video analysis and understanding, motion tracking, stereo vision as well as diverse computer vision applications and services.

As we do not have enough space to mention and describe them all in this preface, we will try to draw attention to some of them, letting readers discover the others on their own. Most of them were also competing for the best paper and best student paper awards, which finally were attributed to the papers: “Detector of Facial Landmarks Learned by the Structured Output SVM” by Michal Uřičář, Vojtěch Franc, and Václav Hlaváč, “Orientation-Based Segmentation of Textured Images by Energy Minimization” by Maria Sagrebin-Mitzel and Til Aach, and “Static Pose Estimation from Depth Images Using Random Regression Forests and Hough Voting,” by Brian Holt and Richard Bowden. While the decision was not easy, these papers were selected not only for their originality
and topicality, but also because the proposed approaches were nicely and clearly presented both in the article and also in the conference sessions.

The paper by M. Uričář et al. presents a new and efficient facial landmark detector, available as open-source implementation on their site, which is based on deformable part models and provides excellent performance on the challenging LFW (Labeled Faces in the Wild) dataset.

The originality of the orientation-based segmentation method proposed by M. Sagrebin-Mitzel and T. Aach resides in the proposed energy functions consisting of a data term evaluating tensor rank and a smoothness term, and in their hierarchical algorithm that approximates energy minimization by using graph cuts.

Finally, the robust and fast algorithm proposed by B. Holt and R. Bowden to estimate the pose of a human directly from the depth images, for example, captured by a Kinect sensor, has its advantage in its speed and simplicity. Their idea is to predict joint locations for each pixel using simple local features and to accumulate these predictions with Hough voting.

From the other papers we would like to mention: "Occlusion Handling for the Integration of Virtual Objects into Video" by K. Cordes et al., which proposes to efficiently combine optical flow and SIFT-based matching to get stable feature tracking and efficient composition of virtual objects with real scenes; "Fast Prototyping of Embedded Image Processing Application on Homogeneous System" by H. Chenini et al., which discusses how to design efficient application-specific MP-SoC (Multi-Processors System on Chip) architectures detailing with the example of a dedicated MP-SoC for efficient face tracking; "3D Reconstruction of Plant Roots from MRI Images" by H. Schulz proposing a structural model of root systems from 3D MRI measurements allowing non-invasive analysis of the roots of soil-grown plants; "MCMC Particle Filter with Overrelaxed Slice Sampling for Accurate Rail Inspection" by M. Nieto et al. describing a framework for early detection of rail wear and track widening based on projective geometry and probabilistic inference. While these papers do not propose novel algorithms, they are nice examples of how to efficiently apply existing methods to real-world applications. Concerning the other papers included in this book, even if they are not explicitly mentioned here, they were selected because of their high quality and their contribution to the respective areas and we strongly recommend them to the reader.

Finally, we would like to also mention that when we selected the papers from VISAPP for this book our intention was to cover and highlight research from different areas and sub-areas related to computer vision. Therefore, papers were mainly competing with other papers having similar content and therefore we want to acknowledge that some high-quality papers accepted at the conference could have been integrated in this book if we had space for them.

Concerning GRAPP 2012, 8 papers were selected out of the 20 accepted full papers. The paper selection was based on both the reviewers’ feedback and the quality of the oral presentation appreciated by the GRAPP Program Chair. We tried to cover the main areas of Computer Graphics to make the content of the
book similar to the research addressed in the conference. Most of the accepted full papers competed for the best paper and best student paper awards, which finally were attributed to Jesús Gimeno, Pedro Morillo, Juan Manuel Orduña, and Marcos Fernández for “An Occlusion-Aware AR Authoring Tool for Assembly and Repair Task” and Tomokazu Ishikawa, Yonghao Yue, Kei Iwasaki, Yoshinori Dobashi, and Tomoyuki Nishita for “Visual Simulation of Magnetic Fluid.”

The paper by Gimeno et al. proposes an easy-to-use Kinect-based authoring tool oriented to the development of augmented reality applications for the execution of industrial sequential procedures. Ishikawa et al. focus on the simulation of magnetic fluids and propose an efficient method by combining a procedural and the smoothed particle hydrodynamics approach. The proposed method simulates overall behaviors of the magnetic fluids method and generates visually plausible results within a reasonable computational cost.

Concerning the other papers, we would like to mention: “Muscle Fibers Modeling” by J. Kohout et al., which describes a method for representing muscles by a realistic chaff of fibers that are automatically generated in the volume defined by the surface mesh of the muscle which itself automatically wraps around bones as they move; “Patchworks Terrains” by L. Rocca et al. presents a new method for the management, multi-resolution representation, and rendering of large-terrain databases. This method provides a Ck representation of terrain, with k depending on the type of base patches and supports efficient updates of the database as new data come in; “Visualization of Long Scenes from Dense Image Sequences Using Perspective Composition” by S. Fang and N. Campbell presents a system for generating multi-perspective panoramas for long scenes from dense image sequences by combining different perspectives, including both original and novel perspectives; “Distance-Adapted 2D Manipulation Techniques for Large High-Resolution Display Environments” by A. Lehmann and O. Staadt presents an intuitive overview+detail technique in large high-resolution display environments where users may interact bimanually at different distances to manipulate high-resolution content with the appropriate accuracy; “Sketching Fluid Flow — Combining Sketch-Based Techniques and Gradient Vector Flow for Lattice-Boltzmann Initialization” by S. Ferreira Judice and G.A. Giraldi proposes an intuitive fluid flow initialization for computer graphics applications. They use a combination of sketching techniques and gradient vector flow to obtain a smooth initialization for the simulation using a lattice Boltzmann method (LBM).

The four selected IVAPP papers are not only excellent representatives of the field of information visualization but also form quite a balanced representation of the field itself. In particular, they cover both, application and theory; they use a wide and diverse range of data types (flow fields, geospatial data, trees, and high-dimensional point sets); they use visualization for various tasks (search for individual data points, exploration of data sets, visualization of structures in the data, etc.); and they employ many of the tools and methods that are crucial in information visualization (data analysis, computer graphics, information design, interaction design, etc.). Above all, they are almost as diverse and exciting as the field of information visualization itself.
Specifically, flow visualization is represented by the paper “Space–Time Vi-
sualization of Dynamics in Lagrangian Coherent Structures of Time-Dependent
2D Vector Fields” by Sven Bachthaler, Filip Sadlo, Carsten Dachsbacher, and
Daniel Weiskopf, who discuss space–time visualizations of time-dependent vector
fields and finite-time Lyapunov exponent fields. A Web-based system for geo-
visualization is presented in the paper “Comparative Visualization of Geospatial-
Temporal Data” by Stefan Jänicke, Christian Heine, Ralf Stockmann, and Gerik
Scheuermann. This system provides interactive visualizations for the compar-
ision of multiple geospatial and temporal data sets. Tree visualization is em-
ployed in the paper “Scaffold Hunter” by Karsten Klein, Nils Kriege, and Pe-
tra Mutzel, who present an interactive tool for the exploration and analysis of
chemical databases. The fourth paper, “Interpretation, Interaction, and Scal-
ability for Structural Decomposition Trees” by René Rosenbaum, Daniel Engel,
James Mouradian, Hans Hagen, and Bernd Hamann, investigates visualizations
of high-dimensional, scattered point sets using structural decomposition trees.
Among the four selected papers, it therefore represents visualization of the most
abstract data.

It is not to be expected that any single reader is equally interested in all four
of the selected IVAPP papers; however, the diversity of these papers makes it
very likely that all readers can find something of interest in this selection.

VISIGRAPP 2012 included four invited keynote lectures, presented by inter-
nationally renowned researchers, whom we would like to thank for their contribu-
tion to reinforce the overall quality of the conference, namely, in alphabetical
order: Sabine Coquillart (INRIA, France), Zoltan Kato (University of Szeged,
Hungary), Sabine Süssstrunk (Ecole Polytechnique Fédérale de Lausanne (EPFL,
Switzerland) and Colin Ware (University of New Hampshire, USA). Professor
Zoltan Kato kindly accepted to write a brief resume of his intervention published
herein.

We wish to thank all those who supported VISIGRAPP and helped to or-
ganize the conference. On behalf of the Organizing Committee, we would like
to especially thank the authors, whose work was the essential part of the con-
ference and contributed to a very successful event. We would also like to thank
the members of the Program Committee, whose expertise and diligence were in-
strumental ensuring the quality of the final contributions. We also wish to thank
all the members of the Organizing Committee, whose work and commitment
was invaluable. Last but not least, we would like to thank Springer for their
collaboration in getting this book to print.

December 2012

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Table of Contents

Invited Paper
Linear and Nonlinear Shape Alignment without Correspondences ........ 3
   Zoltan Kato

Part I: Computer Graphics Theory and Applications
An Easy-to-Use AR Authoring Tool for Industrial Applications .......... 17
   Jesús Gimeno, Pedro Morillo, Juan Manuel Orduña, and Marcos Fernández

Fast Realistic Modelling of Muscle Fibres .............................. 33
   Josef Kohout, Gordon J. Clapworthy, Saulo Martelli, and Marco Viceconti

Patchwork Terrains: Multi-resolution Representation from Arbitrary Overlapping Grids with Dynamic Update ...................... 48
   Luigi Rocca, Daniele Panozzo, and Enrico Puppo

Visualization of Long Scenes from Dense Image Sequences Using Perspective Composition ............................................. 67
   Siyuan Fang and Neill Campbell

Optimizations with CUDA: A Case Study on 3D Curve-Skeleton Extraction from Voxelized Models ................................. 82
   Jesús Jiménez and Juan Ruiz de Miras

Distance-Aware Bimanual Interaction for Large High-Resolution Displays ................................................................. 97
   Anke Lehmann and Oliver Staadt

Visual Simulation of Magnetic Fluid Using a Procedural Approach for Spikes Shape ..................................................... 112
   Tomokazu Ishikawa, Yonghao Yue, Kei Iwasaki, Yoshinori Dobashi, and Tomoyuki Nishita

Perspectives for Sketching Fluids Using Sketch-Based Techniques and Gradient Vector Flow for 3D LBM Initialization ............ 127
   Sicilia Judice, José Guilherme Mayworm, Pedro Azevedo, and Gilson Giraldi
Part II: Information Visualization Theory and Applications

Space-Time Flow Visualization of Dynamics in 2D Lagrangian Coherent Structures ................................................................. 145
Filip Sadlo, Sven Bachhaler, Carsten Dachsbacher, and Daniel Weiskopf

GeoTemCo: Comparative Visualization of Geospatial-Temporal Data with Clutter Removal Based on Dynamic Delaunay Triangulations ...... 160
Stefan Jänicke, Christian Heine, and Gerik Scheuermann

Scaffold Hunter: Facilitating Drug Discovery by Visual Analysis of Chemical Space ............................................................................... 176
Karsten Klein, Nils Kriege, and Petra Mutzel

Structural Decomposition Trees: Semantic and Practical Implications ................................................................. 193
Daniel Engel, Hans Hagen, Bernd Hamann, and René Rosenbaum

Part III: Computer Vision Theory and Applications

Photometric Linearization by Robust PCA for Shadow and Specular Removal ......................................................................................... 211
Takahiro Mori, Ryohei Taketa, Shinsaku Hiura, and Kosuke Sato

A Robust People Tracking Algorithm Using Contextual Reasoning for Recovering Detection Errors ...................................................... 225
Rosario Di Lascio, Pasquale Foggia, Alessia Saggese, and Mario Vento

Artifact-Free Decompression and Zooming of JPEG Compressed Images with Total Generalized Variation .............................................. 242
Kristian Bredies and Martin Holler

Efficient Rapid Prototyping of Particle Filter Based Object Tracking on Homogenous System ................................................................. 259
Hanen Chenini, Jean Pierre Dérutin, and Thierry Chateau

Veridical Perception of 3D Objects in a Dynamic Stereoscopic Augmented Reality System ................................................................. 274
Manuela Chessa, Matteo Garibotti, Andrea Canessa, Agostino Gibaldi, Silvio P. Sabatini, and Fabio Solari

Orientation-Based Segmentation of Textured Images Using Graph-Cuts ............................................................................................... 286
Maria Sagrebin-Mitzel and Til Aach
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Resolution Surveillance Video Compression Using JPEG2000</td>
<td>301</td>
</tr>
<tr>
<td>Compression of Random Variables</td>
<td></td>
</tr>
<tr>
<td><em>Octavian Biris and Joseph L. Mundy</em></td>
<td></td>
</tr>
<tr>
<td>Automatic Human Age Estimation Using Overlapped Age Groups</td>
<td>313</td>
</tr>
<tr>
<td><em>Merve Kilinc and Yusuf Sinan Akgul</em></td>
<td></td>
</tr>
<tr>
<td>Single Camera Railways Track Profile Inspection Using an Slice</td>
<td>326</td>
</tr>
<tr>
<td>Sampling-Based Particle Filter</td>
<td></td>
</tr>
<tr>
<td><em>Marcos Nieto, Andoni Cortés, Javier Barandiaran, Oihana Otaegui, and Iñigo Etxabe</em></td>
<td></td>
</tr>
<tr>
<td>Foreground Segmentation from Occlusions Using Structure and Motion Recovery</td>
<td>340</td>
</tr>
<tr>
<td><em>Kai Cordes, Björn Scheuermann, Bodo Rosenhahn, and Jörn Ostermann</em></td>
<td></td>
</tr>
<tr>
<td>A Model for the Restoration of Semi-transparent Defects Based on Lie Groups and Human Visual System</td>
<td>354</td>
</tr>
<tr>
<td><em>Vittoria Bruni, Elisa Rossi, and Domenico Vitulano</em></td>
<td></td>
</tr>
<tr>
<td>3D Structure Estimation from a Single View using Generic Fitted Primitives (GFP)</td>
<td>369</td>
</tr>
<tr>
<td><em>Tiberiu T. Cocias, Sorin M. Grigorescu, and Florin Moldoveanu</em></td>
<td></td>
</tr>
<tr>
<td>Facial Landmarks Detector Learned by the Structured Output SVM</td>
<td>383</td>
</tr>
<tr>
<td><em>Michal Uřičář, Vojtěch Franc, and Václav Hlaváč</em></td>
<td></td>
</tr>
<tr>
<td>Efficient Estimation of Human Upper Body Pose in Static Depth Images</td>
<td>399</td>
</tr>
<tr>
<td><em>Brian Holt and Richard Bowden</em></td>
<td></td>
</tr>
<tr>
<td>Plant Root System Analysis from MRI Images</td>
<td>411</td>
</tr>
<tr>
<td>*Hannes Schulz, Johannes A. Postma, Dagmar van Dusschoten, Hanno Scharr, and Sven Behnke</td>
<td></td>
</tr>
<tr>
<td>Region Growing: When Simplicity Meets Theory – Region Growing Revisited in Feature Space and Variational Framework</td>
<td>426</td>
</tr>
<tr>
<td><em>Chantal Revol-Muller, Thomas Grenier, Jean-Loïc Rose, Alexandra Pacureanu, Françoise Peyrin, and Christophe Odet</em></td>
<td></td>
</tr>
<tr>
<td>Author Index</td>
<td>445</td>
</tr>
</tbody>
</table>