

*Commenced Publication in 1973*

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

## Editorial Board

David Hutchison

*Lancaster University, Lancaster, UK*

Takeo Kanade

*Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler

*University of Surrey, Guildford, UK*

Jon M. Kleinberg

*Cornell University, Ithaca, NY, USA*

Friedemann Mattern

*ETH Zurich, Zurich, Switzerland*

John C. Mitchell

*Stanford University, Stanford, CA, USA*

Moni Naor

*Weizmann Institute of Science, Rehovot, Israel*

C. Pandu Rangan

*Indian Institute of Technology, Madras, India*

Bernhard Steffen

*TU Dortmund University, Dortmund, Germany*

Demetri Terzopoulos

*University of California, Los Angeles, CA, USA*

Doug Tygar

*University of California, Berkeley, CA, USA*

Gerhard Weikum

*Max Planck Institute for Informatics, Saarbrücken, Germany*

More information about this series at <http://www.springer.com/series/7412>

Yao Zhao · Xiangwei Kong  
David Taubman (Eds.)

# Image and Graphics

9th International Conference, ICIG 2017  
Shanghai, China, September 13–15, 2017  
Revised Selected Papers, Part II



Springer

*Editors*

Yao Zhao  
Beijing Jiaotong University  
Beijing  
China

David Taubman  
UNSW  
Sydney, NSW  
Australia

Xiangwei Kong  
Dalian University of Technology  
Dalian  
China

ISSN 0302-9743

ISSN 1611-3349 (electronic)

Lecture Notes in Computer Science

ISBN 978-3-319-71588-9

ISBN 978-3-319-71589-6 (eBook)

<https://doi.org/10.1007/978-3-319-71589-6>

Library of Congress Control Number: 2017960877

LNCS Sublibrary: SL6 – Image Processing, Computer Vision, Pattern Recognition, and Graphics

© Springer International Publishing AG 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by Springer Nature

The registered company is Springer International Publishing AG

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

## Preface

These are the proceedings of the 8th International Conference on Image and Graphics (ICIG 2017), held in Shanghai, China, during September 13–15, 2017.

The China Society of Image and Graphics (CSIG) has hosted this series of ICIG conferences since 2000. ICIG is the biennial conference organized by the China Society of Image and Graphics (CSIG), focusing on innovative technologies of image, video, and graphics processing and fostering innovation, entrepreneurship, and networking. This time, Shanghai Jiaotong University was the organizer, and the Nanjing Technology University and Zong Mu Technology Ltd. Company were the co-organizers. Details about the past eight conferences, as well as the current one, are as follows:

Conference	Place	Date	Submitted	Proceeding
First (ICIG 2000)	Tianjin, China	August 16–18	220	156
Second (ICIG 2002)	Hefei, China	August 15–18	280	166
Third (ICIG 2004)	Hong Kong, China	December 17–19	460	140
4th (ICIG 2007)	Chengdu, China	August 22–24	525	184
5th (ICIG 2009)	Xi'an, China	September 20–23	362	179
6th (ICIG 2011)	Hefei, China	August 12–15	329	183
7th (ICIG 2013)	Qingdao, China	July 26–28	346	181
8th (ICIG 2015)	Tianjin, China	August 13–16	345	170
9th (ICIG 2017)	Shanghai, China	September 13–15	370	172

This time, the proceedings are published by Springer in the LNCS series. The titles, abstracts, and biographies of the three invited speakers of plenary talks are presented first. At ICIG 2017, 370 submissions were received, and 160 papers were accepted. To ease in the search of a required paper in these proceedings, the 160 regular papers have been arranged in alphabetical order according to their titles. Another 12 papers forming a special topic are included at the end.

Our sincere thanks go to all the contributors (around 200), who came from around the world to present their advanced works at this event. Special thanks go to the members of Technical Program Committee, who carefully reviewed every single submission and made their valuable comments for improving the accepted papers.

The proceedings could not have been produced without the invaluable efforts of the publication chairs, the web chairs, and a number of active members of CSIG.

September 2017

Yao Zhao  
Xiangwei Kong  
David Taubman

# **Organization**

## **Honorary Chairs**

Guanhua Xu                    MOST, China  
Yuan F. Zheng                Ohio State University, USA

## **General Chairs**

Tieniu Tan                    Chinese Academy of Sciences, China  
Hongkai Xiong                Shanghai Jiaotong University, China  
Zixiang Xiong                Texas A&M University, USA

## **Organizing Committee Chairs**

Weiyao Lin                    Shanghai Jiaotong University, China  
Huimin Ma                    Tsinghua University, China  
Bo Yan                        Fudan University, China

## **Technical Program Chairs**

David Taubman                UNSW, Australia  
Yao Zhao                      Beijing Jiaotong University, China

## **Finance Chairs**

Zhihua Chen                    ECUST, China  
Zhenwei Shi                    Beihang University, China

## **Special Session Chairs**

Jian Cheng                    Chinese Academy of Sciences, China  
Zhihai He                    University of Missouri, USA  
Z. Jane Wang                University of British Columbia, Canada

## **Award Chairs**

Xin Li                        West Virginia University, USA  
Shiqiang Yang                Tsinghua University, China

## Publicity Chairs

Mingming Cheng Nankai University, China  
Moncef Gabbouj TUT, Finland

## Exhibits Chairs

Zhijun Fang Shanghai University of Engineering Science, China  
Yan Lv Microsoft Research, China

## Publication Chairs

Xiangwei Kong Dalian University of Technology, China  
Jun Yan Journal of Image and Graphics, China

## International Liaisons

Xiaoqian Jiang UCSD, USA  
Huifang Sun MERL, USA

## Local Chairs

Wenrui Dai UCSD, USA  
Junni Zou Shanghai Jiaotong University, China

## Registration Chair

Chen Ye Shanghai Jiaotong University, China

## Webmasters

Chenglin Li EPFL, Switzerland  
Yangmei Shen Shanghai Jiaotong University, China

## Technical Program Committee

Ping An Shanghai University, China  
Ru An Hohai University, China  
Xiao Bai Beijing University of Aeronautics and Astronautics, China  
Lianfa Bai Nanjing University of Science and Technology, China  
Xiang Bai Huazhong University of Science and Technology, China  
Chongke Bi Tianjin University, China  
Hai Bian Hangzhou Dica3d Technology Co., Ltd., China  
Xiaochun Cao Institute of Information Engineering,  
Chinese Academy of Sciences, China

Yan-Pei Cao	Tsinghua University, China
Chong Cao	Tsinghua University, China
Qi Chen	Hainan University, China
Kang Chen	Tsinghua University, China
Mingkai Chen	Nanjing University of Posts and Telecommunications, China
Mingming Cheng	Nankai University, China
Yue Dong	MSRA, China
Zhijun Fang	Shanghai University of Engineering Science, China
Qianjin Feng	Southern Medical University, China
Xiaoyi Feng	Northwestern Polytechnical University, China
Dongmei Fu	University of Science and Technology Beijing, China
Junying Gan	Wuyi University, China
Lin Gao	ICT, CAS, China
Yue Gao	Tsinghua University, China
Xinbo Gao	Xidian University, China
Zexun Geng	Information Engineering University, China
Guanghua Gu	Yanshan University, China
Lin Gu	National Institute of Informatics, Japan
Yanwen Guo	Nanjing University, China
Hu Han	Nanyang Technological University, Singapore
Xiaowei He	Northwest University, China
Qiming Hou	Zhejiang University, China
Dong Hu	Nanjing University of Posts and Telecommunications, China
Hua Huang	Beijing Institute of Technology, China
Haozhi Huang	Tsinghua University, China
Yongfeng Huang	Tsinghua University, China
Rongrong Ji	Xiamen University, China
Yunde Jia	Beijing Institute of Technology, China
Sen Jia	Shenzhen University, China
Xiuping Jia	University of New South Wales, USA
Zhiguo Jiang	Beijing University of Aeronautics and Astronautics, China
Zhaohui Jiang	Central South University, China
Xiaoqian Jiang	University of California, San Diego, USA
Lianwen Jin	South China University of Technology, China
Bin Kong	Institute of Intelligent Machines, Chinese Academy of Sciences, China
Xiangwei Kong	Dalian University of Technology, China
Dengfeng Kuang	Nankai University, China
Jianhuang Lai	Sun Yat-Sen University, China
Congyan Lang	Beijing Jiaotong University, China
Changhua Li	Xi'an University of Architecture and Technology, China
Chenglin Li	Swiss Federal Institute of Technology in Lausanne, Switzerland
Hua Li	Institute of Computing Technology, Chinese Academy of Sciences, China
Jiming Li	Zhejiang Police College, China

Qi Li	Peking University, China
Shutao Li	Hunan University, China
Xi Li	Zhejiang University, China
Jie Liang	China Aerodynamics Research and Development Center, China
Pin Liao	Nanchang University, China
Chunyu Lin	Beijing Jiaotong University, China
Xiaojing Liu	Qinghai University, China
Changhong Liu	Jiangxi Normal University, China
Bin Liu	University of Science and Technology of China, China
Bin Liu	Tsinghua University, China
Chenglin Liu	Institute of Automation, Chinese Academy of Sciences, China
Wenyu Liu	Huazhong University of Science and Technology, China
Yue Liu	Beijing Institute of Technology, China
Qingshan Liu	Nanjing University of Information Science and Technology, China
Hongbing Lu	Fourth Military Medical University, China
Hanqing Lu	Institute of Automation, Chinese Academy of Sciences, China
Jiwen Lu	Tsinghua University, China
Jianhua Ma	Southern Medical University, China
Huimin Ma	Tsinghua University, China
Weidong Min	Nanchang University, China
Xuanqin Mou	Xi'an Jiaotong University, China
Taijiang Mu	Tsinghua University, China
Feiping Nie	Northwestern Polytechnical University, China
Yongwei Nie	South China University of Technology, China
Zhigeng Pan	Hangzhou Normal University, China
Yanwei Pang	Tianjin University, China
Yuxin Peng	Peking University, China
Yuntao Qian	Zhejiang University, China
Bo Ren	Nankai University, China
Jun Sang	Chongqing University, China
Nong Sang	Huazhong University of Science and Technology, China
Yangmei Shen	Shanghai Jiaotong University, China
Yuying Shi	North China Electric Power University, China
Huifang Sun	Mitsubishi Electric Research Laboratories, USA
Jiande Sun	Shandong University, China
Linmi Tao	Tsinghua University, China
Lei Tong	Beijing University of Technology, China
Yunhai Wang	Shandong University, China
Qi Wang	Northwestern Polytechnical University, China
Cheng Wang	Xiamen University, China
Meng Wang	Hefei University of Technology, China
Hanzi Wang	Xiamen University, China
Peizhen Wang	Anhui University of Technology, China
Tianjiang Wang	Huazhong University of Science and Technology, China

Bin Wang	Tsinghua University, China
Lili Wang	Beihang University, China
Shigang Wang	Jilin University, China
Miao Wang	Tsinghua University, China
Yunhong Wang	Beijing University of Aeronautics and Astronautics, China
Chunhong Wu	University of Science and Technology Beijing, China
Hongzhi Wu	Zhejiang University, China
Xiaojun Wu	Jiangnan University, China
Fei Wu	Zhejiang University, China
Zhongke Wu	Beijing Normal University, China
Dingyuan Xia	Wuhan University of Technology, China
Hongkai Xiong	Shanghai Jiaotong University, China
Mingliang Xu	Zhengzhou University, China
Chunxu Xu	Tsinghua University, China
Kun Xu	Tsinghua University, China
Zengpu Xu	Tianjin University of Science and Technology, China
Jianru Xue	Xi'an Jiaotong University, China
Xiangyang Xue	Fudan University, China
Bo Yan	Fudan University, China
Ling-Qi Yan	UC Berkeley, USA
Xiao Yan	Tsinghua University, China
Jingwen Yan	Shantou University, China
Jun Yan	Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China
Jinfeng Yang	Civil Aviation University of China, China
Sheng Yang	Tsinghua University, China
Yongliang Yang	Bath University, UK
Shiqiang Yang	Tsinghua University, China
Tao Yang	Tsinghua University, China
Hongxun Yao	Harbin Institute of Technology, China
Yong Yin	Dalian Maritime University, China
Shiqi Yu	Shenzhen University, China
Nenghai Yu	University of Science and Technology of China, China
Yinwei Zhan	Guangdong University of Technology, China
Aiqing Zhang	Anhui Normal University, China
Wei Zhang	Shandong University, China
Daoqiang Zhang	Nanjing University of Aeronautics and Astronautics, China
Jiawan Zhang	Tianjin University, China
Lei Zhang	Beijing Institute of Technology, China
Song-Hai Zhang	Tsinghua University, China
Shiliang Zhang	Peking University, China
Xinpeng Zhang	Shanghai University, China
Yanci Zhang	Sichuan University, China
Yongfei Zhang	Beijing University of Aeronautics and Astronautics, China
Fang-Lue Zhang	Victoria University of Wellington, New Zealand
Guofeng Zhang	Zhejiang University, China

Qiang Zhang	Dalian University, China
Yun Zhang	Zhejiang University of Media and Communications, China
Liangpei Zhang	Wuhan University, China
Shengchuan Zhang	Xiamen University, China
Xiaopeng Zhang	Shanghai Jiaotong University, China
Sicheng Zhao	Tsinghua University, China
Yao Zhao	Beijing Jiaotong University, China
Jieyu Zhao	Ningbo University, China
Chunhui Zhao	Harbin Engineering University, China
Ying Zhao	Central South University, China
Wei-Shi Zheng	Sun Yat-Sen University, China
Ping Zhong	National University of Defense Technology, China
Quan Zhou	China Academy of Space Technology, Xi'an, China
Jun Zhou	Griffith University, Australia
Liang Zhou	Nanjing University of Posts and Telecommunications, China
Linna Zhou	University of International Relations, China
Tao Zhou	Ningxia Medical University, China
Wengang Zhou	University of Science and Technology of China, China
Zhe Zhu	Duke University, USA
Wang-Jiang Zhu	Tsinghua University, China
Yonggui Zhu	Communication University of China, China

## Contents – Part II

### Computer Vision and Pattern Recognition

Boosting CNN-Based Pedestrian Detection via 3D LiDAR Fusion in Autonomous Driving . . . . .	3
<i>Jian Dou, Jianwu Fang, Tao Li, and Jianru Xue</i>	
Actual License Plate Images Clarity Classification via Sparse Representation. . . . .	14
<i>Yudong Cheng, Feng Liu, Zongliang Gan, and Ziguan Cui</i>	
Non-rigid 3D Object Retrieval with a Learned Shape Descriptor. . . . .	24
<i>Xiangfu Shi, Jieyu Zhao, Long Zhang, and Xulun Ye</i>	
Adaptive Patch Quantization for Histogram-Based Visual Tracking . . . . .	38
<i>Lvran Chen, Huicheng Zheng, Zijian Lin, Dajun Lin, and Bo Ke</i>	
Neural Image Caption Generation with Global Feature Based Attention Scheme . . . . .	51
<i>Yongzhuang Wang and Hongkai Xiong</i>	
Activation-Based Weight Significance Criterion for Pruning Deep Neural Networks. . . . .	62
<i>Jiayu Dong, Huicheng Zheng, and Lina Lian</i>	
Local and Global Sparsity for Deep Learning Networks. . . . .	74
<i>Long Zhang, Jieyu Zhao, Xiangfu Shi, and Xulun Ye</i>	
Object Detection by Learning Oriented Gradients . . . . .	86
<i>Jiajie Chen, Huicheng Zheng, Na He, Ziquan Luo, and Rui Zhu</i>	
Unsupervised Representation Learning with Deep Convolutional Neural Network for Remote Sensing Images. . . . .	97
<i>Yang Yu, Zhiqiang Gong, Ping Zhong, and Jiaxin Shan</i>	
Image Captioning with Object Detection and Localization . . . . .	109
<i>Zhongliang Yang, Yu-Jin Zhang, Sadaqat ur Rehman, and Yongfeng Huang</i>	
Image Set Representation with $L_1$ -Norm Optimal Mean Robust Principal Component Analysis . . . . .	119
<i>Youxia Cao, Bo Jiang, Jin Tang, and Bin Luo</i>	

Object Tracking Based on Multi-modality Dictionary Learning . . . . .	129
<i>Jing Wang, Hong Zhu, Shan Xue, and Jing Shi</i>	
Hardness Prediction for Object Detection Inspired by Human Vision . . . . .	139
<i>Yuwei Qiu, Huimin Ma, and Lei Gao</i>	
Orientation Estimation Network . . . . .	151
<i>Jie Sun, Wengang Zhou, and Houqiang Li</i>	
A Method for Detecting Surface Defects in Insulators Based on RPCA . . . . .	163
<i>Wei Hu, Hongyu Qi, Zhenbing Zhao, and Leilei Xu</i>	
A Dim Small Target Detection Method Based on Spatial-Frequency Domain Features Space . . . . .	174
<i>Jinqiu Sun, Danna Xue, Haisen Li, Yu Zhu, and Yanning Zhang</i>	
<b>Compression, Transmission, Retrieval</b>	
An Algorithm for Tight Frame Grouplet to Compute Association Fields . . . . .	187
<i>Jingwen Yan, Zhenguo Yuan, Tingting Xie, and Huimin Zhao</i>	
Adaptive Coding for Compressed Video Sensing . . . . .	197
<i>Jian Wu, Yongfang Wang, Yun Zhu, and Yuan Shuai</i>	
Deep Top Similarity Preserving Hashing for Image Retrieval . . . . .	206
<i>Qiang Li, Haiyan Fu, and Xiangwei Kong</i>	
A Fast CU Decision Algorithm in Inter Coding Based on Residual Analysis . . . . .	216
<i>Lanfang Dong and Li Wang</i>	
Feature-Based Facial Image Coding Method Using Wavelet Transform . . . . .	229
<i>Chuxi Yang, Yan Zhao, Shigang Wang, and Yuanyuan Liu</i>	
Video Content Caching and Delivery for Tri-Party Joint Profit Optimization . . . . .	239
<i>Congcong Zhai, Junni Zou, and Yunfei Zhang</i>	
Information Gain Product Quantization for Image Retrieval . . . . .	252
<i>Jingjia Chen, Yonghong Song, and Yuanlin Zhang</i>	
A Crop Disease Image Retrieval Method Based on the Improvement of Inverted Index . . . . .	262
<i>Yuan Yuan, Lei Chen, Miao Li, and Na Wu</i>	
A Novel Self-adaptive Defog Method Based on Bionic . . . . .	274
<i>Shi-ping Ma, Quan-He Li, Du-Yan Bi, and Ya-Yun Dong</i>	

Local Disparity Vector Derivation Scheme in 3D-AVS2 . . . . .	286
<i>Qi Mao, Shanshe Wang, and Siwei Ma</i>	

A Feature-Based Coding Algorithm for Face Image. . . . .	299
<i>Henan Li, Shigang Wang, Yan Zhao, Chuxi Yang, and Aobo Wang</i>	

## 5G Multimedia Communications

Video Quality Assessment Based on the Improved LSTM Model . . . . .	313
<i>Qixia Bao, Ruochen Huang, and Xin Wei</i>	

GECKO: Gamer Experience-Centric Bitrate Control Algorithm for Cloud Gaming . . . . .	325
<i>Yihao Ke, Guoqiao Ye, Di Wu, Yipeng Zhou, Edith Ngai, and Han Hu</i>	

A QoE-Aware Video Quality Guarantee Mechanism in 5G Network . . . . .	336
<i>Ruyan Wang, Yan Yang, and Dapeng Wu</i>	

Energy-Aware Fast Interest Forwarding for Multimedia Streaming over ICN 5G-D2D . . . . .	353
<i>Xingyan Chen, Mu Wang, Shijie Jia, and Changqiao Xu</i>	

## Artificial Intelligence

Stability Analysis of ECOC Kernel Machines . . . . .	369
<i>Aijun Xue, Xiaodan Wang, and Xiaolong Fu</i>	

Deep Convolutional Neural Network for Emotion Recognition Using EEG and Peripheral Physiological Signal . . . . .	385
<i>Wenqian Lin, Chao Li, and Shouqian Sun</i>	

Incremental Active Learning Method for Supervised ISOMAP . . . . .	395
<i>Guopeng Zhang, Rui Huang, and Junli Chen</i>	

USTB-Helloear: A Large Database of Ear Images Photographed Under Uncontrolled Conditions . . . . .	405
<i>Yi Zhang, Zhichun Mu, Li Yuan, Chen Yu, and Qing Liu</i>	

Survival-Oriented Reinforcement Learning Model: An Efficient and Robust Deep Reinforcement Learning Algorithm for Autonomous Driving Problem . . . . .	417
<i>Changkun Ye, Huimin Ma, Xiaoqin Zhang, Kai Zhang, and Shaodi You</i>	

Edge Detection Based on Primary Visual Pathway . . . . .	430
<i>Chao Lv, Yuelei Xu, Xulei Zhang, Shiping Ma, Shuai Li, Peng Xin, Mingning Zhu, and Hongqiang Ma</i>	

Multi-channel Satellite Cloud Image Fusion in the Shearlet Transform Domain and Its Influence on Typhoon Center Location . . . . .	440
<i>Changjiang Zhang, Yuan Chen, and Leiming Ma</i>	

## Biological and Medical Image Processing

Parallel Regional Growth Marching Cubes: Efficient Surface Reconstruction Based on MPI . . . . .	455
<i>Xiaohui Wei, Xinyan Bao, Xiaoli Pang, and Haolong Cui</i>	

Shape Registration and Low-Rank for Multiple Image Segmentation . . . . .	466
<i>Wei Hua and Fei Chen</i>	

Efficient Statistical Shape Models-Based Image Segmentation Approach Using Deformable Simplex Meshes . . . . .	476
<i>Jinke Wang, Hongliang Zu, and Shinichi Tamura</i>	

An Artery/Vein Classification Method Based on Color and Vascular Structure Information . . . . .	487
<i>Dongmei Fu, Yang Liu, and Haosen Ma</i>	

Improved U-Net Model for Nerve Segmentation . . . . .	496
<i>Houlong Zhao and Nongliang Sun</i>	

ECG Waveform Extraction from Paper Records . . . . .	505
<i>Jian Wang, Yanwei Pang, Yuqing He, and Jing Pan</i>	

Automatic Classification of Focal Liver Lesion in Ultrasound Images Based on Sparse Representation . . . . .	513
<i>Weining Wang, Yizi Jiang, Tingting Shi, Longzhong Liu, Qinghua Huang, and Xiangmin Xu</i>	

Simultaneous Segmentation of Multiple Regions in 3D Bladder MRI by Efficient Convex Optimization of Coupled Surfaces . . . . .	528
<i>Xiao-pan Xu, Xi Zhang, Yang Liu, Qiang Tian, Guo-peng Zhang, Zeng-yue Yang, Hong-bing Lu, and Jing Yuan</i>	

## Color and Multispectral Processing

Background Self-adapted Digital Camouflage Pattern Generation Algorithm for Fixed Target . . . . .	545
<i>Qin Lei, Duan Ze-wei, Hu Jiang-hua, Xu Wei-dong, and Zhang Xiang</i>	

Practical Bottom-up Golf Course Detection Using Multispectral Remote Sensing Imagery . . . . .	552
<i>Jingbo Chen, Chengyi Wang, Dongxu He, Jiansheng Chen,     and Anzhi Yue</i>	
Efficient Decolorization via Perceptual Group Difference Enhancement . . . . .	560
<i>Hongchao Zhang and Shiguang Liu</i>	
A Spectral Unmixing Method Based on Co-Training . . . . .	570
<i>Qingyu Pang, Jing Yu, and Weidong Sun</i>	
A Novel Algorithm of Image Fusion Based on Non-subsampled Shearlet-Contrast Transform . . . . .	580
<i>Dongpeng Wu, Duyan Bi, Linyuan He, Shiping Ma, Zunlin Fan,     Wenshan Ding, Liyang Wu, Shiping Wang, and Kun Liu</i>	
Tricolor Pre-equalization Deblurring for Underwater Image Enhancement . . . . .	590
<i>Xiaofan Sun, Hao Liu, Xinsheng Zhang, and Kailian Deng</i>	
Link Functions and Training-Based in Reflectance Reconstruction from RGB Images . . . . .	602
<i>Lijun Zhang, Jun Jiang, Jingjing Zhang, and Chen Wang</i>	
Multi-modal Image Registration Based on Modified-SURF and Consensus Inliers Recovery . . . . .	612
<i>Yanjia Chen, Xiuwei Zhang, Fei Li, and Yanning Zhang</i>	
<b>Author Index . . . . .</b>	<b>623</b>