

## Founding Editors

Gerhard Goos

*Karlsruhe Institute of Technology, Karlsruhe, Germany*

Juris Hartmanis

*Cornell University, Ithaca, NY, USA*


## Editorial Board Members

Elisa Bertino

*Purdue University, West Lafayette, IN, USA*

Wen Gao

*Peking University, Beijing, China*

Bernhard Steffen 

*TU Dortmund University, Dortmund, Germany*

Gerhard Woeginger 

*RWTH Aachen, Aachen, Germany*

Moti Yung

*Columbia University, New York, NY, USA*


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

Huimin Ma · Liang Wang · Changshui Zhang ·  
Fei Wu · Tieniu Tan · Yaonan Wang ·  
Jianhuang Lai · Yao Zhao (Eds.)

# Pattern Recognition and Computer Vision

4th Chinese Conference, PRCV 2021  
Beijing, China, October 29 – November 1, 2021  
Proceedings, Part II

### *Editors*

Huimin Ma   
University of Science and Technology Beijing  
Beijing, China

Changshui Zhang  
Tsinghua University  
Beijing, China

Tieniu Tan  
Chinese Academy of Sciences  
Beijing, China

Jianhuang Lai  
Sun Yat-Sen University  
Guangzhou, Guangdong, China

Liang Wang  
Chinese Academy of Sciences  
Beijing, China

Fei Wu   
Zhejiang University  
Hangzhou, China

Yaonan Wang  
Hunan University  
Changsha, China

Yao Zhao   
Beijing Jiaotong University  
Beijing, China

ISSN 0302-9743

ISSN 1611-3349 (electronic)

Lecture Notes in Computer Science

ISBN 978-3-030-88006-4

ISBN 978-3-030-88007-1 (eBook)

<https://doi.org/10.1007/978-3-030-88007-1>

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

© Springer Nature Switzerland AG 2021, corrected publication 2021

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, expressed 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.

This Springer imprint is published by the registered company Springer Nature Switzerland AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Preface

Welcome to the proceedings of the 4th Chinese Conference on Pattern Recognition and Computer Vision (PRCV 2021) held in Beijing, China!

PRCV was established to further boost the impact of the Chinese community in pattern recognition and computer vision, which are two core areas of artificial intelligence, and further improve the quality of academic communication. Accordingly, PRCV is co-sponsored by four major academic societies of China: the China Society of Image and Graphics (CSIG), the Chinese Association for Artificial Intelligence (CAAI), the China Computer Federation (CCF), and the Chinese Association of Automation (CAA).

PRCV aims at providing an interactive communication platform for researchers from academia and from industry. It promotes not only academic exchange but also communication between academia and industry. In order to keep track of the frontier of academic trends and share the latest research achievements, innovative ideas, and scientific methods, international and local leading experts and professors are invited to deliver keynote speeches, introducing the latest advances in theories and methods in the fields of pattern recognition and computer vision.

PRCV 2021 was hosted by University of Science and Technology Beijing, Beijing Jiaotong University, and the Beijing University of Posts and Telecommunications. We received 513 full submissions. Each submission was reviewed by at least three reviewers selected from the Program Committee and other qualified researchers. Based on the reviewers' reports, 201 papers were finally accepted for presentation at the conference, including 30 oral and 171 posters. The acceptance rate was 39.2%. PRCV took place during October 29 to November 1, 2021, and the proceedings are published in this volume in Springer's Lecture Notes in Computer Science (LNCS) series.

We are grateful to the keynote speakers, Larry Davis from the University of Maryland, USA, Yoichi Sato from the University of Tokyo, Japan, Michael Black from the Max Planck Institute for Intelligent Systems, Germany, Songchun Zhu from Peking University and Tsinghua University, China, and Bo Xu from the Institute of Automation, Chinese Academy of Sciences, China.

We give sincere thanks to the authors of all submitted papers, the Program Committee members and the reviewers, and the Organizing Committee. Without their contributions, this conference would not have been possible. Special thanks also go to all of the sponsors

and the organizers of the special forums; their support helped to make the conference a success. We are also grateful to Springer for publishing the proceedings.

October 2021

Tieniu Tan  
Yaonan Wang  
Jianhuang Lai  
Yao Zhao  
Huimin Ma  
Liang Wang  
Changshui Zhang  
Fei Wu

# Organization

## Steering Committee Chair

Tieniu Tan                      Institute of Automation, Chinese Academy of Sciences, China

## Steering Committee

Xilin Chen                      Institute of Computing Technology, Chinese Academy of Sciences,  
China  
Chenglin Liu                      Institute of Automation, Chinese Academy of Sciences, China  
Yong Rui                          Lenovo, China  
Hongbing Zha                      Peking University, China  
Nanning Zheng                      Xi'an Jiaotong University, China  
Jie Zhou                          Tsinghua University, China

## Steering Committee Secretariat

Liang Wang                      Institute of Automation, Chinese Academy of Sciences, China

## General Chairs

Tieniu Tan                      Institute of Automation, Chinese Academy of Sciences, China  
Yaonan Wang                      Hunan University, China  
Jianhuang Lai                      Sun Yat-sen University, China  
Yao Zhao                          Beijing Jiaotong University, China

## Program Chairs

Huimin Ma                      University of Science and Technology Beijing, China  
Liang Wang                      Institute of Automation, Chinese Academy of Sciences, China  
Changshui Zhang                      Tsinghua University, China  
Fei Wu                          Zhejiang University, China

## Organizing Committee Chairs

Xucheng Yin                      University of Science and Technology Beijing, China  
Zhanyu Ma                      Beijing University of Posts and Telecommunications, China  
Zhenfeng Zhu                      Beijing Jiaotong University, China  
Ruiping Wang                      Institute of Computing Technology, Chinese Academy of Sciences,  
China

## **Sponsorship Chairs**

Nenghai Yu	University of Science and Technology of China, China
Xiang Bai	Huazhong University of Science and Technology, China
Yue Liu	Beijing Institute of Technology, China
Jinfeng Yang	Shenzhen Polytechnic, China

## **Publicity Chairs**

Xiangwei Kong	Zhejiang University, China
Tao Mei	JD.com, China
Jiaying Liu	Peking University, China
Dan Zeng	Shanghai University, China

## **International Liaison Chairs**

Jingyi Yu	ShanghaiTech University, China
Xuelong Li	Northwestern Polytechnical University, China
Bangzhi Ruan	Hong Kong Baptist University, China

## **Tutorial Chairs**

Weishi Zheng	Sun Yat-sen University, China
Mingming Cheng	Nankai University, China
Shikui Wei	Beijing Jiaotong University, China

## **Symposium Chairs**

Hua Huang	Beijing Normal University, China
Yuxin Peng	Peking University, China
Nannan Wang	Xidian University, China

## **Doctoral Forum Chairs**

Xi Peng	Sichuan University, China
Hang Su	Tsinghua University, China
Huihui Bai	Beijing Jiaotong University, China

## **Competition Chairs**

Nong Sang	Huazhong University of Science and Technology, China
Wangmeng Zuo	Harbin Institute of Technology, China
Xiaohua Xie	Sun Yat-sen University, China



## Special Issue Chairs

Jiwen Lu	Tsinghua University, China
Shiming Xiang	Institute of Automation, Chinese Academy of Sciences, China
Jianxin Wu	Nanjing University, China

## Publication Chairs

Zhouchen Lin	Peking University, China
Chunyu Lin	Beijing Jiaotong University, China
Huawei Tian	People's Public Security University of China, China

## Registration Chairs

Junjun Yin	University of Science and Technology Beijing, China
Yue Ming	Beijing University of Posts and Telecommunications, China
Jimin Xiao	Xi'an Jiaotong-Liverpool University, China

## Demo Chairs

Xiaokang Yang	Shanghai Jiaotong University, China
Xiaobin Zhu	University of Science and Technology Beijing, China
Chunjie Zhang	Beijing Jiaotong University, China

## Website Chairs

Chao Zhu	University of Science and Technology Beijing, China
Zhaofeng He	Beijing University of Posts and Telecommunications, China
Runmin Cong	Beijing Jiaotong University, China

## Finance Chairs

Weiping Wang	University of Science and Technology Beijing, China
Lifang Wu	Beijing University of Technology, China
Meiqin Liu	Beijing Jiaotong University, China

## Program Committee

Jing Dong	Chinese Academy of Sciences, China
Ran He	Institute of Automation, Chinese Academy of Sciences, China
Xi Li	Zhejiang University, China
Si Liu	Beihang University, China
Xi Peng	Sichuan University, China
Yu Qiao	Chinese Academy of Sciences, China
Jian Sun	Xi'an Jiaotong University, China
Rongrong Ji	Xiamen University, China
Xiang Bai	Huazhong University of Science and Technology, China
Jian Cheng	Institute of Automation, Chinese Academy of Sciences, China
Mingming Cheng	Nankai University, China
Junyu Dong	Ocean University of China, China
Weisheng Dong	Xidian University, China
Yuming Fang	Jiangxi University of Finance and Economics, China
Jianjiang Feng	Tsinghua University, China
Shenghua Gao	ShanghaiTech University, China
Maoguo Gong	Xidian University, China
Yahong Han	Tianjin University, China
Huiguang He	Institute of Automation, Chinese Academy of Sciences, China
Shuqiang Jiang	Institute of Computing Technology, China Academy of Science, China
Lianwen Jin	South China University of Technology, China
Xiaoyuan Jing	Wuhan University, China
Haojie Li	Dalian University of Technology, China
Jianguo Li	Ant Group, China
Peihua Li	Dalian University of Technology, China
Liang Lin	Sun Yat-sen University, China
Zhouchen Lin	Peking University, China
Jiwen Lu	Tsinghua University, China
Siwei Ma	Peking University, China
Deyu Meng	Xi'an Jiaotong University, China
Qiguang Miao	Xidian University, China
Liqiang Nie	Shandong University, China
Wanli Ouyang	The University of Sydney, Australia
Jinshan Pan	Nanjing University of Science and Technology, China
Nong Sang	Huazhong University of Science and Technology, China
Shiguang Shan	Institute of Computing Technology, Chinese Academy of Sciences, China
Hongbin Shen	Shanghai Jiao Tong University, China
Linlin Shen	Shenzhen University, China
Mingli Song	Zhejiang University, China
Hanli Wang	Tongji University, China
Hanzi Wang	Xiamen University, China
Jingdong Wang	Microsoft, China

Nannan Wang	Xidian University, China
Jianxin Wu	Nanjing University, China
Jinjian Wu	Xidian University, China
Yihong Wu	Institute of Automation, Chinese Academy of Sciences, China
Guisong Xia	Wuhan University, China
Yong Xia	Northwestern Polytechnical University, China
Shiming Xiang	Chinese Academy of Sciences, China
Xiaohua Xie	Sun Yat-sen University, China
Jufeng Yang	Nankai University, China
Wankou Yang	Southeast University, China
Yang Yang	University of Electronic Science and Technology of China, China
Yilong Yin	Shandong University, China
Xiaotong Yuan	Nanjing University of Information Science and Technology, China
Zhengjun Zha	University of Science and Technology of China, China
Daoqiang Zhang	Nanjing University of Aeronautics and Astronautics, China
Zhaoxiang Zhang	Institute of Automation, Chinese Academy of Sciences, China
Weishi Zheng	Sun Yat-sen University, China
Wangmeng Zuo	Harbin Institute of Technology, China

## Reviewers

Bai Xiang	Feng Jiachang	He Hongliang
Bai Xiao	Feng Jiawei	Hong Jincheng
Cai Shen	Fu Bin	Hu Shishuai
Cai Yinghao	Fu Ying	Hu Jie
Chen Zailiang	Gao Hongxia	Hu Yang
Chen Weixiang	Gao Shang-Hua	Hu Fuyuan
Chen Jinyu	Gao Changxin	Hu Ruyun
Chen Yifan	Gao Guangwei	Hu Yangwen
Cheng Gong	Gao Yi	Huang Lei
Chu Jun	Ge Shiming	Huang Sheng
Cui Chaoran	Ge Yongxin	Huang Dong
Cui Hengfei	Geng Xin	Huang Huaibo
Cui Zhe	Gong Chen	Huang Jiangtao
Deng Hongxia	Gong Xun	Huang Xiaoming
Deng Cheng	Gu Guanghua	Ji Fanfan
Ding Zihan	Gu Yu-Chao	Ji Jiayi
Dong Qiulei	Guo Chunle	Ji Zhong
Dong Yu	Guo Jianwei	Jia Chuanmin
Dong Xue	Guo Zhenhua	Jia Wei
Duan Lijuan	Han Qi	Jia Xibin
Fan Bin	Han Linghao	Jiang Bo
Fan Yongxian	He Hong	Jiang Peng-Tao
Fan Bohao	He Mingjie	Kan Meina
Fang Yuchun	He Zhaofeng	Kang Wenxiong

Lei Na	Liu Zhou	Tan Chaolei
Lei Zhen	Lu Shaoping	Tan Xiaoyang
Leng Lu	Lu Haopeng	Tang Jin
Li Chenglong	Luo Bin	Tu Zhengzheng
Li Chunlei	Luo Gen	Wang Fudong
Li Hongjun	Ma Chao	Wang Hao
Li Shuyan	Ma Wenchao	Wang Limin
Li Xia	Ma Cheng	Wang Qinfen
Li Zhiyong	Ma Wei	Wang Xingce
Li Guanbin	Mei Jie	Wang Xinnian
Li Peng	Miao Yongwei	Wang Zitian
Li Ruirui	Nie Liqiang	Wang Hongxing
Li Zechao	Nie Xiushan	Wang Jiapeng
Li Zhen	Niu Xuesong	Wang Luting
Li Ce	Niu Yuzhen	Wang Shanshan
Li Changzhou	Ouyang Jianquan	Wang Shengke
Li Jia	Pan Chunyan	Wang Yude
Li Jian	Pan Zhiyu	Wang Zilei
Li Shiyong	Pan Jinshan	Wang Dong
Li Wanhua	Peng Yixing	Wang Hanzi
Li Yongjie	Peng Jun	Wang Jinjia
Li Yunfan	Qian Wenhua	Wang Long
Liang Jian	Qin Binjie	Wang Qiufeng
Liang Yanjie	Qu Yanyun	Wang Shuqiang
Liao Zehui	Rao Yongming	Wang Xingzheng
Lin Zihang	Ren Wenqi	Wei Xiu-Shen
Lin Chunyu	Rui Song	Wei Wei
Lin Guangfeng	Shen Chao	Wen Jie
Liu Heng	Shen Haifeng	Wu Yadong
Liu Li	Shen Shuhan	Wu Hong
Liu Wu	Shen Tiancheng	Wu Shixiang
Liu Yiguang	Sheng Lijun	Wu Xia
Liu Zhiang	Shi Caijuan	Wu Yongxian
Liu Chongyu	Shi Wu	Wu Yuwei
Liu Li	Shi Zhiping	Wu Xinxiao
Liu Qingshan	Shi Hailin	Wu Yihong
Liu Yun	Shi Lukui	Xia Daoxun
Liu Cheng-Lin	Song Chunfeng	Xiang Shiming
Liu Min	Su Hang	Xiao Jinsheng
Liu Risheng	Sun Xiaoshuai	Xiao Liang
Liu Tiange	Sun Jinqiu	Xiao Jun
Liu Weifeng	Sun Zhanli	Xie Xingyu
Liu Xiaolong	Sun Jun	Xu Gang
Liu Yang	Sun Xian	Xu Shugong
Liu Zhi	Sun Zhenan	Xu Xun

Xu Zhenghua	You Gexin	Zhang Mingjin
Xu Lixiang	Yu Ye	Zhang Shanshan
Xu Xin-Shun	Yu Qian	Zhang Xiao-Yu
Xu Mingye	Yu Zhe	Zhang Yanming
Xu Yong	Zeng Lingan	Zhang Yuefeng
Xue Nan	Zeng Hui	Zhao Cairong
Yan Bo	Zhai Yongjie	Zhao Yang
Yan Dongming	Zhang Aiwu	Zhao Yuqian
Yan Junchi	Zhang Chi	Zhen Peng
Yang Dong	Zhang Jie	Zheng Wenming
Yang Guan	Zhang Shu	Zheng Feng
Yang Peipei	Zhang Wenqiang	Zhong Dexing
Yang Wenming	Zhang Yunfeng	Zhong Guoqiang
Yang Yibo	Zhang Zhao	Zhou Xiaolong
Yang Lu	Zhang Hui	Zhou Xue
Yang Jinfu	Zhang Lei	Zhou Quan
Yang Wen	Zhang Xuyao	Zhou Xiaowei
Yao Tao	Zhang Yongfei	Zhu Chaoyang
Ye Mao	Zhang Dingwen	Zhu Xiangping
Yin Ming	Zhang Honggang	Zou Yuexian
Yin Fei	Zhang Lin	Zuo Wangmeng

## Contents – Part II

### Computer Vision, Theories and Applications

Dynamic Fusion Network for Light Field Depth Estimation .....	3
<i>Yukun Zhang, Yongri Piao, Xinxin Ji, and Miao Zhang</i>	
Metric Calibration of Aerial On-Board Multiple Non-overlapping Cameras Based on Visual and Inertial Measurement Data .....	16
<i>Xiaoqiang Zhang, Liangtao Zhong, Chao Liang, Hongyu Chu, Yanhua Shao, and Lingyan Ran</i>	
SEINet: Semantic-Edge Interaction Network for Image Manipulation Localization .....	29
<i>Ye Zhu, Na Qi, Yingchun Guo, and Bin Li</i>	
Video-Based Reconstruction of Smooth 3D Human Body Motion .....	42
<i>Han Zhang, Jianming Wang, and Hui Liu</i>	
A Unified Modular Framework with Deep Graph Convolutional Networks for Multi-label Image Recognition .....	54
<i>Qifan Lin, Zhaoliang Chen, Shiping Wang, and Wenzhong Guo</i>	
3D Correspondence Grouping with Compatibility Features .....	66
<i>Jiaqi Yang, Jiahao Chen, Zhiqiang Huang, Zhiguo Cao, and Yanning Zhang</i>	
Contour-Aware Panoptic Segmentation Network .....	79
<i>Yue Xu, Dongchen Zhu, Guanghui Zhang, Wenjun Shi, Jiamao Li, and Xiaolin Zhang</i>	
VGG-CAE: Unsupervised Visual Place Recognition Using VGG16-Based Convolutional Autoencoder .....	91
<i>Zhenyu Xu, Qieshi Zhang, Fusheng Hao, Ziliang Ren, Yuhang Kang, and Jun Cheng</i>	
Slice Sequential Network: A Lightweight Unsupervised Point Cloud Completion Network .....	103
<i>Bofeng Chen, Jiaqi Fan, Ping Zhao, and Zhihua Wei</i>	

From Digital Model to Reality Application: A Domain Adaptation Method for Rail Defect Detection .....	115
<i>Wenkai Cui, Jianzhu Wang, Haomin Yu, Wenjuan Peng, Le Wang, Shengchun Wang, Peng Dai, and Qingyong Li</i>	
FMixAugment for Semi-supervised Learning with Consistency Regularization .....	127
<i>Huibin Lin, Shiping Wang, Zhanghui Liu, Shunxin Xiao, Shide Du, and Wenzhong Guo</i>	
IDANet: Iterative D-LinkNets with Attention for Road Extraction from High-Resolution Satellite Imagery .....	140
<i>Benzhu Xu, Shengshuai Bao, Liping Zheng, Gaofeng Zhang, and Wenming Wu</i>	
Disentangling Deep Network for Reconstructing 3D Object Shapes from Single 2D Images .....	153
<i>Yang Yang, Junwei Han, Dingwen Zhang, and De Cheng</i>	
AnchorConv: Anchor Convolution for Point Clouds Analysis .....	167
<i>Youngsun Pan, Andy J. Ma, and Yiqi Lin</i>	
IFR: Iterative Fusion Based Recognizer for Low Quality Scene Text Recognition .....	180
<i>Zhiwei Jia, Shugong Xu, Shiyi Mu, Yue Tao, Shan Cao, and Zhiyong Chen</i>	
Immersive Traditional Chinese Portrait Painting: Research on Style Transfer and Face Replacement .....	192
<i>Jiayue Li, Qing Wang, Shiji Li, Qiang Zhong, and Qian Zhou</i>	
Multi-camera Extrinsic Auto-calibration Using Pedestrians in Occluded Environments .....	204
<i>Junzhi Guan, Hujun Geng, Feng Gao, Chenyang Li, and Zeyong Zhang</i>	
Dual-Layer Barcodes .....	216
<i>Kang Fu, Jun Jia, and Guangtao Zhai</i>	
Graph Matching Based Robust Line Segment Correspondence for Active Camera Relocalization .....	228
<i>Mengyu Pan, Chen Meng, Fei-Peng Tian, and Wei Feng</i>	
Unsupervised Learning Framework for 3D Reconstruction from Face Sketch .....	239
<i>Youjia Wang, Qing Yan, Wenli Zhou, and Fang Liu</i>	

HEI-Human: A Hybrid Explicit and Implicit Method for Single-View 3D Clothed Human Reconstruction .....	251
<i>Leyuan Liu, Jianchi Sun, Yunqi Gao, and Jingying Chen</i>	
A Point Cloud Generative Model via Tree-Structured Graph Convolutions for 3D Brain Shape Reconstruction .....	263
<i>Bowen Hu, Baiying Lei, Yanyan Shen, Yong Liu, and Shuqiang Wang</i>	
3D-SceneCaptioner: Visual Scene Captioning Network for Three-Dimensional Point Clouds .....	275
<i>Qiang Yu, Xianbing Pan, Shiming Xiang, and Chunhong Pan</i>	
Soccer Field Registration Based on Geometric Constraint and Deep Learning Method .....	287
<i>Pengjie Li, Jianwei Li, Shouxin Zong, and Kaiyu Zhang</i>	
Enhancing Latent Features for Unsupervised Video Anomaly Detection .....	299
<i>Linmao Zhou, Hong Chang, Nan Kang, Xiangjun Zhao, and Bingpeng Ma</i>	
Adaptive Anomaly Detection Network for Unseen Scene Without Fine-Tuning .....	311
<i>Yutao Hu, Xin Huang, and Xiaoyan Luo</i>	
Facial Expression Recognition Based on Multi-scale Feature Fusion Convolutional Neural Network and Attention Mechanism .....	324
<i>Yana Wu, Kebin Jia, and Zhonghua Sun</i>	
Separable Reversible Data Hiding Based on Integer Mapping and Multi-MSB Prediction for Encrypted 3D Mesh Models .....	336
<i>Zhaoxia Yin, Na Xu, Feng Wang, Lulu Cheng, and Bin Luo</i>	
MPN: Multi-scale Progressive Restoration Network for Unsupervised Defect Detection .....	349
<i>Xuefei Liu, Kaitao Song, and Jianfeng Lu</i>	
Scene-Aware Ensemble Learning for Robust Crowd Counting .....	360
<i>Ling Xu, Kefeng Huang, Kaiyu Sun, Xiaokang Yang, and Chongyang Zhang</i>	
Complementary Temporal Classification Activation Maps in Temporal Action Localization .....	373
<i>Lijuan Wang, Suguo Zhu, Zhihao Li, and Zhenying Fang</i>	



Improve Semantic Correspondence by Filtering the Correlation Scores in both Image Space and Hough Space .....	385
<i>Shihua Xiong and Yonggang Lu</i>	
A Simple Network with Progressive Structure for Salient Object Detection .....	397
<i>Boyi Zhou, Gang Yang, Xin Wan, Yutao Wang, Chang Liu, and Hangxu Wang</i>	
Feature Enhancement and Multi-scale Cross-Modal Attention for RGB-D Salient Object Detection .....	409
<i>Xin Wan, Gang Yang, Boyi Zhou, Chang Liu, Hangxu Wang, and Yutao Wang</i>	
Improving Unsupervised Learning of Monocular Depth and Ego-Motion via Stereo Network .....	421
<i>Mu He, Jin Xie, and Jian Yang</i>	
A Non-autoregressive Decoding Model Based on Joint Classification for 3D Human Pose Regression .....	434
<i>Yuhang Guo, Dongmei Fu, and Tao Yang</i>	
<b>Multimedia Processing and Analysis</b>	
Multiple Semantic Embedding with Graph Convolutional Networks for Multi-Label Image Classification .....	449
<i>Tong Zhou and Songhe Feng</i>	
AMEN: Adversarial Multi-space Embedding Network for Text-Based Person Re-identification .....	462
<i>Zijie Wang, Jingyi Xue, Aichun Zhu, Yifeng Li, Mingyi Zhang, and Chongliang Zhong</i>	
AFM-RNN: A Sequent Prediction Model for Delineating Building Rooftops from Remote Sensing Images by Integrating RNN with Attraction Field Map .....	474
<i>Zeping Liu, Hong Tang, and Wei Huang</i>	
Attribute-Level Interest Matching Network for Personalized Recommendation .....	486
<i>Ran Yang, Meng Jian, Ge Shi, Lifang Wu, and Ye Xiang</i>	
Variational Deep Representation Learning for Cross-Modal Retrieval .....	498
<i>Chen Yang, Zongyong Deng, Tianyu Li, Hao Liu, and Libo Liu</i>	

Vein Centerline Extraction of Visible Images Based on Tracking Method . . . . .	511
<i>Yufeng Zhang, Chaoying Tang, Jiarui Yang, and Biao Wang</i>	
Discrete Bidirectional Matrix Factorization Hashing for Zero-Shot Cross-Media Retrieval . . . . .	524
<i>Donglin Zhang, Xiao-Jun Wu, and Jun Yu</i>	
Dual Stream Fusion Network for Multi-spectral High Resolution Remote Sensing Image Segmentation . . . . .	537
<i>Yong Cao, Yiwen Shi, Yiwei Liu, Chunlei Huo, Shiming Xiang, and Chunhong Pan</i>	
Multi-scale Extracting and Second-Order Statistics for Lightweight Steganalysis . . . . .	548
<i>Junfu Chen, Zhangjie Fu, Xingming Sun, and Enlu Li</i>	
HTCN: Harmonious Text Colorization Network for Visual-Textual Presentation Design . . . . .	560
<i>Xuyong Yang, Xiaobin Xu, Yaohong Huang, and Nenghai Yu</i>	
A Fast Method for Extracting Parameters of Circular Objects . . . . .	572
<i>Zezhong Xu, Qingxiang You, and Cheng Qian</i>	
GGRNet: Global Graph Reasoning Network for Salient Object Detection in Optical Remote Sensing Images . . . . .	584
<i>Xuan Liu, Yumo Zhang, Runmin Cong, Chen Zhang, Ning Yang, Chunjie Zhang, and Yao Zhao</i>	
A Combination Classifier of Polarimetric SAR Image Based on D-S Evidence Theory . . . . .	597
<i>Jiaqi Chen, Shuyin Zhang, Meng Tian, Zhiguo Xie, Huan Chen, and Erlei Zhang</i>	
Image Tampering Localization Using Unified Two-Stream Features Enhanced with Channel and Spatial Attention . . . . .	610
<i>Haodong Li, Xiaoming Chen, Peiyu Zhuang, and Bin Li</i>	
An End-to-End Mutual Enhancement Network Toward Image Compression and Semantic Segmentation . . . . .	623
<i>Junru Chen, Chao Yao, Meiqin Liu, and Yao Zhao</i>	
Deep Double Center Hashing for Face Image Retrieval . . . . .	636
<i>Xin Fu, Wenzhong Wang, and Jin Tang</i>	

<b>A Novel Method of Cropped Images Forensics in Social Networks</b> .....	649
<i>Rongrong Gao, Xiaolong Li, and Yao Zhao</i>	
<b>MGD-GAN: Text-to-Pedestrian Generation Through Multi-grained Discrimination</b> .....	662
<i>Shengyu Zhang, Donghui Wang, Zhou Zhao, Siliang Tang, Kun Kuang, Di Xie, and Fei Wu</i>	
<b>Correction to: Pattern Recognition and Computer Vision</b> .....	C1
<i>Huimin Ma, Liang Wang, Changshui Zhang, Fei Wu, Tieniu Tan, Yaonan Wang, Jianhuang Lai, and Yao Zhao</i>	
<b>Author Index</b> .....	675