Lecture Notes in Computer Science

13022

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 IV



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 D Zhejiang University Hangzhou, China

Yaonan Wang Hunan University Changsha, China

Yao Zhao D Beijing Jiaotong University Beijing, China

ISSN 0302-9743 ISSN 1611-3349 (electronic) Lecture Notes in Computer Science ISBN 978-3-030-88012-5 ISBN 978-3-030-88013-2 (eBook) https://doi.org/10.1007/978-3-030-88013-2

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

© Springer Nature Switzerland AG 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

vi Preface

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
Jianhuang Lai
Yao Zhao

Hunan University, China
Sun Yat-sen University, China
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

Zhanyu Ma

University of Science and Technology Beijing, China
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
Zhouchen Lin
Jiwen Lu
Siwei Ma
Deyu Meng
Sun Yat-sen University, China
Peking University, China
Tsinghua University, China
Peking University, China
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 Xiamen University, China

Jingdong Wang Microsoft, China

Nannan Wang
Jianxin Wu
Jinjian Wu
Xidian University, China
Xidian University, China
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
Zhaoxiang Zhang
University of Aeronautics and Astronautics, China
Institute of Automation, Chinese Academy of Sciences, China

Weishi Zheng Sun Yat-sen University, China

Wangmeng Zuo Harbin Institute of Technology, China

Reviewers

He Hongliang Bai Xiang Feng Jiachang Bai Xiao Feng Jiawei Hong Jincheng Fu Bin Hu Shishuai Cai Shen Cai Yinghao Fu Ying Hu Jie Chen Zailiang Gao Hongxia Hu Yang Gao Shang-Hua Hu Fuyuan Chen Weixiang Chen Jinyu Gao Changxin Hu Ruyun Chen Yifan Gao Guangwei Hu Yangwen Gao Yi Cheng Gong Huang Lei **Huang Sheng** Chu Jun Ge Shiming Cui Chaoran Ge Yongxin Huang Dong Cui Hengfei Geng Xin Huang Huaibo Cui Zhe Gong Chen Huang Jiangtao **Huang Xiaoming** Deng Hongxia Gong Xun Gu Guanghua Ji Fanfan Deng Cheng

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 Oi 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 Oinfen Li Zhiyong Ma Wei Wang Xingce Li Guanbin Wang Xinnian Mei Jie Wang Zitian Li Peng Miao Yongwei Li Ruirui Nie Ligiang Wang Hongxing Wang Jiapeng Li Zechao Nie Xiushan Wang Luting Li Zhen Niu Xuesong Li Ce Niu Yuzhen Wang Shanshan Wang Shengke Li Changzhou Ouyang Jianquan Pan Chunyan Wang Yude Li Jia Li Jian Pan Zhiyu Wang Zilei Li Shiying Pan Jinshan Wang Dong Wang Hanzi Li Wanhua Peng Yixing Wang Jinjia Li Yongjie Peng Jun Li Yunfan Oian Wenhua Wang Long Liang Jian Qin Binjie Wang Qiufeng Liang Yanjie Wang Shuqiang Qu Yanyun Liao Zehui Rao Yongming Wang Xingzheng Lin Zihang Ren Wengi Wei Xiu-Shen Lin Chunyu Rui Song Wei Wei Shen Chao Lin Guangfeng Wen Jie Liu Heng Shen Haifeng Wu Yadong Wu Hong Liu Li Shen Shuhan Liu Wu Shen Tiancheng Wu Shixiang Liu Yiguang Sheng Lijun Wu Xia Shi Caijuan Liu Zhiang 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 Sun Xiaoshuai Xiao Liang Liu Risheng Xiao Jun Liu Tiange Sun Jinqiu Liu Weifeng Sun Zhanli Xie Xingyu Liu Xiaolong Sun Jun Xu Gang Liu Yang Sun Xian Xu Shugong Xu Xun Liu Zhi Sun Zhenan

Zuo Wangmeng

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

Zhang Lin

Yin Fei

Contents - Part IV

Machine Learning, Neural Network and Deep Learning	
Edge-Wise One-Level Global Pruning on NAS Generated Networks	3
Convolution Tells Where to Look	16
Robust Single-Step Adversarial Training with Regularizer	29
Texture-Guided U-Net for OCT-to-OCTA Generation	42
Learning Key Actors and Their Interactions for Group Activity Recognition Yutai Duan and Jianming Wang	53
Attributed Non-negative Matrix Multi-factorization for Data Representation Jie Wang, Yanfeng Sun, Jipeng Guo, Yongli Hu, and Baocai Yin	66
Improved Categorical Cross-Entropy Loss for Training Deep Neural Networks with Noisy Labels Panle Li, Xiaohui He, Dingjun Song, Zihao Ding, Mengjia Qiao, Xijie Cheng, and Runchuan Li	78
A Residual Correction Approach for Semi-supervised Semantic Segmentation	90
Hypergraph Convolutional Network with Hybrid Higher-Order Neighbors Jiahao Huang, Fangyuan Lei, Senhong Wang, Song Wang, and Qingyun Dai	103
Text-Aware Single Image Specular Highlight Removal Shiyu Hou, Chaoqun Wang, Weize Quan, Jingen Jiang, and Dong-Ming Yan	115
Minimizing Wasserstein-1 Distance by Quantile Regression for GANs Model	128

A Competition of Shape and Texture Bias by Multi-view Image Representation	140
Lingwei Kong, Jianzong Wang, Zhangcheng Huang, and Jing Xiao	140
Learning Indistinguishable and Transferable Adversarial Examples	152
Efficient Object Detection and Classification of Ground Objects from Thermal Infrared Remote Sensing Image Based on Deep Learning Falin Wu, Guopeng Zhou, Jiaqi He, Haolun Li, Yushuang Liu, and Gongliu Yang	165
MEMA-NAS: Memory-Efficient Multi-Agent Neural Architecture Search Qi Kong, Xin Xu, and Liangliang Zhang	176
Adversarial Decoupling for Weakly Supervised Semantic Segmentation Guoying Sun, Meng Yang, and Wenfeng Luo	188
Towards End-to-End Embroidery Style Generation: A Paired Dataset and Benchmark Jingwen Ye, Yixin Ji, Jie Song, Zunlei Feng, and Mingli Song	201
Efficient and Real-Time Particle Detection via Encoder-Decoder Network Yuanyuan Wang, Ling Ma, Lihua Jian, and Huiqin Jiang	214
Flexible Projection Search Using Optimal Re-weighted Adjacency for Unsupervised Manifold Learning	227
Fabric Defect Detection via Multi-scale Feature Fusion-Based Saliency Zhoufeng Liu, Ning Huang, Chunlei Li, Zijing Guo, and Chengli Gao	240
Improving Adversarial Robustness of Detector via Objectness Regularization Jiayu Bao, Jiansheng Chen, Hongbing Ma, Huimin Ma, Cheng Yu, and Yiqing Huang	252
IPE Transformer for Depth Completion with Input-Aware Positional Embeddings Bocen Li, Guozhen Li, Haiting Wang, Lijun Wang, Zhenfei Gong, Xiaohua Zhang, and Huchuan Lu	263
Enhanced Multi-view Matrix Factorization with Shared Representation Sheng Huang, Yunhe Zhang, Lele Fu, and Shiping Wang	276

Contents - Part IV	XV11
Multi-level Residual Attention Network for Speckle Suppression	288
Suppressing Style-Sensitive Features via Randomly Erasing for Domain Generalizable Semantic Segmentation	300
MAGAN: Multi-attention Generative Adversarial Networks for Text-to-Image Generation	312
Dual Attention Based Network with Hierarchical ConvLSTM for Video Object Segmentation	323
Distance-Based Class Activation Map for Metric Learning	336
Reading Pointer Meter Through One Stage End-to-End Deep Regression Zhenzhen Chao, Yaobin Mao, and Yi Han	348
Deep Architecture Compression with Automatic Clustering of Similar Neurons Xiang Liu, Wenxue Liu, Li-Na Wang, and Guoqiang Zhong	361
Attention Guided Spatio-Temporal Artifacts Extraction for Deepfake Detection	374
Learn the Approximation Distribution of Sparse Coding with Mixture Sparsity Network Li Li, Xiao Long, Liansheng Zhuang, and Shafei Wang	387
Anti-occluded Person Re-identification via Pose Restoration and Dual Channel Feature Distance Measurement Bin Wu, Keyang Cheng, Chunyun Meng, and Sai Liang	399
Dynamic Runtime Feature Map Pruning	411

Special Session:	New	Advances	in	Visual	Perception	and
Understanding						

Multi-branch Graph Network for Learning Human-Object Interaction Tongtong Wu, Xu Zhang, Fuqing Duan, and Liang Chang	425
FDEA: Face Dataset with Ethnicity Attribute Jun Chen, Ting Liu, Fu-Zhao Ou, and Yuan-Gen Wang	437
TMD-FS: Improving Few-Shot Object Detection with Transformer Multi-modal Directing Ying Yuan, Lijuan Duan, Wenjian Wang, and Qing En	447
Feature Matching Network for Weakly-Supervised Temporal Action Localization Peng Dou, Wei Zhou, Zhongke Liao, and Haifeng Hu	459
LiDAR-Based Symmetrical Guidance for 3D Object Detection	472
Few-Shot Segmentation via Complementary Prototype Learning and Cascaded Refinement Hanxiao Luo, Hui Li, Qingbo Wu, Hongliang Li, King Ngi Ngan, Fanman Meng, and Linfeng Xu	484
Couple Double-Stage FPNs with Single Pipe-Line for Solar Speckle Images Deblurring	496
Multi-scale Image Partitioning and Saliency Detection for Single Image Blind Deblurring Jiaqian Yan, Yu Shi, Xia Hua, Zhigao Huang, and Ruzhou Li	508
CETransformer: Casual Effect Estimation via Transformer Based Representation Learning Zhenyu Guo, Shuai Zheng, Zhizhe Liu, Kun Yan, and Zhenfeng Zhu	524
An Efficient Polyp Detection Framework with Suspicious Targets Assisted Training Zhipeng Zhang, Li Xiao, Fuzhen Zhuang, Ling Ma, Yuan Chang, Yuanyuan Wang, Huiqin Jiang, and Qing He	536
Invertible Image Compressive Sensing	548

	Contents - Part IV	xix
Gradient-Free Neural Network Training Based on Deep Dic	•	561
Learning with the Log Regularizer Ying Xie, Zhenni Li, and Haoli Zhao	•••••	301
Author Index		575