Lecture Notes in Computer Science

12889

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

Yuxin Peng · Shi-Min Hu · Moncef Gabbouj · Kun Zhou · Michael Elad · Kun Xu (Eds.)

Image and Graphics

11th International Conference, ICIG 2021 Haikou, China, August 6–8, 2021 Proceedings, Part II



Editors Yuxin Peng Peking University Beijing, China

Moncef Gabbouj Tampere University Tampere, Finland

Michael Elad

Technion – Israel Institute of Technology Haifa, Israel Shi-Min Hu Tsinghua University Beijing, China

Kun Zhou Zhejiang University Hangzhou, China

Kun Xu

Tsinghua University Beijing, China

ISSN 0302-9743 ISSN 1611-3349 (electronic) Lecture Notes in Computer Science ISBN 978-3-030-87357-8 ISBN 978-3-030-87358-5 (eBook) https://doi.org/10.1007/978-3-030-87358-5

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

These are the proceedings of the 11th International Conference on Image and Graphics (ICIG 2021), which was supposed to be held in Haikou, China, during August 6–8, 2021, but was postponed due to COVID-19.

The China Society of Image and Graphics (CSIG) has hosted the series of ICIG conferences since 2000. ICIG is the biennial conference organized by the CSIG that focuses on innovative technologies of image, video, and graphics processing and fosters innovation, entrepreneurship, and networking. This time, the conference was organized by Hainan University. Details about the past conferences 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
10th (ICIG 2019)	Shanghai, China	August 23–25	384	183

For ICIG 2021, 421 submissions were received and 198 papers were accepted. To ease the search of a required paper in these proceedings, the accepted papers have been arranged into different sections according to their topic.

We sincerely thank all the contributors, who came from around the world to present their advanced work at this event. We would also like to thank all the reviewers, who carefully reviewed all submissions and made their valuable comments for improving the accepted papers. The proceedings could not have been produced without the invaluable efforts of the members of the Organizing Committee, and a number of active members of CSIG.

August 2021

Yuxin Peng Shi-Min Hu Moncef Gabbouj Kun Zhou Michael Elad Kun Xu

Organization

Organizing Committee

General Chairs

Yaonan Wang Hunan University, China Laurence T. Yang Hainan University, China

Ming Lin University of Maryland at College Park, USA

Technical Program Chairs

Yuxin Peng Peking University, China Shi-Min Hu Tsinghua University, China

Moncef Gabbouj TUT, Finland

Kun Zhou Zhejiang University, China

Organizing Committee Chairs

Mingming Cheng Nankai University, China Zhaohui Wang Hainan University, China

Faouzi Alaya Cheikh NTNU, Norway

Sponsorship Chairs

Rongrong Ji Xiamen University, China

Yafeng Deng Qihoo 360 Technology Co., Ltd., China

Finance Chair

Jing Dong Institute of Automation, CAS, China

Special Session Chairs

Ioan Tabus Tampere University, Finland

Jian Cheng Institute of Automation, CAS, China

Award Chairs

Yirong Wu Aerospace Information Research Institute, CAS, China

Ridha Hamila Qatar University, Qatar Jieqing Feng Zhejiang University, China

Publicity Chairs

Sid Ahmed Fezza INTTIC, Algeria

Zhi Jin Sun Yat-sen University, China

Jimin Xiao Xi'an Jiaotong-Liverpool University, China

viii Organization

Exhibits Chairs

Jinjian Wu Xidian University, China

Drahansky Martin Brno University of Technology, Czech Republic

Dong Wang Dalian University of Technology, China

Publication Chairs

Michael Elad Israel Institute of Technology, Israel

Kun Xu Tsinghua University, China

Oversea Liaison Chairs

Yubing Tong University of Pennsylvania, USA

Azeddine Beghdadi University Sorbonne Paris Nord, France

Local Chair

Xiaozhang Liu Hainan University, China

Tutorial Chairs

Hongkai Xiong Shanghai Jiao Tong University, China

Yo-Sung Ho GIST, South Korea Zhanchuan Cai MUST, Macau, China

Workshop Chairs

Yunchao Wei UTS, Australia

Joaquín Olivares University of Cordoba, Spain Cheng Deng Xidian University, China

Symposium Chairs

Chia-wen Lin Tsing Hua University, Taiwan, China

Frederic Dufaux CNRS, France

Website Chair

Zhenwei Shi Beihang University, China

Area Chairs

Weihong Deng	Meina Kan	Huimin Lu	Hang Su
Jing Dong	Weiyao Lin	Wanli Ouyang	Hao Su
Hu Han	Risheng Liu	Jinshan Pan	Nannan Wang
Gao Huang	Jiaying Liu	Houwen Peng	Shuhui Wang
Di Huang	Si Liu	Xi Peng	Yunhai Wang
Xu Jia	Zhilei Liu	Boxin Shi	Xinchao Wang

Limin Wang	Baoyuan Wu	Shiqi Yu	Liang Zheng
Dong Wang	Yong Xia	Shanshan Zhang	Xiaobin Zhu
Yunhai Wang	Guisong Xia	Xi Sheryl Zhang	Chao Zuo
Yingcai Wu	Iunchi Yan	Xiaovu Zhang	

Additional Reviewers

Haoran Bai	Jiajun Deng	Songfang Han	Zeren Jiang
Xiaoyu Bai	Weijian Deng	Xinzhe Han	Zhiying Jiang
Zhidong Bai	Shangzhe Di	Yahong Han	Lianwen Jin
Bingkun Bao	Jian Ding	Yizeng Han	Zhuochen Jin
Daniel Barath	Hao Du	Zheng Han	Yongcheng Jing
Chunjuan Bo	Heming Du	Zhenjun Han	Meina Kan
Jintong Cai	Peiqi Duan	Shuai Hao	Yongzhen Ke
Zewei Cai	Yuping Duan	You Hao	Jianhuang Lai
Zhanchuan Cai	Jiahao Fan	Zhongkai Hao	Nan Lai
Anqi Cao	Yao Fan	Xiangyang He	Xing Lan
Jian Cao	Yongxian Fan	Richang Hong	Hyeongmin Lee
Jianhui Chang	Zejia Fan	Yuchen Hong	Baohua Li
Di Chen	Zhenfeng Fan	Chenping Hou	Boyun Li
Han Chen	Sheng Fang	JieBo Hou	Fenghai Li
Hao Chen	Xianyong Fang	Yunzhong Hou	Guozhang Li
Jinsong Chen	Jieqing Feng	Yuxuan Hou	Han Li
Shuaijun Chen	Qianjin Feng	Donghui Hu	Hangyu Li
Wenting Chen	Xiaomei Feng	Fuyuan Hu	Hongjun Li
Xiaojun Chen	Zunlei Feng	Lanqing Hu	Jiaji Li
Xin Chen	Chenping Fu	Peng Hu	Ping Li
Xiu Chen	Jiahui Fu	Qingyong Hu	Ruihuang Li
Yang Chen	Xueyang Fu	Ruimin Hu	Shuang Li
Yuanyuan Chen	Jingru Gan	Shishuai Hu	Wenbin Li
Yuqing Chen	Difei Gao	Yang Hu	Wenhao Li
Zhibo Chen	Guangshuai Gao	Zhenzhen Hu	Yi Li
Zhihua Chen	Jiaxin Gao	Yan Hu	Yifan Li
De Cheng	Jun Gao	Bao Hua	Yixuan Li
Yu Cheng	Ruochen Gao	Haofeng Huang	Yunfan Li
Zhanglin Cheng	Shang Gao	Jun Huang	Zekun Li
Xiangtong Chu	Ziteng Gao	Shaofei Huang	Zhuoshi Li
Yang Cong	Zhang Ge	Yan Huang	Zhuoxiao Li
Hengfei Cui	Yuanbiao Gou	Zhenghua Huang	Hao Liang
Yutao Cui	Heng Guo	Zhenyu Huang	Min Liang
Zhaopeng Cui	Jie Guo	Xiaopeng Ji	Zhifang Liang
Enyan Dai	Senhui Guo	Haozhe Jia	Xin Liao
Ju Dai	Xuyang Guo	Mengxi Jia	Zehui Liao
Congyue Deng	Yingkai guo	Muwei Jian	Yijie Lin
Dazhen Deng	Chunrui Han	Xinrui Jiang	Chang Liu

Chenglin Liu Hao Liu Jie Liu Jinvuan Liu Liu Liu Min Liu Minghua Liu Pengbo Liu Oingshan Liu Risheng Liu Ruijun Liu Shiguang Liu Shuaigi Liu Si Liu Wenvu Liu Xuan Liu Xuejing Liu Yaohua Liu Yaqi Liu Yiguang Liu Yipeng Liu Yong Liu Yu Liu Yuchi Liu Yunan Liu Zhenguang Liu Zimo Liu Yang Long Hongtao Lu Hu Lu Kaiyue Lu Linpeng Lu Tao Lu Bin Luo Weigi Luo Kai Lv Youwei Lyu Huimin Ma Lizhuang Ma Long Ma Tengyu Ma Xiaorui Ma Xinzhu Ma Yuhao Ma Oirong Mao Shitong Mao

Yongwei Miao Weidong Min Zhou Ning Xuesong Niu Weihua Ou Xuran Pan Guansong Pang Bo Peng Sida Peng Xi Peng Zhaobo Qi Jiaming Oian Rui Oian Zhenxing Qian Qingyang Wu Jiayan Qiu Xinkuan Qiu Zelin Oiu Zhong Qu Wengi Ren Tushar Sandhan Hanbo Sang Nong Sang Cai Shang Shuai Shao Zhiwen Shao Chunhua Shen Linlin Shen Oian Shen Yuefan Shen Shurong Sheng Haichao Shi Jun Shi Yongjie Shi Zhenghao Shi Zhenwei Shi Shizhan Liu Jaskirat Singh Guoxian Song Sijie Song Bowen Sun Haomiao Sun Jiande Sun Jianing Sun Shitong Sun Xiaoxiao Sun

Bin Tan Haoteng Tang Hong Tang Shixiang Tang Jun Tao Zhou Tao Yadong Teng Zhan Tong Jun Tu Kurban Ubul Thomas Verelst Fang Wan Renjie Wan Beibei Wang Bowen Wang Ce Wang Chengyu Wang Di Wang Dong Wang Feipeng Wang Fudong Wang Guodong Wang Hanli Wang Hanzi Wang Hongyu Wang Hu Wang Huiqun Wang Jinwei Wang Kaili Wang Kangkan Wang Kunfeng Wang Lijun Wang Longguang Wang Mei Wang Meng Wang Min Wang Qiang Wang Runzhong Wang Shengjin Wang Shuhui Wang Shujun Wang Tao Wang Dongsheng Wang Wei Wang Weizheng Wang Wenbin Wang

Xiaoxing Wang Xingce Wang Xinhao Wang Xueping Wang Xun Wang Yifan Wang Yinggian Wang Yongfang Wang Yuehuan Wang Zhengyi Wang Zhihui Wang Ziming Wang Hongyuan Wang Jinjia Wang Jie Wei Xiushen Wei Ziyu Wei Weifan Guan Ying Wen Di Weng Shuchen Weng Zhi Weng Wenhua Oian Kan Wu Runmin Wu Yawen Wu Yicheng Wu Zhongke Wu Zizhao Wu Zhuofan Xia Fanbo Xiang Tao Xiang Wei Xiang Wenzhao Xiang Qinjie Xiao Jingwei Xin Xiaomeng Xin Bowen Xu Fang Xu Jia Xu Oian Xu Shibiao Xu Mingliang Xue Xiangyang Xue Xinwei Xue Zhe Xue

Zhenfeng Xue Zivu Xue Xuejuan Wu Bin Yan Xin Yan Bangbang Yang Hongyu Yang Mouxing Yang Oisen Yang Shuo Yang Xue Yang Yiding Yang Yifang Yang Yuansheng Yao Yue Yao Jingwen Ye Shuainan Ye Yiwen Ye Zhichao Ye

Wei Yin Yongkai Yin Zhaoxia Yin Zhenfei Yin Chengyang Ying Di You Baosheng Yu Hongyuan Yu Nenghai Yu Zhenxun Yuan Yuzhang Hu Jiabei Zeng Geng Zhan Yinwei Zhan Bohua Zhang Boyuan Zhang Cuicui Zhang Jialin Zhang

Jianguo Zhang

Jiawan Zhang Jie Zhang Jing Zhang Junxing Zhang Kaihua Zhang Pengyu Zhang Pingping Zhang Runnan Zhang Shaoxiong Zhang Shizhou Zhang Songyang Zhang Xiaoshuai Zhang Xinfeng Zhang Xinpeng Zhang Xinyu Zhang Yanan Zhang Yanfu Zhang Yanhao Zhang Yaru Zhang

Yifan Zhang Zhangiu Zhang Zhexi Zhang Ziwei Zhang Jie Zhao Tianxiang Zhao Wenda Zhao Yan Zhao Oian Zheng Weishi Zheng Chengju Zhou Chu Zhou Dawei Zhou Guijing Zhu Jianqing Zhu Mingrui Zhu Zijian Zhu Yunzhi Zhuge Junbao Zhuo

Contents – Part II

Artificial Intelligence	
A Calibration Strategy for Smart Welding	3
Brain Connectivity: Exploring from a High-Level Topological Perspective Wei Sheng, Liang Li, Shaoqiang Han, Yunshuang Fan, Chong Wang, Qin Tang, Yuyan Chen, Qian Cui, and Huafu Chen	18
Hetero-STAN: Crowd Flow Prediction by Heterogeneous Spatio-Temporal Attention Network	30
UAV Track Planning Algorithm Based on Graph Attention Network and Deep Q Network	42
Object 6DoF Pose Estimation for Power Grid Manipulating Robots Shan Du, Xiaoye Zhang, Zhongliang Li, Jingpeng Yue, and Qin Zou	55
Novel Augmented Reality System for Oral and Maxillofacial Surgery Lele Ding, Long Shao, Zehua Zhao, Tao Zhang, Danni Ai, Jian Yang, and Yongtian Wang	67
A New Dataset and Recognition for Egocentric Microgesture Designed	0.0
by Ergonomists	80
Machine Learning Architectures and Formulations	
Orthogonal Dual Graph Regularized Nonnegative Matrix Factorization Jinrong He, Yanxin Shi, Zongwen Bai, and Zeyu Bao	93
Robust Recovery of Low Rank Matrix by Nonconvex Rank Regularization	106
Free Adversarial Training with Layerwise Heuristic Learning	120

and Xiaohui Kuang

Adversarial Attack with KD-Tree Searching on Training Set Xinghua Guo, Fan Jia, Jianqiao An, and Yahong Han	132
Mixup Without Hesitation	143
An LDA and RBF-SVM Based Classification Method for Inertinite Macerals of Coal	155
A Weighted Non-convex Restoration Model for Hyperspectral Image Yijun Yu and Min Li	167
Edge-Based Blur Kernel Estimation Using Sparse Representation and Self-similarity	179
Normal Distribution Function on Descriptor Extraction	206
Supervised Non-negative Matrix Factorization Induced by Huber Loss Ying Huang, Wen-Sheng Chen, Binbin Pan, and Bo Chen	216
Small Sample Identification for Specific Emitter Based on Adversarial Embedded Networks	226
Multi-mode Tensor Singular Value Decomposition for Low-Rank Image Recovery	238
Hyperspectral Anomaly Detection Based on Tensor Truncated Nuclear Norm and Linear Total Variation Regularization	250
Face, Gesture, and Body Pose	
Deep Human Pose Estimation via Self-guided Learning	265
Binary Convolutional Neural Networks for Facial Action Unit Detection Mengyi Liu, Fei Wan, and Ruicong Zhi	275
Efficient Example Mining for Anchor-Free Face Detection	288

6D Object Pose Estimation with Mutual Attention Fusion	301
Attention-Guided Siamese Network for Clothes-Changing Person Re-identification	314
Cross-domain Person Re-identification Based on the Sample Relation Guidance	326
Large-Scale Target Detection and Classification Based on Improved Candidate Regions	338
Joint Face Detection and Landmark Localization Based on an Extremely Lightweight Network	351
Extremely Tiny Face Detector for Platforms with Limited Resources Chen Chen, Maojun Zhang, Yang Peng, Hanlin Tan, and Huaxin Xiao	362
Multi-pose Facial Expression Recognition Based on Unpaired Images Bairu Chen, Yibo Gan, and Bing-Kun Bao	374
Keypoint Context Aggregation for Human Pose Estimation	386
Clothes-Independent Identity Feature Learning for Long-Term Person Re-identification	397
Lightweight Non-local High-Resolution Networks for Human Pose Estimation	410
Occluded Animal Shape and Pose Estimation from a Single Color Image Yiming Xie, Yunqi Zhao, Shijian Jiang, Jiangyong Hu, and Yangang Wang	423
Adaptively Fusing Complete Multi-resolution Features for Human Pose Estimation	434

Multi-view Gait Recognition by Inception-Encoder and CL-GEI	446
Facial Action Unit Detection Based on Transformer and Attention Mechanism	461
Unsupervised Detailed Human Shape Estimation from Multi-view Color Images	473
Device-Adaptive 2D Gaze Estimation: A Multi-Point Differential Framework	485
Dual Gated Learning for Visible-Infrared Person Re-identification YuHeng Huang, JinCai Xian, Dong Wei, XiaoFeng Jin, and TianShi Xu	498
Biological and Medical Image Processing	
Dual Attention Guided R2 U-Net Architecture for Right Ventricle Segmentation in MRI Images	511
Global Characteristic Guided Landmark Detection for Genu Valgus and Varus Diagnosis	523
Data-Dependence Dual Path Network for Choroidal Neovascularization Segmentation in SD-OCT Images	535
A Novel Feature Fusion Network for Myocardial Infarction Screening Based on ECG Images Pengyi Hao, Xin Yin, Fuli Wu, and Fan Zhang	547
Semi-supervised Attention-Guided VNet for Breast Cancer Detection via Multi-task Learning	559
Cross-Domain Transfer Learning for Vessel Segmentation in Computed Tomographic Coronary Angiographic Images	571

3-D Convolutional Neural Network Driven by Dimensionality Reduction for Hyperspectral Blood Cells Classification	729
Deep Learning-Based Regional Sub-models Integration for Parkinson's Disease Diagnosis Using Diffusion Tensor Imaging	742
Individual-Specific Connectome Fingerprint Based Classification of Temporal Lobe Epilepsy	754
Multi-atlas Segmentation Combining Multi-task Local Label Learning and Semi-supervised Label Propagation	762
HPCSeg-Net: Hippocampus Segmentation Network Integrating Autofocus Attention Mechanism and Feature Recombination and Recalibration Module Bin Liu, Qiang Zheng, Kun Zhao, Honglun Li, Chaoqing Ma, Shuanhu Wu, and Xiangrong Tong	77 3
Uncertainty-Based Visual Guidance for Interactive Medical Volume Segmentation Editing	783
Semi-supervised Yolo Network for Induced Pluripotent Stem Cells Detection	797
Corona Virus Disease (COVID-19) Detection in CT Images Using Synergic Deep Learning	809
Eye Movement Event Detection Based onPath Signature	820
Author Index	831