

PROCEEDINGS OF SPIE

**Fourteenth International
Conference on Graphics
and Image Processing
(ICGIP 2022)**

**Liang Xiao
Jianru Xue**
Editors

**21–23 October 2022
Nanjing, China**

Sponsored by
Nanjing University of Science and Technology (China)

Organized by
Nanjing University of Science and Technology (China)
Jiangsu Computer Society (China)
Jiangsu Association of Artificial Intelligence (China)

Published by
SPIE

Volume 12705

Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 12705

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Fourteenth International Conference on Graphics and Image Processing (ICGIP 2022),
edited by Liang Xiao, Jianru Xue, Proc. of SPIE Vol. 12705, 1270501
© 2023 SPIE · 0277-786X · doi: 10.1117/12.2688350

Proc. of SPIE Vol. 12705 1270501-1

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:
Author(s), "Title of Paper," in *Fourteenth International Conference on Graphics and Image Processing (ICGIP 2022)*, edited by Liang Xiao, Jianru Xue, Proc. of SPIE 12705, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510666313
ISBN: 9781510666320 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2023 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

xi	<i>Conference Committee</i>
xv	<i>Introduction</i>

Part One

OBJECT DETECTION

12705 02	Vehicle detection in the infrared thermal images based on a sparse neural network [12705-196]
12705 03	Research on the comparison of FCN and U-Net in remote sensing image change detection [12705-7]
12705 04	Gated bidirectional pyramid context network for infrared maritime target detection [12705-163]
12705 05	An improved YOLOX for remote sensing image object detection [12705-127]
12705 06	Multi-scale feature fusion attention network for infrared small target detection [12705-26]
12705 07	Improved YOLOv5 network for agricultural pest detection [12705-194]
12705 08	An effective unsupervised method for change detection in SAR images [12705-79]

PATTERN RECOGNITION

12705 09	Research on face recognition based on fusion detection and pose estimation [12705-122]
12705 0A	A multi-attention based fMRI feature extraction method for brain states recognition [12705-190]
12705 0C	Joint multi half-orientation features learning for contactless palmprint recognition [12705-153]
12705 0D	Classroom quality analysis based on facial expression recognition [12705-155]
12705 0E	Robot arm gripping pose estimation algorithm based on binocular camera [12705-76]
12705 0F	Lightweight human pose estimation with attention mechanism [12705-185]

- 12705 OG **Prior-guided dense up-down sampling network for face super-resolution and recognition** [12705-48]
- 12705 OH **Max-margin class incremental learning with mixup augmentation** [12705-67]
- 12705 OI **Automatic license plate recognition using transformer** [12705-166]
- 12705 OJ **Person re-identification with IBN layer and channel attention module for indoor scenarios** [12705-182]
- 12705 OK **Width-resolution multiplier lightweight network for person re-identification** [12705-141]
- 12705 OL **Semi-supervised learning for tongue constitution recognition** [12705-29]
- 12705 OM **Unsupervised person re-identification based on intermediate domains** [12705-62]

DEFECT DETECTION

- 12705 ON **Research on PCB solder joint defect detection method based on machine vision** [12705-135]
- 12705 OO **Saliency-based fabric defect detection network with feature pyramid learning and refinement** [12705-27]
- 12705 OP **Effective fabric defect detection using contrastive learning and layered fusion network** [12705-178]
- 12705 OQ **A multi-attention fusion mechanism for collaborative industrial surface defect detection** [12705-162]
- 12705 OR **An aircraft surface damage inspection method based on improved SSD** [12705-77]

IMAGE ANALYSIS AND CALCULATION

- 12705 OS **An ℓ_p -nonconvex regularization method for image smoothing** [12705-184]
- 12705 OT **Research on realistic effect generation algorithm of rendering images based on GAN** [12705-161]
- 12705 OU **Adaptive amplification of image texture boundaries** [12705-63]
- 12705 OV **Combined regional homography-affine warp for image stitching** [12705-15]

- 12705 OW **Joint generative learning and super-resolution for real-world camera-screen degradation** [12705-199]
- 12705 OX **A CABAC pre-coding based and lossless recompression method for JPEG images** [12705-151]
- 12705 OY **Deep non-convex low-rank subspace clustering** [12705-71]
- 12705 10 **GCN-based group level analysis of brain functional connectivity in fMRI** [12705-49]
- 12705 11 **A lightweight convolutional network based on pruning algorithm for YOLO** [12705-138]
- 12705 12 **Preoperative identification of microvascular invasion in hepatocellular carcinoma based on multi-modal and multi response convolutional neural network** [12705-187]
- 12705 13 **A novel image scaling algorithm based on wavelet transform and polyphase filtering** [12705-33]
- 12705 14 **An improved slanted-edge method for measuring modulation transfer function based on edge-preserving filter** [12705-144]

IMAGE CLASSIFICATION

- 12705 15 **Embedding BN layers into AlexNet for remote sensing scene image classification** [12705-81]
- 12705 16 **Capsule attention module-based CapsNet for hyperspectral image classification** [12705-6]
- 12705 17 **A lightweight convolution network with self-knowledge distillation for hyperspectral image classification** [12705-17]
- 12705 18 **A multi-view feature decomposition deep learning method for lung cancer histology classification** [12705-47]
- 12705 19 **Fastformer: transformer-based fast reasoning framework** [12705-142]
- 12705 1A **A network for acute bilirubin encephalopathy classification based upon attention mechanism and 3D convolution kernels** [12705-9]
- 12705 1B **Hyperspectral image classification based on spectral spatial feature extraction and deep rotation forest ensemble with AdaBoost** [12705-44]
- 12705 1C **Generative adversarial networks and spatial uncertainty sample selection strategy for hyperspectral image classification** [12705-173]

- 12705 1D **Hyperspectral image classification aided by LiDAR data** [12705-24]
- 12705 1E **Garbage classification model integrating attention mechanism** [12705-183]
- 12705 1F **Multi-scale attention-based few-shot hyperspectral images classification** [12705-21]
- 12705 1G **Vessel classification algorithm based on the convolutional attention module for natural maritime images** [12705-147]
- 12705 1H **Classification of breast cancer pathological images combining fine-grained region location** [12705-159]
- 12705 1I **Multiscale semantic alignment graph convolution network for single-shot learning based hyperspectral image classification** [12705-197]

IMAGE SEGMENTATION

- 12705 1J **Semantic segmentation of high spatial resolution remote sensing imagery based on weighted attention U-Net** [12705-107]
- 12705 1K **Research on thyroid CT image segmentation based on U-shaped convolutional neural network** [12705-160]
- 12705 1L **A correntropy-based local additive bias-field-corrected image fitting model for image segmentation** [12705-177]
- 12705 1M **Metal surface defects segmentation method using cycle generative adversarial networks on small datasets** [12705-154]
- 12705 1N **A 3D self-adjustable organ aware deep network for abdominal segmentation in CT images** [12705-90]
- 12705 1O **Semantic segmentation and image quality assessment of anterior segment images for smartphones** [12705-51]
- 12705 1P **MFCTrans-net: a multi-scale fusion and channel transformer net for retinal vessel segmentation** [12705-215]
- 12705 1Q **Episode-based training strategy for zero-shot semantic segmentation** [12705-119]
- 12705 1R **Semantic segmentation of road scene based on the mechanism of adversarial attention** [12705-110]

Part Two

- 12705 1S **Adaptive scale based u-shape transformer network for ischemic stroke lesion segmentation in CTP images** [12705-34]
- 12705 1T **Dual-attention deep fusion network for multi-modal medical image segmentation** [12705-38]
- 12705 1U **Research on superpixels segmentation of cloud remote sensing images based on density features** [12705-140]

IMAGE FUSION

- 12705 1V **Medical image fusion based on multi-scale transform and sparse representation** [12705-12]
- 12705 1W **Exploring affective image representation with visual attention and aesthetic fusion** [12705-58]
- 12705 1X **Multiple feature fusion algorithm for human fall detection in intelligent monitor video** [12705-208]
- 12705 1Y **Underwater stereo matching based on multilevel recurrent field transforms with iterative attentional feature fusion** [12705-102]
- 12705 1Z **Image restoration method based on adaptive multiple priors fusion in scattering scenes** [12705-20]
- 12705 20 **Siamese network algorithm based on multi-scale channel attention fusion and multi-scale depth-wise cross correlation** [12705-85]
- 12705 21 **Single image snow removal via multi-scale dual domain decomposition and fusion** [12705-99]
- 12705 22 **Instance-level image synthesis method based on multi-scale style transformation** [12705-61]

IMAGE ENHANCEMENT AND DENOISING

- 12705 23 **Object detection in infrared images using modified YOLOv4 models and an image enhancement module** [12705-94]
- 12705 24 **DRA-Net: densely residual attention based low-light image enhancement** [12705-157]
- 12705 25 **Complementary features-aware attentive multi-adaptor network for hyperspectral object tracking** [12705-169]
- 12705 26 **Low-rank and spectral-spatial variation regularized hyperspectral image denoising algorithm** [12705-8]

- 12705 27 **A non-local image denoising method based on TV-L1 with variable exponents** [12705-36]
- 12705 28 **An improved OCT retinal image denoising algorithm based on variational image decomposition** [12705-105]
- 12705 29 **An adaptive mean denoising algorithm for pepper and salt noised image** [12705-131]
- 12705 2A **Adaptive locality sensitive analysis representation learning via K-SVD algorithm** [12705-121]

IMAGE RECONSTRUCTION AND 3D MODEL

- 12705 2B **Multi-scale transformer 3D plane recovery** [12705-103]
- 12705 2C **Remote sensing image fusion based on MobileViT and spatial detail reconstruction** [12705-175]
- 12705 2D **Fast system matrix iterative computation algorithm for PET image reconstruction** [12705-186]
- 12705 2E **Global accurate multi-view point cloud registration based on manifold clustering and thermal gradient method** [12705-10]
- 12705 2F **A method for extracting flash point cloud feature on the surface of wind turbine blade based on difference of normal vector** [12705-137]
- 12705 2G **End-to-end mesh reconstruction from partial point cloud based on continuous implicit function** [12705-150]
- 12705 2H **SCGRNet: shape completion-guided registration network for face point cloud** [12705-98]
- 12705 2I **MR image reconstruction via non-local attention networks** [12705-108]
- 12705 2J **Active scene reconstruction via self-rotation driven by optimized information theory** [12705-125]
- 12705 2K **A systematic registration method for cross-source point clouds based on cross-view image matching** [12705-195]
- 12705 2L **Improving reference-driven undersampled MRI reconstruction via iterative data correction** [12705-167]
- 12705 2M **A parallel method of NURBS inverse evaluation for 3D CAD model quality testing** [12705-39]

INTELLIGENT IMAGE DETECTION TECHNOLOGY AND ALGORITHM

- 12705 2N **Crowded people detection for occluded classroom surveillance scenes based on relation model** [12705-106]

- 12705 2O **Self-perceptual generative adversarial network for synthetic aperture sonar image generation** [12705-65]
- 12705 2P **A fatigue driving detection algorithm based YOLOv5** [12705-2]
- 12705 2Q **RVSRT: real-time video super resolution transformer** [12705-83]
- 12705 2R **Medical waste detection base on improved YOLOv5-s** [12705-93]
- 12705 2S **Ellipse shape prior based anti-noise network for parathyroid detection** [12705-189]
- 12705 2T **Frequency domain deepfake detection based on two-stream neural network** [12705-111]
- 12705 2U **Real-time clothing detection networks for surveillance videos** [12705-158]

OPTICS AND OPTICAL IMAGING TECHNOLOGY

- 12705 2V **DTEA: optical flow estimation with deep Taylor expansion approximation network** [12705-54]
- 12705 2W **Miss distance estimation using shadow and single view** [12705-53]
- 12705 2X **Multi-task learning using optical flow for motion magnification** [12705-148]
- 12705 2Y **Fast line segment matching based on point-line affine invariants and pairwise constraints** [12705-92]
- 12705 2Z **Study of spectral reflectance recovery based on color constancy** [12705-19]
- 12705 30 **A comparative study on continuum removal for Chang'E-4 VNIS hyperspectral data and its impact on elements retrieval** [12705-30]
- 12705 31 **Eliminating illumination influence via Gaussian-based local sensitive histogram** [12705-88]

COMPUTER AIDED DESIGN AND COMPUTER PHOTOGRAPHY

- 12705 32 **A construction method of biofeedback training system based on virtual reality technology** [12705-68]
- 12705 33 **Research on the influence of using augmented reality technology in industrial display design** [12705-129]
- 12705 34 **Application of augmented reality technology in train maintenance training system** [12705-18]

- 12705 35 **Analysis of measuring accuracy for planar and non-planar scenes in photogrammetry**
[12705-45]
- 12705 36 **VP-GAT: vector prior graph attention network for automated segment labeling of coronary arteries** [12705-139]
- 12705 37 **CSF-Net: color space fusion network for color constancy** [12705-172]
- 12705 38 **A novel vision-based scheme to levelness estimation of DLP projector** [12705-89]
- 12705 39 **V-channel adaptive defogging with low illumination images based on optimized retinex model**
[12705-143]
- 12705 3A **Design and implementation of virtual intelligent doctor consultation system based on Unity3D**
[12705-188]
- 12705 3B **An improved single constant Kubelka-Munk method for pigment unmixing of Chinese paintings**
[12705-95]

COMPUTER MODEL AND NUMERICAL CALCULATION

- 12705 3D **RLC-Servo: a full-automatic hand-eye cooperative servo model based on reinforcement learning** [12705-192]
- 12705 3E **Prominence convergence in the strategy coordination of crowdsourcing workers** [12705-165]
- 12705 3F **Multiscale fusion and convolution spatial propagation networks for deep complementation of outdoor scenes** [12705-59]
- 12705 3G **Application of XGBoost and TrajGRU to improve the accuracy of ECMWF wind forecasts**
[12705-124]
- 12705 3H **A portrait image recommendation method based on collaborative filtering** [12705-113]
- 12705 3I **Research on personalized recommendation from the perspective of staff-position matching**
[12705-164]
- 12705 3J **An improved GhostNet for unsafe driving behavior algorithm** [12705-66]
- 12705 3K **Effects of hyper-parameters setting in Bi-LSTM-CRF on Chinese named entity recognition**
[12705-109]

Conference Committee

Advisory Committees

Xuelong Li, Chinese Academy of Sciences (China)
Ruigang Yang, University of Kentucky (United States)

General Conference Chair

Liang Xiao, Nanjing University of Science and Technology (China)

Conference Co-chair

Jianru Xue, Xi'an Jiaotong University (China)

Program Chairs

Guan Gui, Nanjing University of Posts and Telecommunications
(China)
Shengke Wang, Ocean University of China (China)
Zhenghao Shi, Xi'an University of Technology (China)
Vit Vozenilek, Palacky University (Czech Republic)
Dan Xu, Yunnan University (China)

Special Session Co-chairs

Yong Liu, Zhejiang University (China)
Guoqiang Zhong, Ocean University of China (China)
Youquan Liu, Chang'an University (China)

Publication Chairs

Huijun Ren, Shandong University (China)
Gaoqi He, East China Normal University (China)

Publicity Committees

Meili Wang, Northwest A&F University (China)
Muwei Jian, Shandong University of Finance and Economics (China)
Kai Liu, Sichuan University (China)
Tuan D. Pham, Linkoping University (Sweden)
Kanghyun Jo, University of Ulsan (Korea)
Lin Qi, Ocean University of China (China)
Yong Zhao, Ocean University of China (China)

Steering Committees

Zhigeng Pan, Nanjing University of Information Science & Technology (China)
Xinhong Hei, Xi'an University of Technology (China)
David Zhang, Hong Kong Polytechnic University (China)
Hui Yu, University of Portsmouth (United Kingdom)
Yifei Pu, Sichuan University (China)
Junyu Dong, Ocean University of China (China)
Wenhua Qian, Yunnan University (China)
Haiyan Jin, Xi'an University of Technology (China)

Session Chairs

- 1 Pattern Recognition
Xiwen Zhang, Beijing Language and Culture University (China)
- 2 Image Segmentation
Lili Nurliyana Abdullah, Universiti Putra Malaysia (Malaysia)
- 3 Target Detection and Defect Detection
Peishun Liu, Ocean University of China (China)
Chu Miao, Xi'an Technology University (China)
- 4 Image Analysis and Calculation
Juan Zhang, Shaanxi Normal University (China)
Yuan Ding, Beihang University (China)
- 5 Image Classification
Yao Lu, Sun Yat-sen University (China)
- 6 Image Enhancement and Denoising
Ali El-Zaart, Beirut Arab University (Lebanon)
- 7 Image Reconstruction and 3D model
Lifang Wu, Beijing University of Technology (China)
- 8 Intelligent Detection Technology and Algorithm
Hua Zheng, Fujian Normal University (China)
Kraisorn Chaisaowong, King Mongkut's University of Technology North Bangkok (Thailand)
- 9 Optical imaging System and Computer Photography
Jessie R. Balbin, Mapua Institute of Technology (Philippines)

- 10 Computer Aided Design and Image Processing
Malik Zawwar Hussain, University of the Punjab (Pakistan)
- 11 Computer Model and Image Application
Jihua Ye, Jiangxi Normal University (China)
- 12 Image Analysis and Method
Yanlang Hu, Xi'an Institute of Space Radio Technology (China)
- 13 Image Detection and Recognition
Qian Zhang, Taishan University (China)
- 14 Image Fusion
Hongjian Shi, BNU-HKBU United International College (China)

Introduction

The 14th International Conference on Graphics and Image Processing (ICGIP 2022) was held October 21-23, 2022, virtually. This is the 14th year of ICGIP 2022 conference. ICPIC is sponsored by Nanjing University of Science and Technology, (China) organized by the School of Computer Science and Engineering, Nanjing University of Science and Technology, (China) Jiangsu Computer Society and Jiangsu Association of Artificial Intelligence (China).

ICGIP was the main annual Graphics and Image Processing conference aimed at presenting current research. ICGIP 2022 conference aims at serving as a forum for researchers and scientists from areas of visual computing, image processing and analysis, computer graphics and artificial intelligence, etc., to present, discuss, and exchange ideas on enabling technologies, system designs, applications, and practice experiences. Benefiting from this forum, the attendees communicate with each other and reach a better understanding of different approaches as well as their similarities.

ICGIP is an annual conference focusing on graphics and image processing. It provides opportunities for the delegates to exchange new ideas and application experiences, establish business or research relations and find global partners for future collaboration.

This year, we are had three keynote speakers, Professor Xu-Cheng Yin, University of Science and Technology Beijing, (China) Professor Xiaochun Cao, University of Chinese Academy of Sciences, (China) Professor Yiu-Ming Cheung, Hong Kong Baptist University (China).

We also had five invited speakers, they are Professor Xiaorong Xue, Liaoning University of Technology, (China), Associate Professor Jungang Yang, National University of Defense Technology, (China), Professor Yanlang Hu, Xi'an Institute of Space Radio Technology, (China), Associate Professor Zhen Ye, Chang'an University, (China), and Lecturer Kun Jiang, Xi'an University of Technology, (China).

All the papers submitted were subjected to peer-review by conference committee members and international reviewers. We feel deeply grateful to all that have contributed to make this event possible, authors who contributed papers, the conference steering committee, the conference speakers, and the peer reviewers. Thanks are also extended to the conference administrative committee and the supporters for their tireless efforts throughout the course of the conference.

Once again, on behalf of the conference committee, we wish you all the best. And hope you will find the ICGIP 2022 experience a memorable one.

Liang Xiao
Jianru Xue