

PROCEEDINGS OF SPIE

Eleventh International Conference on Digital Image Processing (ICDIP 2019)

**Jenq-Neng Hwang
Xudong Jiang**
Editors

**10–13 May, 2019
Guangzhou, China**

Cosponsored by
East China Normal University (China)
International Association of Computer Science and Information Technology (Singapore)

Hosted by
Sun Yat-Sen University (China)

Published by
SPIE

Volume 11179

Part Two of Two Parts

Proceedings of SPIE 0277-786X, V. 11179

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

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 SPIEDigitalLibrary.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 *Eleventh International Conference on Digital Image Processing (ICDIP 2019)*, edited by Jenq-Neng Hwang, Xudong Jiang, Proceedings of SPIE Vol. 11179 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510630758

ISBN: 9781510630765 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) Fax +1 360 647 1445

SPIE.org

Copyright © 2019, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$21.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 0277-786X/19/\$21.00.

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**

SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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

xiii	<i>Authors</i>
xix	<i>Conference Committee</i>
xxvii	<i>Introduction</i>

Part One

IMAGE PROCESSING

11179 02	Research on improving the authenticity of simulated infrared image using adversarial networks [11179-4]
11179 03	Classification of blood cancer images using a convolutional neural networks ensemble [11179-6]
11179 04	Algorithm of image de-noising for Gaussian-Gaussian mixed noise model based on stochastic resonance [11179-21]
11179 05	Image steganography algorithm based on key matrix generated by quantum walks [11179-25]
11179 06	Relative attitude estimation for small satellite based on stellar image matching [11179-31]
11179 07	Semi-supervised semantic image segmentation using dual discriminator adversarial networks [11179-54]
11179 08	Remote sensing image fusion algorithm based on a trous wavelet transform and HIS transform [11179-55]
11179 09	Content-based power allocation for perception-friendly SoftCast [11179-87]
11179 0A	Computer image analysis in evaluating the quality of dried meat, case study: poultry meat [11179-91]
11179 0B	Sparse 3D point clouds segmentation considering 2D image feature extraction with deep learning [11179-92]
11179 0C	Health properties and evaluation of quality of dried strawberry fruit produced using the convective drying method with neural image analysis [11179-95]
11179 0D	Anchored neighborhoods search based on global dictionary atoms for face photo-sketch synthesis [11179-103]

11179 OE	Velodyne LiDAR and monocular camera data fusion for depth map and 3D reconstruction [11179-106]
11179 OF	Analysis of the effects of scrambling and diffusion of logistic chaotic map on image encryption [11179-125]
11179 OG	Performance analysis of anti-noise interference of hemorrhagic cerebral stroke image reconstruction in chirp-pulse microwave CT (CP-MCT) [11179-127]
11179 OH	An accurate and efficient MR image reconstruction model [11179-162]
11179 OI	Image-to-image translation using a relativistic generative adversarial network [11179-163]
11179 OJ	BMIMatic: body mass index derivation from captured images [11179-169]
11179 OK	Sparse representation based medical ultrasound images denoising with reshaped-RED [11179-172]
11179 OL	Improving resolution images detail features for Generate Network [11179-179]
11179 OM	Research on blurred image restoration based on generative adversarial networks [11179-185]
11179 ON	Generating large scale images using GANs [11179-195]
11179 OO	A two-stage airport detection model on large scale SAR images based on faster R-CNN [11179-200]
11179 OP	An improved segmentation method for porous transducer CT images [11179-5]
11179 OQ	A depth image reconstruction algorithm based on background noise censoring [11179-50]
11179 OR	Fast segmentation of tea flowers based on color and region growth [11179-65]
11179 OS	Image fusion methods based on compressed sensing: theory and application [11179-66]
11179 OT	Single image super resolution based on generative adversarial networks [11179-69]
11179 OU	Blind quality assessment of on-board reconnaissance images [11179-70]
11179 OV	Accurate CT-ultrasound image registration using simulated transformation optimization [11179-77]
11179 OW	Image watermarking algorithm based on quaternion and chaotic Lorenz system [11179-81]
11179 OX	Image denoising and enhancement of terahertz passive imaging [11179-112]
11179 OY	End-to-end image dehazing via dual principles of discriminativeness [11179-120]

11179 0Z	Accurate single image super-resolution using cascading dense connections [11179-139]
11179 10	Image denoising method and evaluation based on mixed wavelet algorithm [11179-141]
11179 11	A method for single image phase unwrapping based on generative adversarial networks [11179-157]
11179 12	Analysis of the effects of scrambling and diffusion of logistic chaotic map on image encryption [11179-168]
11179 13	Image denoising based on non-subsampled shearlet transform use, non-local means, and hard threshold [11179-171]
11179 14	An inquiry on image enhancement methods of remote sensing images [11179-176]
11179 15	Single image super-resolution reconstruction based on multi-directionality of the edge [11179-180]
11179 16	Medical image grading learning based on active and incremental fine-tuning [11179-193]
11179 17	An image caption model incorporating high-level semantic features [11179-196]
11179 18	An integration de-noising method based on self-adaptive manifold filtering and text contour for ancient Chinese calligraphy tablet image [11179-204]
11179 19	The application of UAV remote sensing in natural disasters emergency monitoring and assessment [11179-90]
11179 1A	Fast image stitching of unmanned aerial vehicle remote sensing image based on SURF algorithm [11179-209]

PATTERN RECOGNITION

11179 1B	Aerial infrared target recognition based on lightweight convolutional neural network [11179-11]
11179 1C	Research on face detection method based on improved MTCNN network [11179-16]
11179 1D	Novel algorithm for finger vein recognition based on inception-resnet module [11179-20]
11179 1E	Neural classification of microscope digital pictures domestic pig oocytes [11179-75]
11179 1F	High-speed barcode recognition system based on OpenCV and Zbar [11179-84]
11179 1G	Vehicle color recognition based on superpixel features [11179-102]

11179 1H	Design of image recognition system based on OpenCL acceleration [11179-110]
11179 1I	Multi- perspective gesture recognition based on convolutional neural network [11179-117]
11179 1J	Study on segmentation and recognition algorithm of crystal in urinary sediment image [11179-202]
11179 1K	An ethnic costumes classification model with optimized learning rate [11179-7]
11179 1L	Skeleton based action recognition using pose change map and convolutional neural networks [11179-28]
11179 1M	Palmpoint recognition based on local joint edge and orientation patterns [11179-36]
11179 1N	Evaluating the potential of GF-1 pan-multispectral camera imagery for identifying the quasi-circular vegetation patches in the Yellow River Delta, China [11179-41]
11179 1O	Automatic recognition and correction of solar cells [11179-43]
11179 1P	A parallel segmentation after classification algorithm of multi-spectral image of k-means of deep learning and panchromatic based on wavelet [11179-47]
11179 1Q	Face recognition method based on SVM and SRC [11179-57]
11179 1R	Pattern recognition method for mobile intelligent programming learning [11179-88]
11179 1S	Deep learning concepts and datasets for image recognition: overview 2019 [11179-100]
11179 1T	Sequence recognition of natural scene house number based on convolutional neural network [11179-107]
11179 1U	Joint end-to-end learning for scale-adaptive person super-resolution and re-identification [11179-122]
11179 1V	A novel mice interaction recognition method by using machine learning [11179-165]
11179 1W	Real-time action recognition based on enhanced motion vector temporal segment network [11179-173]
11179 1X	Micronucleus image recognition based on feature-map spatial transformation [11179-192]
11179 1Y	Person re-identification algorithm based on the fusion of deep feature and LOMO feature [11179-199]

CLASSIFICATION AND DETECTION

- 11179 1Z **Examination paper text detection based on character discriminator** [11179-17]
- 11179 20 **Airborne LiDAR point cloud classification based on transfer learning** [11179-22]
- 11179 21 **Feature matching via guided motion field consensus** [11179-26]
- 11179 22 **Initial investigation of different classifiers for plant leaf classification using multiple features**
[11179-44]
- 11179 23 **Internal and external similarity aggregation stereo match algorithm** [11179-62]
- 11179 24 **Mapping and visualization of complex relational structures in the graph form using the Neo4j
graph database** [11179-76]
- 11179 25 **Automated detection of arousal event with fuzzy entropy using physiological signals**
[11179-116]
- 11179 26 **Dynamic vehicle target detection and traffic statistics algorithm research** [11179-136]
- 11179 27 **An improved self-supervised framework for feature point detection** [11179-153]
- 11179 28 **The small target detection based on local directional contrast associated with directional
entropy** [11179-161]

Part Two

- 11179 29 **Single shot relation detector for pedestrian detection** [11179-181]
- 11179 2A **Deinterlacing based on scene change and content characteristics detection** [11179-187]
- 11179 2B **Intraframe interpolation based on edge detection** [11179-188]
- 11179 2C **A new trademark detection method via trademark confidence score of MSERs** [11179-59]
- 11179 2D **Sequence image matching using adaptive SIFT under complex environmental conditions**
[11179-63]
- 11179 2E **Double JPEG compression detection based on noise-free DCT coefficients histograms**
[11179-123]
- 11179 2F **Unsupervised facial image occlusion detection with deep autoencoder** [11179-146]
- 11179 2G **Adaptive edge detection via gray value differences of points** [11179-210]

COMPUTER VISION

11179 2H	An active region corrected method for weakly supervised aircraft detection in remote sensing images [11179-51]
11179 2I	From simulation to reality: ground vehicle detection in aerial imagery based on deep learning [11179-83]
11179 2J	Accurate features point extraction for omnidirectional camera calibration [11179-108]
11179 2K	Research on improved image registration algorithm based on PROSAC algorithm [11179-111]
11179 2L	Multi-target tracking of surveillance video with differential YOLO and DeepSort [11179-174]
11179 2M	An objective assessment method for video stabilization performance [11179-189]
11179 2N	Accurate scale estimation for correlation filter based visual tracking [11179-24]
11179 2O	HEVC fast fractional-pixel prediction with parallel search [11179-35]
11179 2P	A tasseled cap transformation for CBERS-04 fusion multispectral images [11179-39]
11179 2Q	Feasible region division of panoramic images based on morphological filter [11179-46]
11179 2R	Stabilization of atmospheric turbulence-distorted video using complex steerable pyramid [11179-49]
11179 2S	A new method of visualizing the road traffic: differential timing method [11179-73]
11179 2T	Video frames encryption based on DNA sequences and chaos [11179-129]
11179 2U	Remote sensing image texture enhancement based on HSV-BEMD algorithm [11179-142]
11179 2V	Visual object tracking based on adaptive multi-feature fusion in complex scenarios [11179-143]
11179 2W	High-quality hybrid imaging with a cubic phase mask [11179-149]
11179 2X	Rendering circular depth of field effect with integral image [11179-158]
11179 2Y	Fast inter-frame coding algorithm for 360-degree videos [11179-184]
11179 2Z	Digital video stabilization based on block motion estimation and iterative optimization of GMP [11179-190]

MACHINE LEARNING APPLICATION

- 11179 30 **Learning saliently temporal-spatial features for x-ray coronary angiography sequence segmentation** [11179-2]
- 11179 31 **Oil slick extraction from hyperspectral images using a modified stacked auto-encoder network** [11179-52]
- 11179 32 **Research on vehicle license plate data generation in complex environment based on generative adversarial network** [11179-105]
- 11179 33 **Hyperspectral unmixing using double reweighted collaborative sparse regression** [11179-140]
- 11179 34 **Convolutional-neural-network-based feature extraction for liver segmentation from CT images** [11179-159]
- 11179 35 **A novel fusion strategy for probabilistic sparse representation classifier guided by support vector machines** [11179-34]
- 11179 36 **Deep transfer learning for MR image feature point descriptors** [11179-53]
- 11179 37 **An enhanced non local mean method for hole filling in the depth image-based rendering system** [11179-82]
- 11179 38 **Fashion popularity analysis based on online social network via deep learning** [11179-89]
- 11179 39 **Identification of co-substrate composted with sewage sludge using convolutional neural networks** [11179-99]
- 11179 3A **The cache construction and intelligent imagination of airfare shopping engine** [11179-121]

DATA MINING

- 11179 3B **Video question answering by frame attention** [11179-14]
- 11179 3C **Scatter kernel parameters optimization for digital radiography** [11179-29]
- 11179 3D **A new approach to robust fundamental matrix estimation using an analytic objective function and adjusted gradient projection** [11179-38]
- 11179 3E **On the target area tracking method for heart rate measurement using deep learning strategy** [11179-78]
- 11179 3F **The method and a stand for measuring aerodynamic forces in every plane on the basis of an image analysis** [11179-118]
- 11179 3G **Efficient level set formulation for segmentation and correction with application to medical images** [11179-138]

11179 3H	Adaptive fractional-order differentiation filter guided by feature asymmetry for feature-preserving ultrasound despeckling [11179-144]
11179 3I	The system of motion capture based on inertial sensor [11179-154]
11179 3J	The comparative analysis of Chinese GDP spatialization methods based on multi-sensor remote sensing data [11179-23]
11179 3K	A robust anti-occlusion object tracking method [11179-33]
11179 3L	An improved blind watermarking method based on SWT and LU decomposition [11179-79]
11179 3M	Real-time oxygen saturation measurement based on reflective region removal technology [11179-98]
11179 3N	An adversarial approach to non-uniform blind deblurring with opposite-channel-based discriminative priors [11179-101]
11179 3O	The validation of the method of speed test of seeds moving in a tube of a pneumatic seed drill [11179-119]
11179 3P	Singular value decomposition compressed ghost imaging based on non-negative constraints [11179-170]
11179 3Q	3D face landmarking with denoise auto-encoder networks [11179-198]

DATA ANALYSIS

11179 3R	Uncovering vein pattern using generative adversarial network [11179-3]
11179 3S	A stereo matching network with a cascade spatial pyramid pooling (CSPP) substructure [11179-12]
11179 3T	Adversarial training and dilated convolutions for compressed sensing MRI [11179-19]
11179 3U	High-resolution imaging of space target based on compressed sensing [11179-37]
11179 3V	Automatic detection of solar radio burst using k-means clustering [11179-56]
11179 3W	Advantages and disadvantages of typical visual saliency methods applied to ship detection on sea surface [11179-58]
11179 3X	A survey of data hiding schemes based on AMBTC [11179-74]
11179 3Y	1-bit compressed sensing based on reweighting approximate message passing [11179-80]

11179 3Z	A high-speed multi-scale kernel correlation filter tracking algorithm [11179-86]
11179 40	Application of neural modelling methods in the evaluation of the quality of pork half-carcasses [11179-93]
11179 41	Neural image analysis in determining the content of dry matter in corn cob [11179-94]
11179 42	The selection of a representative substance for image analysis assessment [11179-97]
11179 43	Pose estimation of a single circle based on 1D homography [11179-109]
11179 44	A viterbi algorithm-based IF estimator for overlapped multicomponent signal [11179-131]
11179 45	YOLOv3-based face detector with focal loss [11179-132]
11179 46	Research on nonlinear correction system of current transformer [11179-134]
11179 47	Image feature point extraction based on neural network is implemented on FPGA [11179-148]
11179 48	Mono-camera based calibration method for two-axes LRF measurement system [11179-166]
11179 49	Mixed 3D-(2+1)D convolution for action recognition [11179-177]
11179 4A	Recent development of automotive LiDAR technology, industry and trends [11179-178]
11179 4B	A novel proximity algorithm for an unconstrained convex segmentation model [11179-183]
11179 4C	An automatic detection method of solar radio burst based on Otsu binarization [11179-30]
11179 4D	A framework for the revision of large-scale image retrieval benchmarks [11179-32]
11179 4E	Shape correspondence based effective combination of linear and quadratic assignment matrices [11179-42]
11179 4F	Contrast enhancement for the detection of stroke signs in CT using PCA based image fusion [11179-48]
11179 4G	Registration between UAV LiDAR datasets for under-forest areas [11179-67]
11179 4H	A model based method for stereo face reconstruction [11179-71]
11179 4I	Design and implementation of automatic aiming system based on YOLO [11179-72]
11179 4J	An efficient FCN based neural network for image semantic segmentation [11179-147]

- 11179 4K **Vertebrae segmentation via stacked sparse autoencoder from computed tomography images**
[11179-160]
- 11179 4L **3D rigid pose tracking based on new distance function of line segments** [11179-167]
- 11179 4M **Research on single channel Doppler direction finding system** [11179-182]
- 11179 4N **Survey on block-based motion estimation for frame rate conversion** [11179-186]
- 11179 4O **Multi-channel compressed sensing optimization based on singular value decomposition**
[11179-191]
- 11179 4P **Single image super-resolution based on gradient profile prior and nonlocal self-similarity
feature** [11179-211]