

PROCEEDINGS OF SPIE

International Workshop on Advanced Image Technology (IWAIT) 2019

**Qian Kemao
Kazuya Hayase
Phooi Yee Lau
Wen-Nung Lie
Yung-Lyul Lee
Sanun Srisuk
Lu Yu**
Editors

**6–9 January 2019
Singapore**

Organized by
Multi-plAtform Game Innovation Centre (MAGIC), Nanyang Technological University (Singapore)

Sponsored by
EON Reality
School of Art, Design and Media, Nanyang Technological University (Singapore)

Technical Co-sponsor and Publisher
SPIE

Volume 11049
Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 11049

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 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 *International Workshop on Advanced Image Technology (IWAIT) 2019*, edited by Qian Kemao, Kazuya Hayase, Phooi Yee Lau, Wen-Nung Lie, Yung-Lyul Lee, Sanun Srisuk, Lu Yu, Proceedings of SPIE Vol. 11049 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510627734

ISBN: 9781510627741 (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 \$18.00 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/\$18.00.

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

SPIDigitalLibrary.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 *Authors*
xvii *Conference Committee*

Part One

SPECIAL SESSION I

- 11049 02 **Fish monitoring in complex environment** [11049-33]
- 11049 03 **Fast median filter with various kernel sizes** [11049-7]
- 11049 04 **Structure-tensor-based anisotropic rolling filter for image smoothing** [11049-6]
- 11049 05 **Classification of tourism categories based on heterogeneous features considering existence of reliable results** [11049-21]
- 11049 06 **Character recognition of modern Japanese official documents using CNN for imbalanced learning data** [11049-46]
- 11049 07 **Year of wine aromas classification by using principal component analysis as feature reduction** [11049-174]
- 11049 08 **Multi-kernel-based deep residual networks for image super-resolution** [11049-29]
- 11049 09 **3D scene reconstruction and object recognition for indoor scene** [11049-84]

SPECIAL SESSION II

- 11049 0A **A support system for archiving antique stereographs using a camera** [11049-50]
- 11049 0B **Efficient scheduling for dynamic streaming of 3D scene for mobile devices** [11049-53]
- 11049 0C **Range image registration based on the consistency of rigid transformation** [11049-126]
- 11049 0D **Geometrical correction for surrounded projection by simplifying a shape of a measured indoor space** [11049-101]
- 11049 0E **Swimmer position estimation by lane rectification** [11049-31]

- 11049 OF **Examining performance of sketch-to-image translation models with multiclass automatically generated paired training data** [11049-47]
- 11049 OG **Real-time air-writing recognition in motion stream** [11049-128]
- 11049 OH **Multiple linked-view exploration on large displays facilitated by a secondary handheld device** [11049-150]

CG/VR/AR I

- 11049 OI **Noise reduction for 8K endoscope images** [11049-20]
- 11049 OJ **Compact algorithm for noise level detection** [11049-161]
- 11049 OK **Consideration about preventing illegal film copy with re-shooting screen** [11049-106]
- 11049 OL **Development of a VR flood situation experience system** [11049-70]
- 11049 OM **Augmented reality based on the integration of mobile edge computing and fiber-wireless access networks** [11049-30]
- 11049 ON **Converging mobile edge computing and wireless access for virtual reality** [11049-67]

COMPUTER VISION I

- 11049 OO **A system to support kinematic analysis by visualizing human motion with CG** [11049-129]
- 11049 OP **Multi-posture human extraction using coarse-to-fine method and human skeleton method** [11049-89]
- 11049 OQ **Gaze-based visual feature extraction via DLPCA for visual sentiment estimation** [11049-4]
- 11049 OR **Improvement of authenticity inspection accuracy using logo region detection** [11049-73]
- 11049 OS **Horizontal line detection using genetic algorithm** [11049-124]
- 11049 OT **Development of a puzzle-box game with haptic feedback** [11049-91]
- 11049 OU **Defective products detection using adversarial AutoEncoder** [11049-56]
- 11049 OV **A consideration of writer identification using disentangled features that independent of character classes** [11049-57]

IMAGE/VIDEO PROCESSING I

- 11049 0W **Study on restoration method of deterioration in photographed images of cultural properties** [11049-39]
- 11049 0X **Sign language words annotation assistance using binary action segmentation based on SVM and graphcuts** [11049-23]
- 11049 0Y **Field position estimation in soccer videos using convolutional neural network-based image features** [11049-114]
- 11049 0Z **Fast image dehazing based on multi-scale guided filtering** [11049-82]
- 11049 10 **Image optimization method of large autostereoscopic display of dual projection types** [11049-107]
- 11049 11 **A development of content-based video summarization system using machine-learning and its application to analysis of livestock behavior** [11049-171]
- 11049 12 **Shoot motion analysis in basketball formation practice** [11049-159]
- 11049 13 **A study on moving image noise removal using 3D and time-domain total variation regularization method** [11049-51]

CG/VR/AR II

- 11049 14 **A study of historical sites display AR application using location-based AR** [11049-41]
- 11049 15 **Avatar's facial expressions with Manpu (comic symbols) by referring biometric information** [11049-143]
- 11049 16 **A real-time rendering method based on contour drawing techniques in Japanese ink painting** [11049-40]
- 11049 17 **Efficient reconstruction of light fields for consistently augmented reality using dense multi-view systems** [11049-105]
- 11049 18 **An AR-based self-training system of chest compression as CPR** [11049-117]
- 11049 19 **An arm motion learning support system using virtual reality** [11049-75]
- 11049 1A **A study of recognizing flake surfaces based on feature lines of stone tool** [11049-55]
- 11049 1B **Development of VR museum and a comparison with the screen-based virtual museum** [11049-45]

COMPUTER VISION II

- 11049 1C **Finding a rush-out human employing a human body direction detector** [11049-127]
- 11049 1D **Predicting visual saliency via a dilated inception module-based model** [11049-90]
- 11049 1E **Vision-based hand gesture recognition from RGB video data using SVM** [11049-145]
- 11049 1F **Hybrid algorithm of maximum-likelihood expectation-maximization and multiplicative algebraic reconstruction technique for iterative tomographic image reconstruction** [11049-27]
- 11049 1G **Visualize medical information using VISTouch technology** [11049-60]
- 11049 1H **Partial rigid diffeomorphism for measuring temporal change of pancreatic cancer tumor** [11049-66]

IMAGE/VIDEO PROCESSING II

- 11049 1I **Parallel curvature filter for high performance image processing** [11049-14]
- 11049 1J **An adaptive cost aggregation method based on bilateral filter and canny edge detector with segmented area for stereo matching** [11049-65]
- 11049 1K **Classification of speaking activity based on lip features in a sequence of video frames** [11049-116]
- 11049 1L **Correcting geometric distortion and reflection components in an image of a folded print** [11049-119]
- 11049 1M **Manga character clustering with DBSCAN using fine-tuned CNN model** [11049-24]
- 11049 1N **Classification of student activities based on a sequence of images from a single camera** [11049-154]
- 11049 1O **Distortion-resistant spherical visual odometry for UAV-based bridge inspection** [11049-11]
- 11049 1P **Interactive geo-temporal data visualization for aircraft engine** [11049-9]

CG/VR/AR III

- 11049 1Q **A fast method of iron rust by corrosion based on high resolution voxel models** [11049-111]
- 11049 1R **A user interface for walking on VR space by swinging arms and its evaluation** [11049-155]

- 11049 1S **A simulation model of changing state of blood based on SPH method** [11049-113]
- 11049 1T **An examination of flake surface segmentation based on ridge line extraction method from measured point clouds** [11049-85]
- 11049 1U **Surf Disc: a cruising interface in 3D virtual space** [11049-142]
- 11049 1V **Luminance compensation on swinging curtains** [11049-95]
- 11049 1W **Designer-friendly curve refinement** [11049-131]

MEDICAL IMAGING AND PROCESSING

- 11049 1X **Kymograph of continuous MRI images for analyzing speech articulations** [11049-93]
- 11049 1Y **High precision performance evaluation for digital radiography detectors** [11049-3]
- 11049 1Z **Accuracy and precision in estimating noise power spectrum in radiography imaging** [11049-139]
- 11049 20 **Rapid on-site ICH volume measurement and stroke patient prognosis system** [11049-168]

Part Two

MULTIMEDIA

- 11049 21 **TV production tool to make art programmes based on a simple scenario** [11049-44]
- 11049 22 **Playing digital music by waving hands in the air** [11049-58]
- 11049 23 **Digital scratch art painting interface** [11049-83]
- 11049 24 **Two-stage neural network for intra prediction mode decision** [11049-86]
- 11049 25 **Joint super-resolution and bit depth extension by DNN** [11049-147]

CG/VR/AR AND OTHERS

- 11049 26 **Speech motion feedback system using semi-transparent screen** [11049-162]
- 11049 27 **Automatic system for life-stage detection of drosophila with single animal resolution toward high-throughput screening** [11049-35]

- 11049 28 **Development of head direction measuring system using ultrasound for environmental education** [11049-169]
- 11049 29 **A performance improvement of Mask R-CNN using region proposal expansion** [11049-63]
- 11049 2A **SSD Net: toward deep network models based on dissimilarity metrics** [11049-178]

POSTER SESSION I

- 11049 2B **Research on Troxler effect focusing on gazing time for edge blurred stripe image** [11049-16]
- 11049 2C **Study on evaluation method for 3D perspective image** [11049-38]
- 11049 2D **A hybrid filter using noise detector for removing impulse noise of gray image** [11049-77]
- 11049 2E **Automatic generation of 3D faces expressing different utterances by modeling individual variation of shape deformation from expressionless faces** [11049-144]
- 11049 2F **Conflict robust player tracking method for wall-mounted multi-camera systems** [11049-15]
- 11049 2G **Leader-follower formation control of multiple unmanned aerial vehicles for omnidirectional patrolling** [11049-121]
- 11049 2H **Iterative update method of 3D map based on self-localization using multi-layer NDT in dynamic environment** [11049-122]
- 11049 2I **Three-dimensional temperature distribution estimation around a heat source in water using asymmetric inverse Abel transformation** [11049-173]
- 11049 2J **A weight calculation method for multiscale normalized cut image segmentation** [11049-172]
- 11049 2K **A retinex-based image enhancement scheme with noise aware shadow-up function** [11049-120]
- 11049 2L **Dense learning by high dimensional SOMs composed of input-output fusion vectors for interactive image segmentation** [11049-13]
- 11049 2M **Post-processing for disparity map enhancement using modified guided image filter** [11049-32]
- 11049 2N **Analyzing growth potential of young researchers' h-Index and co-author networks in biological science fields** [11049-36]
- 11049 2O **Automated detection of fundic gland polyps from endoscopic images using SSD** [11049-74]
- 11049 2P **The fault tolerant system for real-time video processing by software** [11049-72]

- 11049 2Q **Separating information for space-time hybrid code** [11049-79]
- 11049 2R **Droplet simulation for cerebral aneurysm embolization** [11049-71]
- 11049 2S **Proposal of a welding skill training system using VR technology** [11049-146]
- 11049 2T **3D visualization of work using AR technology for welding skill training** [11049-148]
- 11049 2U **A study on garment wrinkle detection through a 3D camera scanning with normal map and Hough transform** [11049-68]
- 11049 2V **FOE-based regularization for optical flow estimation from an in-vehicle event camera** [11049-94]
- 11049 2W **Proposal of an interactive projection mapping using seats of multiple chairs** [11049-158]
- 11049 2X **Furniture layout design aided system using subjective reward** [11049-97]
- 11049 2Y **A development of stage event management system using virtual reality technique** [11049-170]
- 11049 2Z **Projecting technique of holographic 3D images with the use of fog screen** [11049-25]
- 11049 30 **Multi-view image coding using disparity-compensated and weighted binary patterns** [11049-59]
- 11049 31 **Discrimination of drawing collapse for animated characters by SVM** [11049-96]
- 11049 32 **A machine-learning-based post filtering method utilizing block boundary information in HEVC** [11049-99]
- 11049 33 **Simulation of image enhancement by stochastic resonance in the human vision system** [11049-103]
- 11049 34 **Accuracy improvement of depth estimation with tilted optics by optimizing neural network** [11049-22]
- 11049 35 **A JPEG decompression technique based on compressed sensing** [11049-98]
- 11049 36 **Block adaptive CNN/HEVC interframe prediction for video coding** [11049-12]
- 11049 37 **Physics-based 3D ink diffusion simulation in real time** [11049-19]
- 11049 38 **Hierarchical motion estimation algorithm using multiple candidates for frame rate up-conversion** [11049-42]
- 11049 39 **A study on improvement of lateral resolution in synthetic aperture super-resolution ultrasound imaging** [11049-138]

- 11049 3A **Estimation of objective understanding measure based on student's nonverbal behavior recognition in a person-to-person teaching situation** [11049-137]
- 11049 3B **Integrated analysis of position of gaze/hand for skill-up process analysis of assembly tasks** [11049-135]
- 11049 3C **The contour image style-transfer-based convolutional neural network** [11049-81]

POSTER SESSION II

- 11049 3D **Pastel color imaging and its evaluation using video coding** [11049-43]
- 11049 3E **Generating arbitrarily focused images from sparse focal stack through light field reconstruction** [11049-80]
- 11049 3F **Remarkable point extraction from overlapping analysis of view fields in multiple smartphones shooting environment** [11049-134]
- 11049 3G **A study on rescue operation support systems using 3D reconstruction of disaster scenes with human cooperation via digital pen and dot screen** [11049-61]
- 11049 3H **Examination of perception with auditory stimuli when grasping a virtual soft object with a bare hand** [11049-17]
- 11049 3I **Smoke matting and compositing in video sequences** [11049-37]
- 11049 3J **A color quantization method preserving infrequent salient colors and its implementation on mobile devices** [11049-132]
- 11049 3K **Image registration using 2D projection transformation invariant GPT correlation** [11049-5]
- 11049 3L **An investigation of multiplication error tolerances in CNN and SIFT** [11049-112]
- 11049 3M **Depth from defocus by cross-reblurring with pixel disalignment compensation** [11049-152]
- 11049 3N **RNN-based bitstream feature extraction method for codec classification** [11049-69]
- 11049 3O **Methods of padding inactive regions for rotated sphere projection of 360 video** [11049-130]
- 11049 3P **Refocusing the real-world using the optical see-through head-mounted display** [11049-109]
- 11049 3Q **Boundary handling for video-based light field coding with a new hybrid scan order** [11049-160]
- 11049 3R **Modified hierarchical k-nearest neighbor method with application to land-cover classification** [11049-52]

- 11049 3S **Blind detection of fabric defects using multiple image features** [11049-104]
- 11049 3T **Panoramic image generation from a handheld video by combination of attitude sensors and image features** [11049-110]
- 11049 3U **A parallax-tolerant real-time video stitching method for 12K×2K ultrawide vision** [11049-149]
- 11049 3V **Image segmentation with searching tree of superpixel boundaries** [11049-118]
- 11049 3W **Image recognition using multi-layer sparse feature extraction with ADMM** [11049-48]
- 11049 3X **Pure-color preserving multi-exposure image fusion** [11049-153]
- 11049 3Y **A convolutional neural network with sign-to-position format conversion** [11049-49]
- 11049 3Z **Fall-down event detection for elderly based on motion history images and deep learning** [11049-141]
- 11049 40 **Development of a human-robot cooperative system based on visual information** [11049-167]
- 11049 41 **Procedural animation of waving cartoon hair by emulating animator's techniques** [11049-100]
- 11049 42 **A 3D reconstruction method using PMVS for a limited number of view points** [11049-123]
- 11049 43 **Identification of the genus of stingless bee via faster R-CNN** [11049-62]
- 11049 44 **Physical condition analysis of road signs using image template** [11049-140]
- 11049 45 **High reality image generation for DNN learning based on varying pixel intensity value model depend on each camera: the last 1% accuracy improvement** [11049-136]
- 11049 46 **A parallel pre-processing for multiple objects tracking system** [11049-156]
- 11049 47 **The depth recovery from multiple optical flow detected by fixational eye movements camera** [11049-102]
- 11049 48 **Lossless video coding based on multi-frame example search and probability model optimization** [11049-500]
- 11049 49 **Automated hand eye calibration in laparoscope holding robot for robot assisted surgery** [11049-501]