

PROCEEDINGS OF SPIE

Thirteenth International Conference on Machine Vision (ICMV 2020)

**Wolfgang Osten
Dmitry P. Nikolaev
Jianhong Zhou**
Editors

**2 – 6 November 2020
Rome, Italy**

Organized by
University of Electronic Science and Technology of China

Sponsored by
American Science and Engineering Institute (United States)

Published by
SPIE

Volume 11605

Proceedings of SPIE 0277-786X, V. 11605

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 *Thirteenth International Conference on Machine Vision*, edited by Wolfgang Osten, Dmitry Nikolaev, Jianhong Zhou, Proceedings of SPIE Vol. 11605 (SPIE, Bellingham, WA, 2021) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510640405

ISBN: 9781510640412 (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 © 2021, 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/21/\$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

ARTIFICIAL INTELLIGENCE AND INTELLIGENT COMPUTING

- 11605 02 **LIDAR-based parking spot search algorithm** [11605-44]
- 11605 03 **Deep convolutional neural network based autonomous drone navigation** [11605-46]
- 11605 04 **Abstractive meeting summarization based on an attentional neural model** [11605-49]
- 11605 05 **A semi-supervised learning approach for CBIR systems with relevance feedback** [11605-4]
- 11605 06 **Weak anomaly-reinforced autoencoder for unsupervised anomaly detection** [11605-31]
- 11605 07 **Almost indirect 8-bit convolution for QNNs** [11605-39]
- 11605 08 **Distance-based online pairs generation method for metric networks training** [11605-51]
- 11605 09 **Model selection for support-vector machines through metaheuristic optimization algorithms** [11605-59]
- 11605 0A **Modelling the point source function for collimators employed in radio guided surgery and SPECT** [11605-60]

COMPUTER VISION AND VISUALIZATION TECHNOLOGY

- 11605 0B **A low-complexity yet accurate calibration method for automotive augmented reality head-up displays** [11605-15]
- 11605 0C **A machine vision based smart conveyor system** [11605-26]
- 11605 0D **DOME-T: adversarial computer vision attack on deep learning models based on Tchebichef image moments** [11605-56]
- 11605 0E **Event correlation for deception detection in long video** [11605-7]
- 11605 0F **Choosing the best image of the document owner's photograph in the video stream on the mobile device** [11605-22]
- 11605 0G **How good MVSNetS are at depth fusion** [11605-80]
- 11605 0H **Domain shift in computer vision models for MRI data analysis: an overview** [11605-81]

DIGITAL IMAGE PROCESSING TECHNOLOGY AND APPLICATION

- 11605 OI **Slope detection criterion robust to sparse 2D data** [11605-9]
- 11605 OJ **Fatigue detection based on non-contact respiratory detection** [11605-10]
- 11605 OK **Thermal image processing for feature extraction from encapsulated phase change materials** [11605-27]
- 11605 OL **Lightweight denoising filtering neural network for FBP algorithm** [11605-54]
- 11605 OM **Sde-awb: a generic solution for 2nd international illumination estimation challenge** [11605-84]
- 11605 ON **3D point cloud simplification based on the clustering algorithm and introducing the Shannon's entropy** [11605-87]
- 11605 OO **Keypoint-based static object removal from photographs** [11605-38]
- 11605 OP **Bipolar morphological U-Net for document binarization** [11605-50]
- 11605 OQ **Scalable multi-view stereo using CMA-ES and distance transform-based depth map refinement** [11605-55]
- 11605 OR **Block convolutional layer for position dependent features calculation** [11605-62]
- 11605 OS **Artifacts suppression in biomedical images using a guided filter** [11605-68]
- 11605 OT **Occlusion aware unsupervised learning of optical flow from video** [11605-86]
- 11605 OU **Fast and accurate mobile-aided screening system of moderate diabetic retinopathy** [11605-93]

IMAGE ANALYSIS AND ALGORITHM

- 11605 OV **About Viola-Jones image classifier structure in the problem of stamp detection in document images** [11605-8]
- 11605 OW **On the effectiveness of adversarial unsupervised domain adaptation for iris presentation attack detection in mobile devices** [11605-11]
- 11605 OX **Automated synthetic datasets construction for part semantic segmentation of non-cooperative satellites** [11605-12]

- 11605 0Y **Improvement of U-Net architecture for image binarization with activation functions replacement** [11605-33]
- 11605 0Z **Retinal blood vessel segmentation in fundus images based on morphological operators within entropy information** [11605-40]
- 11605 10 **Color correction of the document owner's photograph image during recognition on mobile device** [11605-74]
- 11605 11 **An instance segmentation framework for in-situ plankton taxa assessment** [11605-78]
- 11605 12 **Language of gleam: impressionism artwork automatic caption generation for people with visual impairments** [11605-85]
- 11605 13 **Improving the quality of tomographic images by the methods of the computer-aided measuring systems** [11605-21]
- 11605 14 **A dynamic programming inspired outlier rejection algorithm for image mosaicing problem** [11605-24]
- 11605 15 **Shape-aware generative adversarial networks for attribute transfer** [11605-30]
- 11605 16 **Blind CT images quality assessment of cupping artifacts** [11605-35]
- 11605 17 **DNNs for multi-map semantic segmentation** [11605-52]
- 11605 18 **Feathers dataset for fine-grained visual categorization** [11605-89]

IMAGE AND SIGNAL PROCESSING

- 11605 19 **LRA-Net: local region attention network for 3D point cloud completion** [11605-2]
- 11605 1A **The method of search for falsifications in copies of contractual documents based on N-grams** [11605-32]
- 11605 1B **Line detection via a lightweight CNN with a Hough layer** [11605-48]
- 11605 1C **Spatiotemporal feature based convolutional neural network for violence detection** [11605-57]
- 11605 1D **Real-time vineyard trunk detection for a grapes harvesting robot via deep learning** [11605-5]
- 11605 1E **Robust white balance estimation using joint attention and angular loss optimization** [11605-18]
- 11605 1F **Improved algorithm of ID card detection by a priori knowledge of the document aspect ratio** [11605-34]

- 11605 1G **Memory consumption reduction for identity document classification with local and global features combination** [11605-36]
- 11605 1H **An application of geometric aspects of variational autoencoder model to forgery detection of scanned documents** [11605-66]
- 11605 1I **Local path planning algorithm for autonomous vehicle based on multi-objective trajectory optimization in state lattice** [11605-72]

INTELLIGENT RECOGNITION TECHNOLOGY AND APPLICATION

- 11605 1J **Robust technique for representative volume element identification in noisy microtomography images of porous materials based on pores morphology and their spatial distribution** [11605-3]
- 11605 1K **Tracking and identification for football video analysis using deep learning** [11605-6]
- 11605 1L **Image stacking versus per-frame results combination for video text recognition** [11605-16]
- 11605 1M **A modification of a stopping method for text recognition in a video stream with best frame selection** [11605-17]
- 11605 1N **Precise localization of synchronization patterns for Aztec code matrix extraction** [11605-42]
- 11605 1O **Steel pipe counting system based on image recognition** [11605-67]
- 11605 1P **Generative approach for 1D barcode dataset population for mobile-based recognition** [11605-75]
- 11605 1Q **The impact of pre-processing algorithms in facial expression recognition** [11605-79]
- 11605 1R **A novel approach to improve the social acceptance of autonomous driving vehicles by recognizing the emotions of passengers** [11605-1]
- 11605 1S **An approach to road scene text recognition with per-frame accumulation and dynamic stopping decision** [11605-14]
- 11605 1T **Chess recognition using 3D patterned illumination camera** [11605-41]
- 11605 1U **Fingerspelling recognition using synthetic images and deep transfer learning** [11605-70]

OPTICAL IMAGING AND COMPUTER PHOTOGRAPHY

- 11605 1V **A target-free calibration method for automotive augmented reality head-up displays** [11605-19]
- 11605 1W **Camera auto-calibration for complex scenes** [11605-28]

- 11605 1X **Application of fractional bio-inspired filter for salient color detection** [11605-43]
- 11605 1Y **Empirical analysis of the optimality of RSRE-based stopping rules for monitored reconstruction** [11605-53]
- 11605 1Z **Fader networks for domain adaptation on fMRI: ABIDE-II study** [11605-58]
- 11605 20 **Consensus-driven illuminant estimation with GANs** [11605-69]
- 11605 21 **Processing and understanding of images in spectral tomography** [11605-71]
- 11605 22 **DVAE-SR: denoiser variational auto-encoder and super-resolution to counter adversarial attacks** [11605-23]
- 11605 23 **Iterative reconstruction of incomplete tomography data: application cases** [11605-25]

TARGET DETECTION AND TRACKING

- 11605 24 **Deep car detection by fusing grayscale image and weighted upsampled LiDAR depth** [11605-13]
- 11605 25 **Application of shared backbone DNNs in ADAS perception systems** [11605-20]
- 11605 26 **CT images GAN-based augmentation with AdaIN for lung nodules detection** [11605-83]
- 11605 27 **Violent scenes detection based on connected component analysis** [11605-94]
- 11605 28 **Maximizing object detection using sUAS** [11605-29]
- 11605 29 **Robust real-time pedestrian detection on embedded devices** [11605-45]
- 11605 2A **Multimodal features for shots boundary detection** [11605-47]
- 11605 2B **Fast Hough transform-based road markings detection for autonomous vehicle** [11605-73]