PROCEEDINGS OF SPIE

Applications of Digital Image Processing XLIV

Andrew G. Tescher
Touradj Ebrahimi
Editors

1–5 August 2021
San Diego, California, United States

Sponsored and Published by
SPIE

Volume 11842

Proceedings of SPIE 0277-786X, V. 11842

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 *Applications of Digital Image Processing XLIV*, edited by Andrew G. Tescher, Touradj Ebrahimi, Proc. of SPIE 11842, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510645226
ISBN: 9781510645233 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2021 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
SPIEDigitalLibrary.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

ARTIFICIAL INTELLIGENCE IN IMAGE AND VIDEO COMPRESSION

11842 03 **Quality-aware CNN-based in-loop filter for video coding** [11842-1]

11842 04 **A study of deep image compression for YUV420 color space** [11842-2]

11842 05 **Bi-directional prediction for end-to-end optimized video compression** [11842-3]

11842 06 **Multi-hypothesis inspired super-resolution for compression distorted screen content image** [11842-4]

11842 07 **Learning-based encoder algorithms for VVC in the context of the optimized VVenC implementation** [11842-5]

VIDEO PROCESSING FOR USER-GENERATED CONTENT

11842 08 **Machine learning based tuning of encoding parameters for UGC video coding optimizations** [11842-8]

11842 09 **On quality control of user-generated-content (UGC) compression** [11842-10]

11842 0A **Subjective and objective study of sharpness enhanced UGC video quality** [11842-11]

ADVANCED VIDEO COMPRESSION

11842 0B **An end-to-end distributed video analytics system using HEVC annotated regions SEI message** [11842-12]

11842 0C **Simplified carriage of MPEG immersive video in HEVC bitstream** [11842-13]

11842 0D **Implementation of film-grain technology within VVC** [11842-14]

11842 0F **VMAF and variants: towards a unified VQA** [11842-16]

11842 0G **Bandlimited wireless video communications over lossy channels** [11842-17]

11842 0H **VVenC: an open optimized VVC encoder in versatile application scenarios** [11842-18]

11842 0I **Overview of baseline profile in MPEG-5 essential video coding standard** [11842-19]

11842 0J **HDR video coding for aerial videos with VVC and AV1** [11842-20]

IMAGING AND INFORMATION CHAOS

11842 0K **Fake-buster: a lightweight solution for deepfake detection** [11842-23]

11842 0L **JPEG Fake Media: a provenance-based sustainable approach to secure and trustworthy media annotation** [11842-24]

11842 0M **Adopting the JPEG universal metadata box format for media authenticity annotations** [11842-25]

11842 0N **Framing photos in the digital dark age: towards a socio-technological 'ecology of images'** [11842-26]

IMAGE AND VIDEO COMPRESSION

11842 0O **Per-clip and per-bitrate adaptation of the Lagrangian multiplier in video coding** [11842-27]

11842 0P **DCST: a data-driven color/spatial transform-based image coding method** [11842-28]

11842 0Q **Content adaptive video compression for autonomous vehicle remote driving** [11842-29]

11842 0R **Frame synthesis for video compression** [11842-30]

11842 0S **Learning residual coding for point clouds** [11842-31]

11842 0T **Towards much better SVT-AV1 quality-cycles tradeoffs for VOD applications** [11842-32]

APPLICATIONS OF VISUAL PERCEPTION IN IMAGING

11842 0U **Training compression artifacts reduction network with domain adaptation** [11842-33]

11842 0V **Study on deep CNN as preprocessing for video compression** [11842-34]

11842 0W **The effect of degradation on compressibility of video** [11842-35]

11842 0X **A differentiable VMAF proxy as a loss function for video noise reduction** [11842-36]

11842 0Y **Review of subjective quality assessment methodologies and standards for compressed images evaluation** [11842-37]

11842 0Z **Fundamental relationships between subjective quality, user acceptance, and the VMAF metric for a quality-based bit-rate ladder design for over-the-top video streaming services** [11842-38]

APPLICATIONS OF BIOMEDICAL IMAGING

11842 10 **Image-based autofocusing algorithm applied in image fusion process for optical microscope** [11842-39]

11842 11 **Evaluation of deep learning techniques for the detection of pulmonary nodules in computer tomography scans** [11842-40]

11842 12 **Evaluation of segmentation techniques for cell tracking in confocal microscopy images** [11842-41]

11842 13 **Preprocessing fast filters and mass segmentation for mammography images** [11842-42]

11842 14 **Evaluation of filtering techniques for cell tracking in confocal microscopy images** [11842-43]

11842 15 **MTS image analyzer: a software tool to identify mesial temporal sclerosis in MRI images** [11842-44]

11842 16 **Cartesian function of glycerin diffusion over ex-vivo porcine skin samples using multiple sequential THz images** [11842-45]

IMAGING SECURITY AND ANALYSIS

11842 17 **Facial recognition system for security access control** [11842-46]

11842 18 **Towards a secure and trustworthy imaging with non-fungible tokens** [11842-47]

11842 1A **Towards image denoising in the latent space of learning-based compression** [11842-49]

11842 1B **Design and implementation of augmented reality system for paper media based on ARtoolKit** [11842-50]

3D IMAGING AND AUGMENTED-REALITY APPLICATIONS

11842 1C **3D computer-generated holograms for augmented reality applications in medical education** [11842-51]

11842 1D **High-speed simultaneous measurement of depth and normal for real-time 3D reconstruction** [11842-52]

IMAGE ANALYSIS TOOLS AND TECHNIQUES

11842 1E **Phase congruency implementation in ImageJ using Radix-2 FFT** [11842-55]

11842 1F **Inpainting method based on variational calculus and sparse matrices** [11842-56]

11842 1G **Study of phase congruency quantization function properties for image edge detection** [11842-57]

11842 1H **Efficient Java implementation of image cloning method based on gradient processing** [11842-58]

11842 1I **Evaluation of panchromatic and multispectral image fusion methods using natural images** [11842-60]

IMAGING SYSTEMS

11842 1K **VehiPose: a multi-scale framework for vehicle pose estimation** [11842-63]

11842 1M **An extensible framework for video ASIC development and validation at Facebook scale** [11842-66]

11842 1N **Towards super resolution in the compressed domain of learning-based image codecs** [11842-67]

POSTER SESSION

11842 1B **Design and implementation of augmented reality system for paper media based on ARtoolKit** [11842-50]

11842 1O **Design and implementation of interactive game based on augmented reality** [11842-53]

11842 1P **ICP algorithm based on stochastic approach** [11842-54]

11842 1Q **Fast algorithm of 3D object volume calculation from point cloud** [11842-68]

11842 1R **Fast 3D object pose normalization for point cloud** [11842-69]

11842 1S **Fast 3D object symmetry detection for point cloud** [11842-70]

11842 1X **Binarization method for chromosomal analysis of primitive plants: the case of Zamia tolimensis and Zamia huilensis (Cycadales, Zamiaceae)** [11842-75]

11842 21 **Regularized variational functional use a rough alignment for point clouds registration** [11842-79]

11842 22 **Convolutional neural network for 3D point clouds matching** [11842-80]

11842 27 **Contactless robust 3D palm-print identification using photometric stereo** [11842-85]

11842 29 **Fast approximate geodesic distance on point cloud** [11842-87]

11842 2B **New method for digitization and manipulation of textile molds based on image processing** [11842-89]

11842 2D **Analysis of lung cancer clinical diagnosis based on nodule detection from computed tomography images** [11842-91]

11842 2E **Development and validation of a novel automated method for quantification of choroidal thickness in age-related macular degeneration** [11842-92]

11842 2F **Gradient direction analysis for contour tracking and local non maximum suppression** [11842-93]

11842 2G **Transform-based quality assessment for enhanced image** [11842-94]