

PROCEEDINGS OF SPIE

# ***Real-Time Image Processing and Deep Learning 2020***

**Nasser Kehtarnavaz  
Matthias F. Carlsohn**  
*Editors*

**27 April – 8 May 2020  
Online Only, United States**

*Sponsored and Published by  
SPIE*

**Volume 11401**

Proceedings of SPIE 0277-786X, V. 11401

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](http://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 *Real-Time Image Processing and Deep Learning 2020*, edited by Nasser Kehtarnavaz, Matthias F. Carlsohn, Proceedings of SPIE Vol. 11401 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510635791

ISBN: 9781510635807 (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](http://SPIE.org)

Copyright © 2020, 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](http://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/20/\$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**  
[SPIDigitalLibrary.org](http://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

---

**SESSION 1 IMAGE PROCESSING ALGORITHMS AND SYSTEMS I**

---

11401 04 **Performance analysis of semantic segmentation algorithms trained with JPEG compressed datasets** [11401-3]

---

**SESSION 2 DEEP LEARNING I**

---

11401 06 **A deep learning-based smartphone app for real-time detection of five stages of diabetic retinopathy** [11401-5]

11401 07 **A robust technique for real-time face verification with a generative network** [11401-6]

11401 08 **CNN to detect differences in cerebral cortical anatomy of left- and right- handers** [11401-7]

---

**SESSION 3 DEEP LEARNING II**

---

11401 09 **Computational aspects of deep learning models for detection of eye retina abnormalities** [11401-9]

11401 0A **Real-time detection of maize crop disease via a deep learning-based smartphone app** [11401-10]

11401 0B **Parallel artificial neural networks using wavelet-based features for classification of remote-sensing hyperspectral images** [11401-12]

11401 0C **No-reference image quality assessment based on residual neural networks (ResNets)** [11401-13]

11401 0D **Coverless image steganography framework using distance local binary pattern and convolutional neural network** [11401-14]

---

**SESSION 4 IMAGE PROCESSING ALGORITHMS AND SYSTEMS II**

---

11401 0G **The combined denoising of images on the optical and thermal range onboard the UAV** [11401-17]

**POSTER SESSION**

---

- 11401 OH **Portable flow device using Fourier ptychography microscopy and deep learning for detection in biosignatures** [11401-18]
- 11401 OI **Parallel color image watermarking scheme for multiple picture object based on multithreading coding** [11401-19]