PROCEEDINGS OF SPIE

Real-Time Image Processing and Deep Learning 2021

Nasser Kehtarnavaz Matthias F. Carlsohn Editors

12–16 April 2021 Online Only, United States

Sponsored and Published by SPIE

Volume 11736

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 *Real-Time Image Processing and Deep Learning 2021*, edited by Nasser Kehtarnavaz, Matthias F. Carlsohn, Proc. of SPIE 11736, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510643093

ISBN: 9781510643109 (electronic)

Published by

SPIE

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

3FIL.UIY

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.



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

DEEP LEARNING 11736 02 Heuristic approaches for porting deep neural networks onto mobile devices [11736-1] 11736 03 Reconstruct fingerprint images using deep learning and sparse autoencoder algorithms [11736-2] 11736 04 Faster deep neural network image processing by using vectorized posit operations on a RISC-V **processor** [11736-3] 11736 05 Segmentation of seagrass blade images using deep learning [11736-4] 11736 06 Deep learning based real-time detection of Northern Corn Leaf Blight crop disease using **YoloV4** [11736-5] 11736 08 Super-resolution photoacoustic microscopy based on deep learning [11736-7] **IMAGE PROCESSING ALGORITHMS I** A review of real-time human action recognition involving vision sensing [11736-9] 11736 0A 11736 OB Embedded real-time people detection and tracking with time-of-flight camera [11736-10] 11736 OC Real-time object detection in 360-degree videos [11736-11] 11736 OE A real-time software framework for driver monitoring systems: software architecture and use **cases** [11736-13] 11736 OF Real time circle detection by simplified Hough transform on smartphones (Best Student Paper Award) [11736-14] HARDWARE IMPLEMENTATION 11736 0G The evaluation of CUDA performance on the Jetson Nano board for an image binarization task [11736-15] 11736 OH Chest x-ray classification using transfer learning on multi-GPU [11736-16] 11736 OI Parallel implementation of a hyperspectral feature extraction method based on Gabor filter [11736-17]

Design of an embedded system for real-time lane detection based on the linear Hough transform [11736-18]

IMAGE PROCESSING ALGORITHMS II

11736 OL	Investigation of band selection techniques to enable classification of hyperspectral imagery at the edge $\left[11736\text{-}20\right]$
11736 OM	Segmentation of hyperspectral images using self-organizing maps [11736-21]
11736 ON	Moving object detection based on improved ViBe algorithm [11736-22]
11736 00	Defending against sparse adversarial attacks using impulsive noise reduction filters [11736-23]
11736 OP	Novel technique for broadcast footage overlay text recognition [11736-24]