

PROCEEDINGS OF SPIE

Geospatial Informatics XIII

**Kannappan Palaniappan
Gunasekaran Seetharaman
Joshua D. Harguess**
Editors

**4 May 2023
Orlando, Florida, United States**

Sponsored and Published by
SPIE

Volume 12525

Proceedings of SPIE 0277-786X, V. 12525

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 *Geospatial Informatics XIII*, edited by Kannappan Palaniappan, Gunasekaran Seetharaman, Joshua D. Harguess, Proc. of SPIE 12525, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510661646

ISBN: 9781510661653 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2023 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**

SPIDigitalLibrary.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

v *Conference Committee*

SESSION 1 GEOSPATIAL ANALYTICS I: SATELLITE IMAGERY

- 12525 02 **Automated global-scale detection and characterization of anthropogenic activity using multi-source satellite-based remote sensing imagery [12525-1]**
- 12525 03 **Mapping dispersed houses in rural areas of Colombia by exploiting planet satellite images with convolutional neural networks [12525-2]**
- 12525 04 **Combining remote sensing and social media data to predict indicators of political and economic instability [12525-3]**
- 12525 05 **Land cover classification of Andean sub-basins in Colombia based on Sentinel-2 satellite images and deep learning [12525-4]**

SESSION 2 GEOSPATIAL ANALYTICS II: SAR, AERIAL, AND SATELLITE IMAGERY

- 12525 06 **Balanced sampling meets imbalanced datasets for SAR image classification [12525-7]**
- 12525 07 **Spatially constrained deep semantic segmentation of geospatial imagery for building footprint extraction [12525-6]**
- 12525 08 **Towards masked autoencoding pre-training for wide area motion imagery [12525-8]**
- 12525 09 **TrackFuse: improving tracker performance by late stage fusion [12525-9]**

SESSION 3 UNMANNED AERIAL VEHICLES FOR GEOSPATIAL ANALYTICS

- 12525 0A **Simulated gold-standard for quantitative evaluation of monocular vision algorithms [12525-10]**
- 12525 0B **Human-robot teaming for a cooperative game in a shared partially observable space [12525-11]**
- 12525 0C **From sparse SLAM to dense mapping for UAV autonomous navigation [12525-12]**

SESSION 4 REAL AND SYNTHETIC DATA COLLECTION AND APPLICATIONS

- 12525 0E **Cognitive tip and cue: a novel framework for intelligent automated collection planning** [12525-15]
- 12525 0F **Diversity-based active learning: creating a representative object detection dataset in 3D point clouds** [12525-16]
- 12525 0G **Multivariate air quality time series analysis via a recurrent variational deep learning model** [12525-17]
- 12525 0I **Fake it till you break it: evaluating the performance of synthetically optimized adversarial patches against real-world imagery** [12525-19]

POSTER SESSION

- 12525 0J **Video-based complex human event recognition with a probabilistic transformer** [12525-21]
- 12525 0K **Skeleton-based human action recognition with a physics-augmented encoder-decoder network** [12525-22]
- 12525 0L **An extended reality environment for urban area environmental data analysis** [12525-23]
- 12525 0M **City scale autonomy learning** [12525-24]

DIGITAL POSTER SESSION

- 12525 0N **Visual interpretation of building objects at the initial and final stages of the life cycle according to the satellite and ground survey data** [12525-5]