

Editorial Board Members

Joaquim Filipe 

Polytechnic Institute of Setúbal, Setúbal, Portugal

Ashish Ghosh

Indian Statistical Institute, Kolkata, India

Raquel Oliveira Prates 

Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil

Lizhu Zhou

Tsinghua University, Beijing, China

More information about this series at <http://www.springer.com/series/7899>

Cédric Grueau · Robert Laurini ·
Lemonia Ragia (Eds.)

Geographical Information Systems Theory, Applications and Management

6th International Conference, GISTAM 2020
Prague, Czech Republic, May 7–9, 2020
Revised Selected Papers

Editors

Cédric Grueau
Polytechnic Institute of Setúbal
Setúbal, Portugal

Robert Laurini
Knowledge Systems Institute
Skokie, IL, USA

Lemonia Ragia
Technical University of Crete
Chania, Greece

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-3-030-76373-2 ISBN 978-3-030-76374-9 (eBook)
<https://doi.org/10.1007/978-3-030-76374-9>

© Springer Nature Switzerland AG 2021

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This book includes extended and revised versions of a set of selected papers from the 6th International Conference on Geographical Information Systems Theory, Applications and Management (GISTAM 2020), exceptionally held as a web-based event, due to the COVID-19 pandemic, during May 7–9, 2020.

GISTAM 2020 received 62 paper submissions from 38 countries, of which 15% were included in this book. The papers were selected by the event chairs and their selection was based on a number of criteria that included classifications and comments provided by Program Committee members, session chairs' assessments, and also the program chairs' global view of all the papers included in the technical program. The authors of selected papers were then invited to submit revised and extended versions of their papers having at least 30% innovative material.

The International Conference on Geographical Information Systems Theory, Applications and Management aims at creating a meeting point of researchers and practitioners that addresses new challenges in geo-spatial data sensing, observation, representation, processing, visualization, sharing, and managing, in all aspects concerning information communication and technologies (ICT) as well as management information systems and knowledge-based systems. The conference welcomes original papers of either practical or theoretical nature, presenting research or applications, of specialized or interdisciplinary nature, addressing any aspect of geographic information systems and technologies.

We are confident that the papers included in this book will strongly contribute to the understanding of some current research trends in geographical information systems theory, applications, and management, specifically with relation to geographic information retrieval, big data, real-time sensors, spatial information and society, spatial modeling and reasoning, spatio-temporal data acquisition, earth observation and satellite data, and ecological and environmental management.

We would like to thank all the authors for their contributions and the reviewers for their hard work which has helped ensure the quality of this publication.

May 2020

Cédric Grueau
Robert Laurini
Lemonia Ragia

Organization

Conference Chair

Lemonia Ragia

ATHENA Research & Innovation Information
Technologies, Greece

Program Chairs

Cédric Grueau

Robert Laurini (Honorary)

Polytechnic Institute of Setúbal, Portugal

Knowledge Systems Institute, France

Program Committee

Andrea Ajmar

Rute Almeida

Costas Armenakis

Thierry Badard

Jan Blachowski

Politecnico di Torino, Italy

University of Porto, Portugal

York University, Canada

Laval University, Canada

Wroclaw University of Science and Technology,
Poland

María Camacho Olmedo

Manuel Campagnolo

Cristina Catita

Filiberto Chiabrando

Eliseo Clementini

Antonio Corral

Joep Crompvoets

Paolo Dabove

Anastasios Doulamis

Nikolaos Doulamis

Suzana Dragicevic

João Fernandes

Ana Fonseca

Cidália Fonte

Cheng Fu

Sébastien Gadal

Universidad de Granada, Spain

Instituto Superior de Agronomia, Portugal

Universidade de Lisboa, Portugal

Politecnico di Torino, Italy

University of L'Aquila, Italy

University of Almeria, Spain

Catholic University of Leuven, Belgium

Politecnico di Torino, Italy

National Technical University of Athens, Greece

National Technical University of Athens, Greece

Simon Fraser University, Canada

Universidade de Lisboa, Portugal

Laboratório Nacional de Engenharia Civil, Portugal

University of Coimbra, Portugal

University of Zurich, Switzerland

Aix-Marseille University, France/CNRS UMR 7300

ESPACE, France/North-Eastern Federal University,
Russia

Auroop Ganguly

Jinzhu Gao

Lianru Gao

Gilles Gesquière

Fabio Giulio Tonolo

Northeastern University, USA

University of the Pacific, USA

Chinese Academy of Sciences, China

LIRIS, France

Politecnico di Torino, Italy

| | |
|----------------------------|--|
| Luis Gomez-Chova | Universitat de València, Spain |
| Gil Gonçalves | University of Coimbra/INESC Coimbra, Portugal |
| Nikos Grammalidis | Centre for Research and Technology Hellas, Greece |
| Hans Guesgen | Massey University, New Zealand |
| Gilberto Gutierrez Retamal | University of Bio-Bio, Chile |
| Bob Haining | University of Cambridge, UK |
| Cristina Henriques | University of Lisbon, Portugal |
| Stephen Hirtle | University of Pittsburgh, USA |
| Wen-Chen Hu | University of North Dakota, USA |
| Karsten Jacobsen | Leibniz Universität Hannover, Germany |
| Simon Jirka | 52° North, Germany |
| Wolfgang Kainz | University of Vienna, Austria |
| Harry Kambezidis | National Observatory of Athens, Greece |
| Andreas Koch | University of Salzburg, Austria |
| Artur Krawczyk | AGH University of Science and Technology, Poland |
| Mel Krokos | University of Portsmouth, UK |
| Poh-Chin Lai | The University of Hong Kong, Hong Kong |
| Roberto Lattuada | myHealthbox, Italy |
| Christophe Lienert | LAINAT, Switzerland |
| Vladimir Lukin | Kharkov Aviation Institute, Ukraine |
| Paulo Marques | Portugal |
| Miguel Martínez-Prieto | University of Valladolid, Spain |
| Jean Mas | Universidad Nacional Autónoma de México, Mexico |
| Gavin McArdle | University College Dublin, Ireland |
| Gintautas Mozgeris | Vytautas Magnus University, Lithuania |
| Anand Nayyar | Duy Tan University, Vietnam |
| Dimos Pantazis | University of West Attica, Greece |
| Jian Peng | Peking University, China |
| Massimiliano Pepe | Politecnico di Bari, Italy |
| Marco Piras | Politecnico di Torino, Italy |
| Lemonia Ragia | ATHENA Research & Innovation Information Technologies, Greece |
| Mathieu Roche | CIRAD, France |
| John Samuel | Graduate School of Chemistry, Physics and Electronics, Lyon, France |
| Markus Schneider | University of Florida, USA |
| Diego Seco | University of Concepción, Chile |
| Sylvie Servigne | INSA Lyon, France |
| Yosio Shimabukuro | Instituto Nacional de Pesquisas Espaciais, Brazil |
| René Sieber | ETH Zurich, Switzerland |
| Francesco Soldovieri | Consiglio Nazionale delle Ricerche, Italy |
| Uwe Stilla | Technische Universität München, Germany |
| Rui Sun | Beijing Normal University, China |
| Ana Teodoro | Oporto University, Portugal |
| Goce Trajcevski | Northwestern University, USA |
| Marc van Kreveld | Utrecht University, Netherlands |

| | |
|-------------------------|--|
| Michael Vassilakopoulos | University of Thessaly, Greece |
| Benoit Vozel | University of Rennes I, France |
| Lei Wang | Louisiana State University, USA |
| Christiane Weber | CNRS UMR TETIS, France |
| Stephan Winter | The University of Melbourne, Australia |
| Laszlo Zentai | Eötvös Loránd University, Hungary |

Invited Speakers

| | |
|-------------------|---|
| Alexander Zipf | Heidelberg University, Germany |
| Paraskevi Nomikou | National and Kapodistrian University of Athens, Greece |
| Andrew U. Frank | Vienna University of Technology, Austria |

Contents

| | |
|--|-----|
| Spatial Information Technology: Past, Present, Future | 1 |
| <i>Andrew U. Frank</i> | |
| Location Extraction from Twitter Messages Using a Bidirectional Long Short-Term Memory Neural Network with Conditional Random Field Model | 18 |
| <i>Zi Chen, Badal Pokharel, Bingnan Li, and Samsung Lim</i> | |
| Automatic Processing of Sentinel-2 Data for Monitoring Biodiversity in a User-Defined Area: An Example from Mount Kilimanjaro National Park | 31 |
| <i>Fortunata Msoffe and Dirk Zeuss</i> | |
| 3D Urban Growth Simulation Using Human Settlement Capacity SLEUTH Model (HSCS) | 46 |
| <i>Rani El Meouche, Mojtaba Eslahi, Anne Ruas, and Muhammad Ali Sammuneh</i> | |
| Quality Assessment of Worldview-3 Stereo Imagery Derived Models Over Millennial Olive Groves. | 66 |
| <i>Ante Šiljeg, Fran Domazetović, Ivan Marić, and Lovre Panđa</i> | |
| Integration of New Data Layers to Support the Land Cover and Use Information System of Spain (SIOSE): An Approach from Object-Oriented Modelling | 85 |
| <i>Benito Zaragozaí, Jesús Javier Rodríguez-Sala, Sergio Trilles, and Alfredo Ramón-Morte</i> | |
| Analysis of Public Transport Mobility Data: A System for Sharing and Reusing GIS Database Queries | 102 |
| <i>Benito Zaragozaí, Aaron Gutierrez, and Sergio Trilles</i> | |
| Geolocation Inference Using Twitter Data: A Case Study of COVID-19 in the Contiguous United States | 119 |
| <i>Bingnan Li, Zi Chen, and Samsung Lim</i> | |
| Digital High-Scale Food Security Analysis: Challenges, Considerations and Opportunities | 140 |
| <i>Timothy Mulrooney and Tysean Wooten</i> | |
| Author Index | 167 |