Lecture Notes in Computer Science 12119

More information about this series at http://www.springer.com/series/7412

Abderrahim El Moataz ·
Driss Mammass · Alamin Mansouri ·
Fathallah Nouboud (Eds.)

Image and Signal Processing

9th International Conference, ICISP 2020
Marrakesh, Morocco, June 4–6, 2020
Proceedings

Springer

Editors
Abderrahim El Moataz
GREYC, University of Caen Normandie
Caen, France

Alamin Mansouri
ImViA
University of Burgundy
Dijon, France

Driss Mammass
IRF-SIC, Faculty of Sciences
Ibn Zohr University
Agadir, Morocco

Fathallah Nouboud
Math - Info
University of Quebec
Trois-Rivières, QC, Canada

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-51934-6 ISBN 978-3-030-51935-3 (eBook)
https://doi.org/10.1007/978-3-030-51935-3

LNCS Sublibrary: SL6 – Image Processing, Computer Vision, Pattern Recognition, and Graphics

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

Preface

The 9th International Conference on Image and Signal Processing (ICISP 2020) was scheduled to take place in Marrakesh, Morocco, during June 4–6, 2020. Unfortunately, the coronavirus pandemic and the ensuing confinement, as well as the uncertainties around when a return to normal life would ensue, led us to cancel the physical holding of the ICISP conference. Fortunately, LNCS agreed to publish the proceedings of the 40 best papers and as a result we are grateful to present the ISCISP 2020 proceedings.

Historically, ICISP is a conference resulting from the actions of researchers from Canada, France, and Morocco. Previous editions of ICISP were held in Cherbourg-Octeville, France (2008, 2014, and 2018), in Trois-Rivières, Quebec, Canada (2010 and 2016), and in Agadir, Morocco (2001, 2003, and 2012).

ICISP 2020 is sponsored by EURASIP (European Association for Image and Signal Processing), CNRST (National Center for Scientific and Technical Research), STIC pole (National STIC competence pole), and ARPRI (association of research on patter recognition and imaging).

For this 9th edition, in addition to the ICISP session, we scheduled three special sessions: Data and Image Processing for Precision Agriculture (DIPPA 2020), Digital Cultural Heritage (DCH 2020), and Machine Learning Application and Innovation (MALAI 2020).

From 84 full papers submitted, 40 were finally accepted. The review process was carried out by the Program Committee members; all are experts in various image and signal processing areas. Each paper was reviewed by three reviewers and also checked by the conference co-chairs. The quality of the papers in these proceedings is attributed first to the authors and second to the quality of the reviews provided by the experts. We would like to thank the authors for responding to our call, the reviewers for their excellent work, and the organizers of the three special sessions. We would also like to thank the members of the Local Organizing Committee for their advice and help. We are also grateful to Springer's editorial staff for supporting this publication in the LNCS series.

We hope this publication provides a good view into the research presented at ICISP 2020, and we look forward to meeting you at the next ICISP conference.

This edition is in memory of Pr. Driss Aboutajdine, who was part of the team responsible for thinking and organizing ICISP since 2001. He contributed to the success of all ICISP editions. Prof. Aboutajdine was the ex-Director of the National Center for Scientific and Technical Research of Morocco (CNRST), a member of the Academy Hassan 2 of Science, and national coordinator of the pole of competence STIC.

June 2020

Abderrahim El Moataz
Driss Mammass
Alamin Mansouri
Fathallah Nouboud

Organization

General Chairs

Abderrahim El Moataz	University of Caen Basse-Normandy, France
Fathallah Nouboud	University of Quebec à Trois-Rivières, Canada

Program Committee Chairs

Driss Mammass	Ibn Zohr University, Morocco
Alamin Mansouri	University of Bourgogne, France

Special Sessions Chairs

Dippa 2020

Mohamed El Hajji	CRMEF-SM Agadir, Morocco
Youssef Es-Saady	Ibn Zohr University, Morocco
Adel Hafiane	INSA Centre Val de Loire, France
Raphaël Canals	University of Orléans, France

DCH 2020

Alamin Mansouri	University of Bourgogne, France

MALAI 2020

Abdelaziz El Fazziki	Cadi Ayyad University, Morocco
Jihad Zahir	Cadi Ayyad University, Morocco

Local Organizing Committee

Hassan Douzi	Ibn Zohr University, Morocco
Mouad Mammass	Ibn Zohr University, Morocco
Mohamed Salim El Bazzi	Ibn Zohr University, Morocco
Soufiane Idbraim	Ibn Zohr University, Morocco
Mustapha Amrouch	Ibn Zohr University, Morocco
Hasna Abioui	Ibn Zohr University, Morocco
Taher Zaki	Ibn Zohr University, Morocco
Ali Idarrou	Ibn Zohr University, Morocco

Web Chair

Mouad Mammass	Ibn Zohr University, Morocco

Proceedings Chair

Mohamed El Hajji	CRMEF-SM Agadir, Morocco
Youssef Es-Saady	Ibn Zohr University, Morocco

International Associations Sponsors

European Association for Signal Processing (EURASIP)
National Center for Scientific and Technical Research (CNRST)
National STIC Competence pole (STIC pole)
Association of Reasearch on Pattern Recognition and Imaging (ARPRI)

Sponsoring Institutions

Ibn Zohr University, Morocco
University of Quebec à Trois-Rivières, Canada
University of Caen Basse-Normandie, France
University of Bourgogne, France
Faculty of Sciences, Agadir, Morocco

Program Committee

Tarik Agouti	Cadi Ayyad University, Morocco
Abdellah Ait Ouahman	Cadi Ayyad University, Morocco
Mustapha Amrouch	EST, Ibn Zohr University, Morocco
Jilali Antari	FPT, Ibn Zohr University, Morocco
Aissam Bekkari	ENSA, Cadi Ayyad University, Morocco
Mostafa Bellafkih	INPT Rabat, Morocco
Yannick Benezeth	University of Bourgogne, France
Djamal Benslimane	Lyon 1 University, France
Giuseppe Boccignone	University of Milan, Italy
Frank Boochs	Mainz University of Applied Sciences, Germany
Stéphanie Bricq	University of Bourgogne, France
Pierre Buyssens	IRISA, France
Raphaël Canals	University of Orleans, France
Pierre Chainais	École Centrale de Lille, France
Pamela Cosman	UC San Diego, USA
Jose Crespo	Universidad Politécnica de Madrid, Spain
Meurie Cyril	University Gustave Eiffel, France
Christian Degrigny	Haute École Arc, France
Hassan Douzi	FSA, Ibn Zohr University, Morocco
Mohamed El Hajji	CRMEF-SM Agadir, Morocco
Azeddine El Hassouny	ENSIAS, Mohamed V University, Morocco
Jessica El Khoury	University of Bourgogne, France
Abderrahim El Moataz	University of Caen Basse-Normandie, France

Abdelmounîm El Yacoubi	Institut Mines-Télécom SudParis, France
Hasna Elalaouhi-Elabdallaoui	Cadi Ayyad University, Morocco
Abdelaziz Elfazziki	Cadi Ayyad University, Morocco
Abdel Ennaji	University of Rouen, France
Youssef Es-saady	FPT, Ibn Zohr University, Morocco
Sony George	Norwegian Colour and Visual Computing Laboratory, Norway
Abel Gomes	University of Beira Interior, Portugal
Adel Hafiane	INSA Centre Val de Loire, France
Rachid Harba	University of Orleans, France
Jon Yngve Hardeberg	Norwegian University of Science and Technology, Norway
Markku Hauta-Kasari	University of Eastern Finland, Finland
Aymeric Histace	ETIS, ENSEA, France
Khalid Housni	Ibn Tofail University, Morocco
El Hassane Ibn Elhaj	INPT Rabat, Morocco
Ali Idarrou	ESTG, Ibn Zohr University, Morocco
Soufiane Idbraim	FSA, Ibn Zohr University, Morocco
Jérôme Idier	University of Nantes, France
M'bark Iggane	Ibn Zohr University, Morocco
Mustapha Kardouchi	University of Moncton, Canada
Ali Khenchaf	ENSTA Bretagne, France
Mohammed Lamine Kherfi	University of Quebec à Trois-Rivières, Canada
Alexandre Krebs	University of Bourgogne, France
Zakaria Lakhdari	University of Caen Basse-Normandie, France
Hajar Lazar	Cadi Ayyad University, Morocco
Francois Lecellier	University of Poitiers, France
Ludovic Macaire	University of Lille, France
Richard Macwan	University of Bourgogne, France
Amal Mahboubi	University of Caen Basse-Normandie, France
Driss Mammass	FSA, Ibn Zohr University, Morocco
Mouad Mammass	ENCG, Ibn Zohr University, Morocco
Alamin Mansouri	University of Bourgogne, France
Franck S. Marzani	University of Bourgogne, France
Jean Meunier	University of Montreal, Canada
Cyrille Migniot	University of Bourgogne, France
Pascal Monasse	LIGM, University of Paris-Est, France
El Mustapha Mouaddib	University of Picardie, France
Hajar Mousannif	University Cadi Ayyad, MA
Neeta Nain	Malaviya National Institute of Technology Jaipur, India
Fathallah Nouboud	University of Quebec à Trois-Rivières, Canada
Jean-Marc Ogier	University of La Rochelle, France
Marius Pedersen	Norwegian University of Science and Technology, Norway
Alessandro Rizzi	University of Milan, Italy

Frederic Ros	University of Orleans, France
Su Ruan	University of Rouen, France
Yassine Ruichek	University of Technology at Belfort and Montbéliard, France
Mohammed Sadgal	Cadi Ayyad University, Morocco
Abderrahmane Sadiq	FPT, Ibn Zohr University, Morocco
Abderrahmane Sbihi	Ibn Tofail University, Morocco
Sophie Schüpp	University of Caen Basse-Normandie, France
Robert Sitnik	Warsaw University of Technology, Poland
Salvatore Tabbone	INRIA, Lorraine University, France
Jean-Baptiste Thomas	University of Bourgogne, France
Norimichi Tsumura	Chiba University, Japan
Serestina Viriri	University of KwaZulu-Natal, South Africa
Jihad Zahir	Cadi Ayyad University, Morocco
Taher Zaki	Ibn Zohr University, Morocco
Djemel Ziou	Sherbrooke University, Canada

Contents

Deep Learning and Applications

Pattern Recognition

Segmentation and Retrieval

Mathematical Imaging and Signal Processing