

EG 3DOR 2022

Eurographics Workshop on 3D Object Retrieval Short Papers

September 1 – 2, 2022

**Florence, Italy
(hybrid mode)**

Workshop Chairs

Stefano Berretti, University of Florence, Italy
Theoharis Theoharis, NTNU, Norway & NKUA, Greece
Mohamed Daoudi, IMT Nord Europe, France

Programme Chairs

Claudio Ferrari, University of Parma, Italy
Remco C. Veltkamp, Utrecht University, The Netherlands

Proceedings Production Editor

Dieter Fellner (TU Darmstadt & Fraunhofer IGD, Germany)

Sponsored by EUROGRAPHICS Association

Dieter W. Fellner, Werner Hansmann, Werner Purgathofer, François Sillion
Series Editors

This work is subject to copyright.

All rights reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machines or similar means, and storage in data banks.

Copyright ©2022 by the Eurographics Association
Postfach 2926, 38629 Goslar, Germany

Published by the Eurographics Association
–Postfach 2926, 38629 Goslar, Germany–
in cooperation with
Institute of Computer Graphics & Knowledge Visualization at Graz University of Technology
and
Fraunhofer IGD (Fraunhofer Institute for Computer Graphics Research), Darmstadt

ISBN 978-3-03868-174-8

ISSN 1997-0471 (online)

The electronic version of the proceedings is available from the Eurographics Digital Library at
<https://diglib.eg.org>

Table of Contents

Table of Contents	iii
International Programme Committee	iv
Author Index	v
Keynote	vi
Short Papers	
Reconstructing 3D Face of Infants in Social Interactions Using Morphable Models of Non-Infants	1
<i>Evangelos Sariyanidi, Casey J. Zampella, Madison N. Drye, Madison L. Fecher, Grace Magginson, Laura Soskey Cubit, Robert T. Schultz, Whitney Guthrie, and Birkan Tunc</i>	
Single Shot Phase Shift 3D Scanning with Convolutional Neural Network and Synthetic Fractals	9
<i>Ke Li, Marcel Spehr, Daniel Höhne, Christian Bräuer-Burchardt, Andreas Tünnermann, and Peter Kühmstedt</i>	
Parameterization Robustness of 3D Auto-Encoders	17
<i>Emery Pierson, Thomas Besnier, Mohamed Daoudi, and Sylvain Arguillère</i>	
Labeled Facets: New Surface Texture Dataset	25
<i>Iyyakutti Iyappan Ganapathi and Naoufel Werghi</i>	

International Programme Committee

Ceyhun B. Akgül, Bogazici University, Turkey
Djamila Aouada, Interdisciplinary Centre for Security, Reliability, and Trust (SnT), Luxembourg
Stefano Berretti, University of Florence, Italy
Silvia Biasotti, CNR-IMATI, Italy
Edmond Boyer, INRIA, France
Michael Bronstein, Imperial College London, UK
Benjamin Bustos, University of Chile, Chile
Umberto Castellani, University of Verona, Italy
Mohamed Daoudi, IMT Nord Europe, France
Florent Dupont, University of Lyon, France
Bianca Falcidieno, CNR-IMATI, Italy
Claudio Ferrari, University of Parma, Italy
Alfredo Ferreira, Instituto Superior Técnico & Universidade de Lisboa, Portugal
Yue Gao, Tsinghua University, China
Andrea Giachetti, University of Verona, Italy
Daniela Giorgi, CNR-ISTI, Italy
Yulan Guo, National University of Defense Technology, China
Andrei Jalba, Eindhoven University of Technology, Netherlands
Anis Kacem, Interdisciplinary Centre for Security, Reliability, and Trust (SnT), Luxembourg
Jiri Kosinka, University of Groningen, Netherlands
Anestis Koutsoudis, Athena Research and Innovation Center, Greece
Zhouhui Lian, Peking University, China
Or Litany, NVIDIA, USA
Riccardo Marin, Sapienza University of Rome, Italy
Simone Melzi, Sapienza University of Rome, Italy
Michela Mortara, CNR-IMATI, Italy
Georgios Papaioannou, Athens University of Economics and Business, Greece
Ioannis Pratikakis, Democritus University of Thrace, Greece
Paul Rosin, Cardiff University, UK
Yusuf Sahillioğlu, METU, Turkey
Nickolas Sapidis, University of Western Macedonia, Greece
Tobias Schreck, Graz University of Technology, Austria
Ivan Sipiran, University of Chile, Chile
Michela Spagnuolo, CNR-IMATI, Italy
Hedi Tabia, Université d'Evry Val d'Essonne, France
Gary K. L. Tam, Swansea University, UK
Theoharis Theoharis, NTNU, Norway & NKUA, Greece
Claudio Tortorici, Technology Innovation Institute, UAE
Bart van Blokland, NTNU, Norway
Remco C. Veltkamp, Utrecht University, Netherlands
Naoufel Werghi, Khalifa University, UAE

Author Index

Arguillère, Sylvain	17	Li, Ke	9
Besnier, Thomas	17	Magginson, Grace	1
Bräuer-Burchardt, Christian	9	Pierson, Emery	17
Cubit, Laura Soskey	1	Sariyanidi, Evangelos	1
Daoudi, Mohamed	17	Schultz, Robert T.	1
Drye, Madison N.	1	Spehr, Marcel	9
Fecher, Madison L.	1	Tunc, Birkan	1
Ganapathi, Iyyakutti Iyappan	25	Tünnermann, Andreas	9
Guthrie, Whitney	1	Werghi, Naoufel	25
Höhne, Daniel	9	Zampella, Casey J.	1
Kühmstedt, Peter	9		

Keynote

From Sound to Metric Priors: A new Paradigm for Shape Generation

Emanuele Rodolà

Abstract

Spectral and metric geometry are at the heart of various problems in computer vision, graphics, pattern recognition, and machine learning. Ultimately, the core reason for their success can be traced down to questions of stability and to the informativeness of the eigenvalues of certain operators. In this talk, I will discuss and show tangible examples of such properties and showcase some dramatic implications on a selection of notoriously hard problems in computer vision and graphics. First, I will address the question of whether one can recover the shape of a geometric object from its vibration frequencies ('hear the shape of the drum'); while theoretically the answer to this question is negative, little is known about the practical possibility of using the spectrum for shape reconstruction and optimization. I will introduce a numerical procedure called isospectralization, as well as a data-driven variant, showing how this *practical* problem is solvable. Then, I will discuss the increasingly popular task of designing an effective generative model for deformable 3D shapes. I will demonstrate how injecting metric distortion priors into a simple geometric reconstruction loss can lead to the formation of a very informative latent space, which can be trained with extremely scarce data (less than 10 examples) and still yield competitive generation quality as well as aiding geometric disentanglement.

Short Biography

Emanuele Rodolà is Full Professor in Computer Science at Sapienza University of Rome, where he leads the GLADIA group on geometry, learning & applied AI. His research is funded by the ERC Starting Grant 2018 SPECGEO and a Google Research Scholar award.

Previously, he was a post-doctoral researcher at USI Lugano (2016-2017), an Alexander von Humboldt Fellow at TU Munich (2013-2016), and a JSPS Research Fellow at The University of Tokyo (2013). He received his PhD in Computer Science at Università Ca' Foscari Venezia (2012), and graduated in Computer System Engineering at the University of Rome "Tor Vergata" (2008). During his doctoral studies, Dr. Rodolà spent a visiting research period at Tel Aviv University under the supervision of Prof. Alex Bronstein. He received a number of awards, including the Best Student Paper Award at 3DPVT 2010, the Best Paper Award at VMV 2015, and the Best Paper Award at SGP 2016. He has been serving in the program committees of the top rated conferences in computer vision (CVPR, ICCV, ECCV, ACCV, etc.), served as Area Chair at 3DV (2016, 2017), founded and chaired several workshops including the workshop on Geometry Meets Deep Learning (ECCV GMDL 2016, ICCV GMDL 2017), organized multiple SHREC contests, and was recognized (eight times) as IEEE Outstanding Reviewer, at CVPR (2013, 2015, 2016, 2017), ICCV (2015, 2017), and ECCV (2014, 2016). He gave tutorials and short courses in multiple occasions at EUROGRAPHICS, ECCV, SGP, SIGGRAPH, and SIGGRAPH Asia. His work on 3D reconstruction was featured by the national Italian television (RAI – Cose dell'altro Geo) in 2012.

Dr. Rodolà research interests include 3D shape analysis, matching, reconstruction and modeling.