Riccardo Fellegara

Curriculum Vitæ (September 1, 2020)

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Email:	(work) riccardo.fellegara@dlr.de / (personal) riccardo.fellegara@gmail.com
Nationality:	Italian
Born:	August 11^{th} 1985

EDUCATION

Ph.D. in Computer Science May 2015

University of Genova (DIBRIS), Genova, Italy

Thesis: A spatio-topological approach to the representation of simplicial complexes and beyond.

Advisors: Prof. Leila De Floriani – University of Genova (Italy)
Dr. Kenneth Weiss – Lawrence Livermore National Laboratory (USA)

M.Sc. in Computer Science July 2010

University of Genova (DIBRIS), Genova, Italy

Thesis: Tetrahedral Trees: Design and Develop spatial indexes for tetrahedral grids (in *Italian*)

Advisors: Prof. Leila De Floriani – University of Genova (Italy)
Prof. Paola Magillo – University of Genova (Italy)

B.Sc. in Computer Science March 2008

University of Genova (DIBRIS), Genova, Italy

Thesis: Realization of kD-tree based spatial index for triangular mesh (in *Italian*)

Advisors: Prof. Leila De Floriani – University of Genova (Italy)
Prof. Paola Magillo – University of Genova (Italy)

EMPLOYMENT

Senior Researcher August 2019 - Present

German Aerospace Center (DLR), Institute for Software Technology, LS, Germany

Post-doctoral associate July 2016 - June 2019

University of Maryland at College Park, Department of Geographical Sciences, MD, USA

Post-doctoral associate April 2015 - June 2016

University of Maryland at College Park, Department of Computer Science, MD, USA

Research associate January 2011 - March 2015

University of Genova, Department of Computer Science, Genova, Italy

Research assistant August 2010 - December 2010
University of Genova, Department of Computer Science, Genova, Italy

RESEARCH INTERESTS

Spatial Data Structures and Algorithms

Scientific Visualization

Topology-based Data Analysis

High Performance Computing (HPC)

Geometric Modeling

Computer Graphics

Geographic Information Science

PUBLICATIONS

Tetrahedral Trees: a Family of Hierarchical Spatial Indexes for Tetrahedral Meshes
Riccardo Fellegara, Leila De Floriani, Paola Magillo and Kenneth Weiss
ACM Transaction on Spatial Algorithms and Systems (TSAS), 6(4), 1-34, 2020

Efficient Homology-Preserving Simplification of High-Dimensional Simplicial Shapes
Riccardo Fellegara, Federico Iuricich, Leila De Floriani and Ulderico Fugacci
Computer Graphics Forum, 39: 244-259, 2020

Multi-Level Filtering to Retrieve Similar Trajectories under the Fréchet Distance
Hong Wei, Riccardo Fellegara, Yin Wang, Leila De Floriani and Hanan Samet
26^{th} ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2018

Efficient representation and analysis of triangulated terrains
Riccardo Fellegara, Federico Iuricich and Leila De Floriani
25^{th} ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2017

The Stellar tree: a Compact Representation for Simplicial Complexes and Beyond
Riccardo Fellegara, Kenneth Weiss and Leila De Floriani
arXiv e-prints, 2017

An efficient approach for verifying manifold properties of simplicial complexes
Riccardo Fellegara, Kenneth Weiss and Leila De Floriani
25^{th} International Meshing Roundtable (IMR '16), 2016

Analysis of geolocalized social networks based on simplicial complexes
Riccardo Fellegara, Ulderico Fugacci, Federico Iuricich and Leila De Floriani
9th ACM SIGSPATIAL International Workshop on Location-Based Social Networks (LBSN), 2016

A spatio-topological approach to the representation of simplicial complexes and beyond
Riccardo Fellegara
Department of Computer Science (DIBRIS), University of Genova, Italy, P.h.D. Thesis, Internal Report DIBRIS-TH-2015-01, 2015

Efficient Computation and Simplification of Discrete Morse Decompositions on Triangulated Terrains
Riccardo Fellegara, Federico Iuricich, Leila De Floriani and Kenneth Weiss
22nd ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2014

A primal/dual representation for discrete Morse complexes on tetrahedral meshes
Kenneth Weiss, Federico Iuricich, Riccardo Fellegara and Leila De Floriani
Computer Graphics Forum (Vol. 32, Num. 3), appeared in Proceedings of The Eurographics Conference on Visualization (Eurovis 2013), 2013

Spatial indexes for Simplicial and cellular meshes
Riccardo Fellegara
17th East-European Conference on Advances in Databases and Information Systems (ADBIS 2013), appeared in New Trends in Databases and information Systems (373-382), 2013

A spatial approach to morphological feature extraction from irregularly sampled scalar fields
Leila De Floriani, Riccardo Fellegara, Federico Iuricich and Kenneth Weiss
3rd ACM SIGSPATIAL International Workshop on GeoStreaming (IWGS '12), 2012

The PR-star Octree: A spatio-topological data structure for tetrahedral meshes
Kenneth Weiss, Riccardo Fellegara, Leila De Floriani, Marcelo Velloso
19th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2011

Spatial Indexing on Tetrahedral Meshes
Leila De Floriani, Riccardo Fellegara and Paola Magillo
18th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2010

ONGOING JOURNAL PAPERS

The Stellar decomposition: A compact representation for simplicial complexes and beyond
Riccardo Fellegara, Kenneth Weiss and Leila De Floriani, *submitted for review*

PARTICIPATION IN RESEARCH PROJECTS

Visual Exploration and Sampling Toolkit for Extreme Computing (VESTEC)
European Commission grant H2020-FETHPC-2017 (ref. 800904)

Geospatial Data Representation and Analysis through the Stellar Decomposition
National Science Foundation (NSF) project IIS-1910766

Open-Source Deep Learning Classification and Visualization of Multi-Temporal Multi-Source Satellite Data
NASA project 18-1-S5.03-4282

Topology-based analytics of big social networks
2017-2018 Dean Research Initiative Program of the Behavioral and Social Sciences (BSOS) College of the University of Maryland

Mesh-based representation and topological analysis of static and time-varying 3D scalar fields and 4D shapes
National Science Foundation (NSF) project IIS-1116747

Analysis and modeling of shapes and multi-dimensional scalar fields
MIUR project - PRIN09 - 2009MT4K2S

PROFESSIONAL SERVICE

SERVICE AT CONFERENCES

- 3rd ACM SIGSPATIAL International Workshop on Analytics for Local Events and News (LENS 2019) - **Role**: Program Committee

REVIEWING ACTIVITIES

- Shape Modeling International Conference - SMI2015/2016
- Symposium on Geometry Processing - SGP2016
- International Conference on Geographic Information Science - GIScience2018
- IEEE Aerospace Conference - IEEE AS 2020

SERVICE AT UNIVERSITY OF MARYLAND

- *Computing Advisory Committee*
  Department of Geographical Sciences, University of Maryland, College Park, USA
  2016/2017/2018

MENTORING AND ADVISING ACTIVITY

- Noel Dyer, Ph.D. student at University of Maryland at College Park and
  National Oceanic and Atmospheric Administration (NOAA), USA

- Chao Feng, Ph.D. student at Xi'an Jiaotong University, Xi'an, China
- Zheng Liu, Ph.D. student at University of Maryland at College Park, USA
- Yunting Song, Ph.D. student at University of Maryland at College Park, USA
- Xin Xu, Ph.D. student at University of Maryland at College Park, USA
- Olivia Pomerenk, undergraduate student at California Institute of Technology, USA (Summer 2016) 2016-2017

TEACHING ACTIVITY

GUEST LECTURER

ALGORITHMS FOR GEOSPATIAL COMPUTING - CMSC498Q - GEOG-498I-788I
Undergraduate and Graduate course in Computer Science and Geographical Sciences
University of Maryland at College Park, USA (2018-2019)

DATA STRUCTURES FOR GEOSPATIAL COMPUTING- GEOG-498I-788I
Undergraduate and Graduate course in Geographical Sciences
University of Maryland at College Park, USA (2017-2018)

GEOSPATIAL ALGORITHMS AND DATA STRUCTURES - GEOG-498I-788I
Undergraduate and Graduate course in Geographical Sciences
University of Maryland at College Park, USA (2016-2017)

TEACHING ASSISTANT

ALGORITHMS AND DATA STRUCTURES
Undergraduate course in Computer Science
University of Genova, Italy (2013-2014)

ALGORITHMS AND DATA STRUCTURES
Undergraduate course in Computer Science
University of Genova, Italy (2012-2013)

ALGORITHMS AND DATA STRUCTURES
Undergraduate course in Computer Science
University of Genova, Italy (2011-2012)

ALGORITHMS AND DATA STRUCTURES
Undergraduate course in Computer Science
University of Genova, Italy (2010-2011)

PRESENTATIONS

Efficient Homology-Preserving Simplification of High-Dimensional Simplicial Shapes
presented at Eurographics 2020
May 2020, Norrköping, Sweden (virtual)

Data processing: compact representations and topological data analysis tools
presented at Capital Graphics 2018
April 2018, Arlington, Washington DC

Efficient Representation and Analysis of Triangulated Terrains
presented at 25^{th} ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems
October 2017, Redondo Beach, California

Geospatial data processing: compact representations and topological data analysis tools
presented at Department of Geographical Sciences - Fall 2016 Seminar Series
October 2016, College Park, MD

Analysis of geolocalized social networks based on simplicial complexes
presented at 9^{th} ACM SIGSPATIAL International Workshop on Location-Based Social Networks
October 2016, Burlingame, California

An efficient approach for verifying manifold properties of simplicial complexes
presented at 25^{th} International Meshing Roundtable (IMR'16)
September 2016, Washington DC

A spatio-topological approach to the representation of simplicial complexes and beyond
Ph.D. thesis defense
May 2015, Genova, Italy

Spatial indexes for simplicial and cellular meshes
ADBIS 2013: 17^{th} East European Conference on Advances in Databases and Information Systems
September 2013, Genova, Italy

A spatial approach to morphological feature extraction from irregularly sampled scalar fields
presented at 3^{rd} ACM SIGSPATIAL International Workshop on GeoStreaming (IWGS'12)
November 2012, Redondo Beach, California

A spatio-topological approach to the representation of simplicial complexes
presented at Dipartimento di Informatica a Scienze dell'Informazione ($DISI$)- Ph.D. Seminar Series
April 2012, Genova, Italy

LANGUAGES (Following CEFR scale)

Italian - *(Native proficiency)(C2)*

English - *(Full professional proficiency)(C1)*

First Certificate, June 2008

P.E.T. Certificate, June 2005

French - *(Limited working proficiency)(B1)*
German - *(Elementary proficiency)(A2)*