Riccardo Fellegara
Curriculum Vitæ (January 12, 2024)

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

Visiting Research Scientist   October 2021 - December 2021
> Helmoholtz Centre for Ocean Research Kiel (GEOMAR), SH, 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

VESTEC: Visual Exploration and Sampling Toolkit for Extreme Computing Urgent decision making meets HPC: Experiences and future challenges
Markus Flatken, Artur Podobas, Riccardo Fellegara, et al.
IEEE Access, vol. 11, pp. 87805-87834, 2023

TopoCluster: A Localized Data Structure for Topology-based Visualization
Guoxi Liu, Federico Iuricich, Riccardo Fellegara, and Leila De Floriani
IEEE Transactions on Visualization and Computer Graphics (TVCG), vol. 29, no. 2, pp. 1506-1517, 2023

Immersive and Interactive 3D Visualization of Large-Scale Geo-Scientific Data
Markus Flatken, Simon Schneegans, Riccardo Fellegara and Andreas Gerndt
IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), pp. 211-215, 2023

Terrain trees: a framework for representing, analyzing and visualizing triangulated terrains
Riccardo Fellegara, Federico Iuricich, Yunting Song, and Leila De Floriani
Springer GeoInformatica, vol. 27, no. 3, pp. 525-564, 2023

Explorative, Immersive Visualization of Space Weather Phenomena
Riccardo Fellegara, Katharina Krösl, Markidis Stefano, et al.
17th International Conference on Space Operations (SpaceOps), 2023

Efficient topology-aware simplification of large triangulated terrains
Yunting Song, Riccardo Fellegara, Federico Iuricich, and Leila De Floriani
29th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2021

The Stellar decomposition: A compact representation for simplicial complexes and beyond
Riccardo Fellegara, Kenneth Weiss and Leila De Floriani
Computers & Graphics, 98: 322–343, 2021

Interactive visualization and topology-based analysis of large-scale time-varying remote-sensing data: challenges and opportunities
Riccardo Fellegara, Markus Flatken, Francesco De Zan, and Andreas Gerndt
EGU General Assembly 2021

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
26th 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
25th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems, 2017

An efficient approach for verifying manifold properties of simplicial complexes
Riccardo Fellegara, Kenneth Weiss and Leila De Floriani
25th 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*

PARTICIPATION IN RESEARCH PROJECTS

CosmoWeather: Augmented / Virtual Reality for Space Safety Programme Use cases
　ESA Express Procurement Plus - EXPRO+ (No. 4000136331/21/D/SR)

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

- Eurographics Symposium on Parallel Graphics and Visualization (EGPGV 2023) - **Role**: Program Committee

- Eurographics Symposium on Parallel Graphics and Visualization (EGPGV 2022) - **Role**: Program Committee

- 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

- Journal of Flow Visualization and Image Processing - 2021

- IEEE Vis - 2021

- GeoInformatica - 2021, 2022

- IEEE TVCG - 2021

- EuroVis EGPGV - 2022, 2023

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

CURRENT STUDENTS

- Yunting Song, Ph.D. student at University of Maryland at College Park, USA (since 2018)

- Lena Ricarda Happ, Ph.D. student at University of Bremen and Alfred-Wegener-Institut - Helmholtz Centre for Polar and Marine Research (AWI), Germany (since 2022)

FORMER STUDENTS

- Ami K. Trivedi, Master student at Hof University, Germany (2023)

- Nicole Schröder, Master student at University of Bremen, Germany (2022)

- Noel Dyer, Ph.D. student at University of Maryland at College Park and National Oceanic and Atmospheric Administration (NOAA), USA (from 2018 to 2019)

- Chao Feng, Ph.D. student at Xi'an Jiaotong University, Xi'an, China (from 2017 to 2018)

- Zheng Liu, Ph.D. student at University of Maryland at College Park, USA (from 2018 to 2019)

- Xin Xu, Ph.D. student at University of Maryland at College Park, USA (from 2016 to 2019)

- Olivia Pomerenk, undergraduate student at California Institute of Technology, USA (Summer 2016) 2016-2017

TEACHING ACTIVITY

GUEST LECTURER

HIGH-PERFORMANCE VISUALIZATION
Undergraduate and Graduate course in Computer Science and Mathematics
University of Bremen, Germany (2022-2023)

HIGH-PERFORMANCE VISUALIZATION
Undergraduate and Graduate course in Computer Science and Mathematics
University of Bremen, Germany (2021-2022)

HIGH-PERFORMANCE VISUALIZATION
Undergraduate and Graduate course in Computer Science and Mathematics
University of Bremen, Germany (2020-2021)

HIGH-PERFORMANCE VISUALIZATION
Undergraduate and Graduate course in Computer Science and Mathematics
University of Bremen, Germany (2019-2020)

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

Explorative, Immersive Visualization of Space Weather Phenomena
presented at 17th International Conference on Space Operations (SpaceOps)
March 2023

Interactive visualization and topology-based analysis of large-scale time-varying remote-sensing data: challenges and opportunities
presented at European Geosciences Union (EGU) General Assembly 2021
April 2021, virtual

Efficient Homology-Preserving Simplification of High-Dimensional Simplicial Shapes
presented at Eurographics & EuroVis 2020
May 2020, Norrköping, Sweden

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 25th 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 9th 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 25th 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: 17th 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 3rd 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

German - *(Limited working proficiency)(B1)*

     Deutschkurs B1+, July 2022 (Completed)

French - *(Limited working proficiency)(B1)*