

# Giulia Bertagnolli

✉ giulia.bertagnolli@unitn.it    🏠 gbertagnolli.github.io    📧 gbertagnolli    📄 giuliabertagnolli    🐦 GiuliaTtt  
🎓 google-scholar    📄 orcid: 0000-0001-8637-0632

## Education

### University of Trento & CoMuNe Lab, ICT, Fondazione Bruno Kessler

Trento, Italy

PHD IN MATHEMATICS, SUMMA CUM LAUDE

2019 - Dec. 2021

- Thesis title: *Modelling the geometry of complex networks*
- Main supervisor: Dr. Manlio De Domenico
- Co-supervisor: Prof. Claudio Agostinelli

### University of Trento

Trento, Italy

MASTER OF SCIENCE IN IN MATHEMATICS FOR LIFE SCIENCES

2016 - 2018

- Thesis title: *Complex Networks and Statistical Data Depths*
- Supervisors: Dr. Manlio De Domenico, Prof. Claudio Agostinelli

### Bologna Business School, Alma Mater Studiorum - Università di Bologna

Bologna, Italy

1ST LEVEL MASTER IN DATA SCIENCE

2015 - 2016

- With a scholarship from the Boston Consulting Group awarded on merit.

### University of Trento

Trento, Italy

BACHELOR IN MATHEMATICS

2010 - 2014

- Thesis Title: *Common Principal Component Analysis with Applications*
- Supervisor: Prof. Pierluigi Novi Inverardi

### Liceo Bertrand Russell

Cles (TN), Italy

DIPLOMA DI LICEO LINGUISTICO

2005 - 2010

- 4<sup>th</sup> year of study abroad at the Theo-Koch-Schule, Grünberg, Germany

## Experience

### Fondazione Bruno Kessler

Trento, Italy

INTERN AT THE COMUNE LAB

Dec 2018 - Oct 2018

Research activity for the MSc thesis

### TIM JOL SKIL Lab, Fondazione Bruno Kessler

Trento, Italy

DATA SCIENTIST INTERN

May 2016 - Oct 2016

Data Science on telecommunication data (CDRs), from the pre-processing to the analysis of communication patterns. See Candeago, L. et al. *EPJ Data Sci.* 8 (1), 19.

### Residencehotel S.p.a. Trento

Trento, Italy

DATA ANALYST INTERN

May 2015 - Oct 2015

- I developed new macros and UDFs in Excel for the analysis of data (booking engine, social networks), programming in VBA (Visual Basic for Applications)
- I built the (old) website [www.residencehotel.it](http://www.residencehotel.it) with Joomla!3 and custom CSS and Javascript.

## Publications

Oriol Artime, Barbara Benigni, **Giulia Bertagnolli**, Valeria D'Andrea, Riccardo Gallotti, Arsham Ghavasieh, Sebastian Raimondo, Manlio De Domenico (2022). *Multilayer Network Science: From Cells to Societies, Elements in Structure and Dynamics of Complex Networks*, Cambridge University Press, coming soon.

**Giulia Bertagnolli**, Riccardo Gallotti and Manlio De Domenico (2021). Quantifying efficient information exchange in real network flows. *Commun. Phys.* 4, 125 (2021). DOI, arXiv.

**Giulia Bertagnolli** and Manlio De Domenico (2021). Diffusion geometry of multiplex and interdependent systems. *Phys. Rev. E* 103, 042301. DOI. arXiv

Riccardo Gallotti, **Giulia Bertagnolli**, Manlio De Domenico (2021). Unraveling the hidden organisation of urban systems and their mobility flows. *EPJ Data Sci.* 10, 3 (2021). DOI, arXiv

Nina Verstraete, Giuseppe Jurman, **Giulia Bertagnolli**, Arsham Ghavasieh, Vera Pancaldi, Manlio De Domenico (2020). *CovMulNet19*,

integrating proteins, diseases, drugs, and symptoms: a network medicine approach to covid-19. Network and systems medicine, Volume 3, 1, 130–141. DOI.

**Giulia Bertagnolli**, Claudio Agostinelli, Manlio De Domenico (2019). Network depth: identifying median and contours in complex networks. Journal of Complex Networks, Volume 8, Issue 4. DOI, arXiv

Lorenzo Candeago, **Giulia Bertagnolli**, Paolo Bosetti, Michele Vescovi, Francesco Sacco and Bruno Lepri (2019). Cities of a feather flock together: a study on the synchronization of communication between Italian cities. EPJ Data Sci. 8 (1), 19 DOI

## Recent Talks

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### Workshop of the Italian chapter of the Complex Systems Society

WORKSHOP CSS/ITALY

*online*

May 25 2022

**Giulia Bertagnolli** and Manlio De Domenico. Functional rich-clus in complex networks. Invited talk.

### Conference on Complex Systems

CCS2021

*Lyon, FR*

Oct 25-29 2021

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion geometry of multiplex and interdependent systems.

### A Joint Sunbelt and NetSci Conference

NETWORKS 2021

*IUNI Indiana, US*

Jul 5-10 2021

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion geometry of multiplex and interdependent systems.

### International (Online) Conference on Complex Networks

COMPLENET LIVE 2021

*Exeter, UK*

May 24-26 2021

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion geometry of multiplex and interdependent systems.

### International (Online) Conference on Complex Systems

CCS 2020

*Thessaloniki, GR*

Dec 4-11 2020

**Giulia Bertagnolli** and Riccardo Gallotti and Manlio De Domenico. Quantifying efficient information exchange in real network flows. DOI: 10.5281/zenodo.4419178

### International School and Conference (Online) on Network Science

NETSCI 2020

*Rome, IT*

Sept 7-15 2020

**Giulia Bertagnolli** and Riccardo Gallotti and Manlio De Domenico. Quantifying efficient information exchange in real network flows.

### International School and Conference (Online) on Network Science

NETSCI 2020 - NETCENT SATELLITE

*Rome, IT*

Sept 7-15 2020

**Giulia Bertagnolli** and Claudio Agostinelli and Manlio De Domenico. Network depth: identifying median and contours in complex networks.

### Higher-order connectivity and correlations in complex systems

CSH WORKSHOP ON HIGHER-ORDER INTERACTIONS

*Vienna, AT*

Nov 25-26 2019

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion processes and the functional organization of complex networks.

## Teaching Activity

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### The geometry of statistical models

TEACHING

*Trento, Italy*

March 2020

A short course (8h) to introduce some students of the master in Mathematics, curriculum: Mathematics and Statistics for Life and Social Sciences (track: Mathematics for data science) to Information geometry. Details on my webpage

### Probability and Statistics Undergraduate Course

TUTOR

*Trento, Italy*

Spring sem. 2022/2023

42h of tutoring/teaching in the Probability and Statistics course for the Undergraduate degree in Computer Science

### Probability and Statistics Undergraduate Course

TUTOR

*Trento, Italy*

Spring sem. 2021/2022

30h of tutoring/teaching in the Probability and Statistics course for the Undergraduate degree in Computer Science

### Graphical models and network science

INVITED LECTURER

*Trento, Italy*

12h Dec. 2021

An introduction to network science for the Master degree in Mathematics, inside the course "Graphical models and network science" of prof. Veronica Vinciotti.

## Fundamentals of network analysis: hands on

SEMINAR

Seminar for the course “Network Science: theory and lab” of the MSc in Data Science.

*Trento, Italy*

*4h Spring 2021*

## Fundamentals of network analysis: hands on

SEMINAR

Seminar for the course “Network Science: theory and lab” of the MSc in Data Science.

*Trento, Italy*

*6h Spring 2020*

## Probability and Statistics Undergraduate Course

TUTOR

34h of tutoring/teaching in the Probability and Statistics course for the Undergraduate degree in Computer Science

*Trento, Italy*

*Autumn sem. 2018/2019*

## Other projects

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**R package: diffudist** Released on CRAN and [gbertagnolli.github.io/diffudist](https://github.com/gbertagnolli/diffudist) CRAN, this R package collects the functions for the computation of diffusion distances on complex (single-layer) networks.

**R package: intsegration** Released on [github.com/gbertagnolli/intsegration](https://github.com/gbertagnolli/intsegration), this R package enables the evaluation of the efficiency of weighted networks. The main algorithm is written in C, as a variation on the classic Floyd-Warshall algorithm for computing weighted shortest paths and distances. This package collects the code used in the paper [EPJ Data Sci. 10, 3 (2021)] and [Commun. Phys. 4, 125 (2021)].

**R package: muxViz 3.0** I contributed in this R package by Dr. Manlio De Domenico. In particular I built the R package, starting from R scripts, built the package website, using pkgdown, and helped deploying it on github.

## Reviewer Activity

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### Statistics Surveys

*Institute of Mathematical Statistics*

### Journal of the Royal Statistical Society: Series A (Statistics in Society)

*Royal Statistical Society*

### Physical Review E

*American Physical Society*

### Physical Review E

*American Physical Society*

### Journal of Physica A: Mathematical and Theoretical

*IOP Publishing*

Selected as an Outstanding Reviewer for Journal of Physics A: Mathematical and Theoretical for 2019.

### Physical Biology

*American Physical Society*