Luca Patelli

Personal Information

Date of Birth	January 19th, 1996
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Presentation

Since December 2024, I have been working as a Postdoctoral Research Fellow in Economic Statistics at the Department of Economics at the University of Bergamo, Italy. My primary research areas are the quantification and impact of sustainability in companies and financial activities, as well as in the environmental field. In July 2025, I obtained my PhD in Applied Economics and Management (specialising in Statistics) from the University of Pavia. My research focused on machine learning algorithms for spatial applications (geostatistics), with a particular emphasis on explainability issues.

Current academic position

12/2024 – p   **Research Fellow in Economic Statistics (STAT-02/A)**
University of Bergamo, Bergamo, Italy
Department of Economics (DSE)
Project: Integrating, managing and modelling big data to study the impact of innovation, sustainability and the ecological revolution.

Education

10/2021–   **PhD in Applied Economics and Management XXXVII cycle - Field: Statistics** (link)
07/2025.   *University of Pavia, Pavia, Italy*
Department of Economics and Management
Final grade: Excellent - Defense: 10th July 2025
Supervisors: prof. Michela Cameletti & dr. Natalia Golini
Thesis: Essays on Statistical Learning Models for Environmental Applications with a Focus on Explainability.

2018–2021   **M.Sc. Degree in Economics & Data Analysis (LM-56) and European Master in Official Statistics (EMOS)**
University of Bergamo, Bergamo, Italy
Department of Economics, Management and Quantitative Methods (DSAEMQ)
Final grade: 110/110 cum laude – Defense: 15th April 2021
Supervisors: prof. Annamaria Bianchi, prof. Silvia Biffignandi, dr. Matteo Mazziotta & dr. Antonella Bernardini
Thesis: Measuring sustainability in enterprises: a regional composite index.

2015–2018	**B.Sc. Degree in Economics (L-33)**
	University of Bergamo, Bergamo, Italy
	Department of Economics, Management and Quantitative Methods (DSAEMQ)
	Final grade: 98/110 – Defense: 22nd October 2018
	<u>Supervisor</u>: prof. Stefano Lucarelli
	<u>Thesis</u>: La Borsa Italiana nel periodo 1990–1994: una network analysis.

Complementary education

Jul. 2024	**Valencia International Bayesian Analysis Summer School (VIBASS), 7th edition**
	VAlencia BAyesian Research group and University of Valencia, Valencia, Spain (link)
	Intensive program (one week) on introduction to Bayesian Learning and Bayesian modelling for economic evaluation of healthcare interventions.
Dec. 2023	**Short course on Network econometrics (4 hours)**
	CMStatistics 2023, Berlin, Germany – prof. Monica Billio & prof. Roberto Casarin
Aug. 2023	**Summer School: Processing and visualizing large geospatial data using R, Python and Julia**
	OpenGeoHUB and Adam Mickiewicz University, Poznan, Poland (link)
	Intensive program (one week) on spatial analysis, visualization of spatio-temporal data, big data in geomorphometry, machine learning and deep learning methods for spatial data, geocomputation in R and/or Python.
May 2023	**Introduction to Bayesian modelling with INLA (3 ECT's)**
	PR Statistics, Online - prof. Virgilio Gómez Rubio (link)
	One week course on Bayesian modelling with INLA, from the basics of Bayesian inference to using INLA with latent effects and priors not included in the R-INLA package – prof. Virgilio Gómez Rubio.

Visiting periods and international research

2-4/2023	**Visiting Research Fellow at University Miguel Hernández of Elche, Spain**
	Research Institute "Center of Operations Research" (CIO)
	<u>Period</u>: February-April 2023 (2 months)
	<u>Supervisor</u>: prof. Josep Xavier Barber Valles
	<u>Research topics</u>:
	o Random Forest explainability;
	o Random Forest for spatio-temporal applications.

Teaching and academic service

Teaching at the University of Bergamo (Italy)
Department of Economics (DSE)

o <u>B.Sc. Courses</u>
Metodi Statistici per Analisi di Mercato (Course page)
3 ECTS/CFU (24 hours), B.Sc. in Economics
A.Y. 2025/2026

o <u>Teaching Assistant of</u>
- *AI and Machine Learning for Finance (18 hours)*
A.Y. 2023/2024
- *Political Economy (18 hours)*
A.Y. 2021/2022; 2022/2023
- *Teaching Assistant of Statistics I (24 hours)*
A.Y. 2020/2021

Department of Engineering and Applied Sciences (DISA)

o <u>Teaching Assistant of</u>
Statistics (16 hours)
A.Y. 2021/2022

Scuola di Alta Formazione (SDM)

o <u>Lecturer of</u>
- *Machine Learning and Artificial Intelligence Algorithms (16 hours)*
A.Y. 2024/2025
- *Introduction to R and RStudio course (8 hours)*
A.Y. 2023/2024; 2024/2025
- *Data Mapping course (2 hours)*
A.Y. 2023/2024

Professional experience

07/2021 – **Collaboration Contract - Construction and Analysis of Datasets**
09/2021 *University of Bergamo, Bergamo, Italy*
The project involved the construction and analysis of datasets to study the connections between Italian parliamentarians and the board members of firms listed on the Milan Stock Exchange. This included the calculation of Centrality Indices for identified networks.

10/2020 – **Curricular Internship**
03/2021 *Istituto Nazionale di Statistica (ISTAT), Rome, Italy*
The project entailed the construction of composite indexes to assess the sustainability levels of enterprises in Italy by region. The key activities encompassed the selection of data from ISTAT and other official statistics sources, the processing and analysis of this data to compile synthetic indicators, and the production and dissemination of the results.

Software and programming skills

Advanced programming knowledge **R** Revision of the function *ci_ampi* contained in the R package *Compind* for the construction of Composite Indicators.

Intermediate programming knowledge **SAS**; **gretl**

Proficient programming knowledge **Python**; **STATA**

Languages

Italian **Mother tongue**

English **Writing**: B2
Oral comprehension: B2
Reading: B2
Speaking: B2

Spanish **Writing**: B2
Oral comprehension: B2
Reading: B2
Speaking: B2

Scientific research output

Bibliometric indices (September 2025)

H-Index: 2 (Google Scholar)

Citations: 19 (Google Scholar)

Peer-reviewed scientific publications

Journal articles

1. Patelli, L., Golini, N., Ignaccolo, R. & Cameletti, M. (2025). **S-SIRUS: an explainability algorithm for spatial regression Random Forest**. *Stat Comput* **35**, 142. DOI: 10.1007/s11222-025-10656-0

Book chapters

2. Patelli, L., Cameletti, M., Golini, N. & Ignaccolo, R. (2024) **A path in regression Random Forest looking for spatial dependence: a taxonomy and a systematic review**. In: Knoth, S., Okhrin, Y., Otto, P. (Eds.), *Advanced Statistical Methods in Process Monitoring, Finance and Environmental Science*, Springer.

Short papers

3. Patelli, L., Maranzano, P. & Toninelli, D. (2025). **Land Use Changes in the Alpine Area of Lombardy: A Challenge for AI**. In: Nava, C. R., Tedeschi, S. (eds), *BDAI 2025 New frontiers in Big Data and Artificial Intelligence 2025. Proceedings of the 2nd Workshop "New frontiers in Big Data and Artificial Intelligence" (BDAI 2025)*. CEUR Workshop Proceedings, 1613–0073. https://doi.org/10.1007/978-3-031-96033-8_27

4. Patelli, L. & Toninelli, D. (2025). **Exploring the Ultrametric Composite Indicator for Assessing Corporate Sustainability**. In: di Bella, E., Gioia, V., Lagazio, C., Zaccarin, S. (eds), *Statistics for Innovation IV. SIS 2025*. Italian Statistical Society Series on Advances in Statistics. Springer, Cham. https://doi.org/10.1007/978-3-031-96033-8_27

5. Patelli, L. & Toninelli, D. (2025). **Corporate Sustainability: a Technical Rehearsal for the Construction of a Composite Index**. In *Book of Short Papers of the 3rd Italian Conference on Economic Statistics (Accepted for publication on January 16th 2025) - To appear*

6. Patelli, L., Cameletti, M., Golini, N. & Ignaccolo, R. (2025). **When space matters, how can we explain Random Forest?**. In: Pollice, A., Mariani, P. (Eds.), *Methodological and Applied Statistics and Demography II. SIS 2024*. Italian Statistical Society Series on Advances in Statistics. Springer. https://doi.org/10.1007/978-3-031-64350-7_43

7. Patelli, L., Cameletti, M., Golini, N. & Ignaccolo, R. (2023). **A taxonomy for Random Forest in the spatial regression framework**. In *Proceedings of the GRASPA 2023 Conference, edited by Adelfio, G. & Abbruzzo, A. Pearson, ISBN 9791221033892 (Accepted for publication on April 13th 2023)*

8. Golini, N., Patelli, L. & Barber, X. (2023). **How can we explain Random Forests in a spatial framework?**. In *Book of the Short Papers SIS 2023, edited by Chelli, F.M., Ciommi, M., Ingrassia, S., Mariani, F. & Recchioni, M.C. Pearson, ISBN 9788891935618AAVV*

Under review and working papers

8. Patelli, L., Cameletti, M., De Rubeis, V., Pino, N.A., Piromallo, C., Sbarra, P., & Tosi, P. (2025+). **Machine Learning for Prompt Estimation of Macroseismic Intensity from Seismometric Data in Italy**. (Submitted and currently under review – 12/09/2025)

9. Figueira, M., Cameletti, M., & Patelli, L. (2025+). **INLA-RF: a hybrid strategy for spatio-temporal modeling of environmental data**. (Submitted and currently under review – 28/07/2025). Preprint available at `https://arxiv.org/abs/2507.18488`

Conferences, seminars and workshops

Incoming events

2025 Invited talk: **Greener Strategies, Stronger Results? Environmental Sustainability and Firm Performance in Italy**, *19th International Joint Conference on Computational and Financial Econometrics (CFE) and Computational and Methodological Statistics (CMStatistics)*, 13-15 December 2025, Birkbeck, University of London, UK.

Organized events, discussant and sessions chair

2025 Solicited session organizer: **Advances in statistical machine learning approaches for environmental applications**, *Conference of the Italian research group for Environmental Statistics (GRASPA 2025)*, Roma Tre University, Italy, September 15-17.

Conferences, workshops and talks

2025 Invited talk: **SPDE and Random forest? An hybrid approach for spatio-temporal modeling**, *Conference of the Italian research group for Environmental Statistics (GRASPA 2025)*, 15-17 September, Roma Tre University, Italy.

Poster: **Exploring the Ultrametric Composite Indicator for assessing Corporate Sustainability**, *SIS conference - Statistics for innovation*, 16-18 June 2025, University of Genova, Genova, Italy.

Contributed talk: **Land Use changes in the Alpine Area of Lombardy: a challenge for AI**, *2nd Workshop "New frontiers in Big Data and Artificial Intelligence"*, 29-30 May 2025, University of Valle d'Aosta, Aosta, Italy.

Invited talk: **Comparable Approaches Across Algorithm Types**, *Advances in Spatial Machine Learning 2025: A Two-Day Scientific Workshop*, 24-25 March 2025, Institute of Landscape Ecology, Münster, Germany.

Contributed talk: **Corporate Sustainability: a Technical Rehearsal for the Construction of a Composite Index**, *3rd Italian Conference on Economic Statistics*, 13-14 February 2025, Parthenope University, Napoli, Italy.

2024 Invited talk: **SPDE-Forest: an hybrid approach for modeling geostatistical data**, *18th International Joint Conference on Computational and Financial Econometrics (CFE) and Computational and Methodological Statistics (CMStatistics)*, 14-16 December 2024, King's College London, London, UK.

Invited talk: **When space matters, how can we explain Random Forest?**, *SIS conference*, 17-20 June 2024, University of Bari Aldo Moro, Bari, Italy.

Invited talk: **Machine Learning for Early Prediction of Seismic Intensity in Italy**, *Statistics Talk (StaTalk 2024)*, 30-31 May 2024, University of Firenze, Department of Statistics, Computer Science, Applications "G. Parenti", Firenze, Italy.

Invited talk: **Seeing through the forest: unveiling patterns in spatial regression applications**, *Workshop on Hierarchical Bayesian Spatio-Temporal modelling*, 16-18 April 2024, University of Valencia, Valencia, Spain.

2023   Invited talk: **Random forest in the spatial framework, how to deal with it?**, *16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2023)*, 16-18 December 2023, HTW Berlin, University of Applied Sciences, Berlin, Germany.

Poster: **A taxonomy for Random Forest in the spatial regression framework**, *GRASPA conference*, 10-11 July 2023, University of Palermo, Palermo, Italy - **Best Poster Award**.

Attendance (co-author): **How can we explain Random Forests in a spatial framework?**, *SIS conference - Statistical Learning, Sustainability and Impact Evaluation*, 21-23 June 2023, University Politecnica delle Marche, Ancona, Italy.

Invited talk: **A path in regression Random Forest looking for spatial dependence: a taxonomy and a systematic review**, *Workshop on Statistical and Machine-Learning methods for the study of spatio-temporal phenomena*, 19th June 2023, University G. D'annunzio, Pescara, Italy.

2022   Attendance: *IMS International Conference on Statistics and Data Science (ICSDS)*, 13-16 December 2022, Firenze, Italy.

Attendance: *Second international Workshop on "Statistical inference for assessing and monitoring natural resources and biodiversity"*, 8-9 November 2022, University of Siena, Siena, Italy.

Academic awards

Best Paper at the 2nd Workshop "New frontiers in Big Data and Artificial Intelligence", Aosta, 29-30 May 2025

Best Poster at the GRASPA conference, Palermo, 10-11 July 2023

Scientific affiliations and societies

Italian Statistical Society (SIS) (since 2023), *Young SIS Group (Y-SIS)* (since 2023), *Institute of Mathematical Statistics (IMS)* (since 2022), *Italian Environmetricians Group (GRASPA-SIS)* (since 2022).

Self-Certification (pursuant to articles 46 and 47 of DPR 445/2000)

I declare that the information given is true and correct and I am aware that I shall be liable to prosecution if any statement to a public officer is found to be false, under article 495 of the Italian Criminal Code.

Bergamo, 8th October 2025