

Renato Berlinghieri

Cambridge, MA, USA

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Education

- **Massachusetts Institute of Technology** **Cambridge, MA, USA**
PhD in Computer Science *September 2021 - Present*
Anticipated graduation date: Spring 2027
Member of Professor Broderick's group in the Laboratory for Information and Decision Systems (LIDS)
Research interests: machine learning, Bayesian inference, optimization.
Main project: modelling ocean currents with Gaussian Processes (GPs) using Helmholtz decomposition (*see below*).
Current class curriculum: deep learning, algorithms for inference in probabilistic graphical models, inference and information theory, non-asymptotic statistics, fluid dynamics.
- **Bocconi University** **Milan, Italy**
MSc in Data Science (DSBA) *September 2019 - July 2021*
GPA: 30/30. Final grade: 110/110 with honors. Graduated **rank 1** out of the entire cohort.
Main subjects: statistical learning, Bayesian inference, optimization, stochastic processes, deep learning, statistical physics.
Final Thesis: "Random measure approaches to Bayesian Nonparametrics".
- **Bocconi University** **Milan, Italy**
Bachelor in Economics & Computer Science (BEMACS) *September 2016 - July 2019*
GPA: 30/30. Final Grade: 110/110 with honors. Graduated rank 1 out of the entire cohort.
Main subjects: statistics, algorithms, machine learning, programming (Python, R, Julia), economic theory.
Final Thesis: "The neural basis of decision making".
- **University of California San Diego** **San Diego, CA**
Exchange Student. Major in Mathematics. *January 2019 - April 2019*
Term GPA: 4.00/4.00.
Main subjects: stochastic processes, differential equation, complex analysis, numerical linear algebra.

Experience & Projects

- **Current project: Modelling ocean currents using Gaussian Processes**
I am currently working on developing methods for inferring ocean currents from observations of the trajectories of surface drifter buoys. To this goal, I use two different Gaussian process priors on the components of a Helmholtz decomposition of a vector field, and this method seems to be able to accurately capture physical properties of ocean currents, e.g. continuity and shape of vortices.
- **Bocconi Institute for Data Science and Analytics (BIDSA)** **Bocconi University, Milan**
Visiting student research assistant *March 2020 - May 2021*
Member of the BayesLab, supervised by Professors Lijoi & Pruenster.
I studied Bayesian nonparametric (BNP) models. In particular, starting from a characterization of BNP models using completely random measures, I investigated a framework based on optimal transport for measuring dependence in these models.
Reference paper: "Measuring dependence in the Wasserstein distance for Bayesian nonparametric models" by Catalano et al. (<https://martacatalano.github.io/files/AOS2065.pdf>).
- **Department of Decision Sciences** **Bocconi University, Milan**
Intern research assistant *October 2018 - December 2020*
Member of the Artificial Intelligence Lab, supervised by Professor Marinacci.
I worked on projects investigating neuroeconomics using statistical models for decision making and simulations (in *Julia* and *Python*). This led to the paper "Letting the data speak for value in the Decision Diffusion Model" (*in preparation*).

IGIER Research Center

Research assistant

Bocconi University , Milan

October 2017 - June 2018

Developed data scraping and machine learning routines for economic research with *Python*.

In particular, I used Natural Language Processing techniques to study sentiments towards immigration and racial discrimination in the US at the beginning of 20th century. Main activities: web scraping & pre-processing of data, data analysis, review NLP literature.

BrixiaMaTe APS

Olympiads of mathematics junior tutor

Brescia, Italy

April 2017 - March 2020

Junior Instructor at national workshops for Maths Olympiads, in preparation for various national competitions.

Main activities: I taught lectures about Algebra, Combinatorics, and Number Theory. I selected exercises and organised competitions' simulations (both for individuals and teams).

Publications

- **Berlinghieri, R.**; Broderick, T.; Giordano, R. J.; Ozgokmen, T; Srinivasan, K.; Trippe, B.L.; Junfei, X. (2022). "Gaussian Processes at the (Helm)holtz for learning currents from drifter data." In preparation.
- **Berlinghieri, R.**; Krajbich, I.; Maccheroni, F.; Marinacci, M.; Pirazzini, M. (2022). "A diffusion model estimator reveals the utility functions for value-based choices." In preparation.
- Jing, B.*; Corso, G.*; **Berlinghieri, R.**; Jaakkola, T. (2022). "Subspace diffusion generative models." Under review. arXiv:2205.01490 [cs.LG]

Honors, Certifications & Awards

- **Bocconi Graduate merit award**, issued to academic profiles considered to be amongst the top applicants for MSc.
- National finalist of *Italian Olympiads of Mathematics*:
 - individual competition, in 2014 and 2015 (**Bronze medal**)
 - team competition (captain), in 2013, 2014 (7th place overall), 2015 and 2016 (5th place)
- Finalist of *Championnat International des Jeux Mathématiques et Logiques*:
 - National final (Milan) from 2010 to 2016. Best standings: 3rd place (category C1, 2011), **2nd place** (category L2, 2016)
 - **International final** (Paris) in 2011 (8th place, category C1), and 2016 (**6th place**, category L2)
- Finalist of *Applied Mathematics Grand Prix*, 3rd place overall (Milan, 2016).
- Finalist of Mathematical Modelling competition in Perugia: **1st place** (category intermediate, 2014), 2nd place (category intermediate, 2015).

Skills

- **Programming Languages**: Python (proficient), R (familiar), Julia (familiar), C/C++ (basic).
- **Theory**: Bayesian modelling, deep and statistical learning, probabilistic graphical models, stochastic processes.
- **Languages**: English (fluent), Italian (native), Spanish (basic).

Extra-curricular Activities & Interests

- Current **Vice president of Academics**, EECS Graduate Student Association, MIT.
- MIT Graduate application assistant program (**GAAP**) **mentor** - this program is designed for providing assistance during grad school application to underrepresented groups, defined as those groups for which representation in the EECS PhD program at MIT is significantly less than representation in the general US population.
- Former President and co-founder of **Computational Society for Bocconi Students** – the first student society at Bocconi University interested in Computer Science and Statistics.

- **Mentee at LeadTheFuture** - among the few Italian students selected to be mentees for LeadTheFuture, a leading mentorship non-profit organization for students in STEM, with acceptance rate below 20%.
- Former **Student Ambassador, course representative** and member of the MSc in Data Science committee at Bocconi University - active participation in planning courses' structure and mentoring activities for incoming BSc and MSc students.
- **Goalkeeper** at U.S. Darfo Boario (competitive semi-professionistic team, Italian 4th division), Darfo Boario Terme (2007-2015).
- **Interests:** running, playing basketball and soccer, amateur cooking, playing piano, memes.