Mattia **Ceccarelli**

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About Me

I am a researcher and data scientist currently working on statistical and machine learning models for animal well-being at the department of agri-food science. Passionate about data science, programming, machine learning and numerical methods.

Education and Experiences

Post Doc

Bologna, Italy

DISTAL, Department of Agricultural and Food Sciences - University of Bologna — *Jan 2024 - Present*

- Post-doc at the University of Bologna for numerical analysis applied to precision dairy farming and animal health

Visiting Ph.D.

Leuven, Belgium

Biosystems Department, KU Leuven, Belgium — *Aug 2022 - Nov 2022*

- Visiting Ph.D. period at KU Leuven at the department of Biosystems, under the supervision of Prof. Ben Aernouts and the Livestock Technology group.
- Study on time-series of fat and protein percentages
- Linear mixed models for analysis of milk components

Ph.D. in Agricultural, Environmental and Food Science and Technology - STAAA

Bologna, Italy

DISTAL, Department of Agricultural and Food Sciences - University of Bologna — *Nov 2020 - Jan 2024*

- Thesis Project: "Applications and development of machine learning and deep learning models for biosystems analysis"
- Main studies: machine learning, time-series analysis, data science applied to plants, animals and biosystems

Master Degree in Physics

Bologna, Italy

University of Bologna — *2018-2020*

- Thesis: "Optimisation and applications of deep learning algorithms for super-resolution in MRI "
- Mark: 110/110 *cum laude*
- Main studies: deep learning, data science applied to biophysics, network analysis, programming in python and R

Bachelor Degree in Physics

Bologna, Italy

University of Bologna — *2015-2018*

- Thesis: "Analysis of complexity for neural networks generated through genetic algorithm"
- Mark: 106/110

Skills

Technical

- **Languages:** Python, R, C++
- **Frameworks:** Pandas, Scikit, Numpy, seaborn, Tensorflow, PyTorch
- **Familiar with:** Bash, Rust
- **Softwares:** LaTeX, OfficeSuite, Git / GitHub
- **OS:** Linux, Windows

Languages

- **Mother tongue :** Italian
- **Foreign language :** English,

Reading	Listening	Speaking	Writing
C2	C2	C1	B2

IELTS - British Council 22/06/2019 - Mark: 8.0 - European Level C1

Research Projects

SUS3D: One SUStainability vision in Dairy farms: a big Data approach for a perspective Decision making.

DISTAL - University of Bologna

Data scientist, Machine Learning developer — *2022 - Present*

Data-driven improvement of animals' well-fare and Precision Livestock Farming (PLF).

Smart dairy farming: innovative solutions to improve herd productivity (MUR-PRIN)

DISTAL - University of Bologna

Data scientist, Machine Learning developer — *2020 - 2023*

Development of models for estimation of dairy cattle's production based on climatic conditions.
Time-series analysis for events prediction related to mastitis.

Big data and advanced analytic for sustainable management of the dairy cattle sector (EIT Food) *DISTAL - University of Bologna*

Data scientist, Machine Learning developer *2021 - 2023*

Analysis and assessment of anomalies in production time-series related to heat-stress in dairy cattle.
Automatic identification of anomalies in production and milk quality data

SIMTAP: Self-Sufficient Integrated Multi-Trophic Aquaponics systems (PRIMA) *DISTAL - University of Bologna*

Data scientist, Machine Learning developer *2020 - 2023*

Data handling and data cleaning for time series analysis of greenhouses
Monitoring of climate condition
Energy consumption analysis

Publications

1. Mattia Ceccarelli, Marco Bovo, Daniele Torreggiani, Patrizia Tassinari, and Ben Aernouts. Linear mixed models for corrections of milk components in ams dairy farms. In *AgEng 2024, Date: 2024/07/01-2024/07/04, Location: Athens, Greece*, 2024
2. Martin Julius Gote, Ines Adriaens, Mattia Ceccarelli, Lore D'Anvers, Dyan Meuwissen, and Ben Aernouts. Cowbase-a library for dairy farm data handling and curation in python. In *Book of Abstracts of the 75th Annual Meeting of the European Federation of Animal Science*, volume 34, pages 286–286, 2024
3. Cristiana Fiscone, Nico Curti, Mattia Ceccarelli, Daniel Remondini, Claudia Testa, Raffaele Lodi, Caterina Tonon, David Neil Manners, and Gastone Castellani. Generalizing the enhanced-deep-super-resolution neural network to brain mr images: A retrospective study on the cam-can dataset. *Eneuro 2024, Vol. 11*, 2024
4. Marco Bovo, Mattia Ceccarelli, Miki Agrusti, Daniele Torreggiani, and Patrizia Tassinari. Dairy chaos: Data driven approach identifying dairy cows affected by heat load stress. *Computers and Electronics in Agriculture*, 218:108729, 3 2024
5. Claudia Giannone, Marco Bovo, Mattia Ceccarelli, Daniele Torreggiani, and Patrizia Tassinari. Review of the heat stress-induced responses in dairy cattle. *Animals 2023, Vol. 13, Page 3451*, 13:3451, 11 2023
6. Alberto Barbaresi, Mattia Ceccarelli, Giulia Menichetti, Daniele Torreggiani, Patrizia Tassinari, and Marco Bovo. Application of machine learning models for fast and accurate predictions of building energy need. *Energies 2022, Vol. 15, Page 1266*, 15:1266, 2 2022
7. Mattia Ceccarelli, Alberto Barbaresi, Giulia Menichetti, Enrica Santolini, Marco Bovo, Patrizia Tassinari, Francesco Barreca, and Daniele Torreggiani. Simulations in agricultural buildings: a machine learning approach to forecast seasonal energy need. In *2022 IEEE Workshop on Metrology for Agriculture and Forestry (MetroAgriFor)*, pages 116–120. IEEE, 2022
8. F Tinti, D Rapti, R Caputo, CA Perez Garcia, M Ceccarelli, E Santolini, S Benni, et al. Investigations and modelling for a practical application of borehole thermal energy storage. In *Geosciences for a Sustainable Future-Proceedings*, pages 1–1. 2022
9. Alberto Barbaresi, Mattia Ceccarelli, Miki Agrusti, Marco Bovo, Enrica Santolini, Patrizia Tassinari, and Daniele Torreggiani. Methodology for sensor calibration in agro-industrial facilities. In *2021 IEEE International Workshop on Metrology for Agriculture and Forestry (MetroAgriFor)*, pages 238–242. IEEE, 11 2021
10. Alberto Barbaresi, Miki Agrusti, Mattia Ceccarelli, Marco Bovo, Patrizia Tassinari, and Daniele Torreggiani. A method for the validation of measurements collected by different monitoring systems applied to aquaculture processing plants. *Biosystems Engineering*, 7 2021
11. Federico Baldo, Lorenzo Dall'Olio, Mattia Ceccarelli, Riccardo Scheda, Michele Lombardi, Andrea Borghesi, Stefano Diciotti, and Michela Milano. Deep learning for virus-spreading forecasting: a brief survey. 3 2021

Personal Projects

NumPyNet (GitHub)

Neural Network Library in pure NumPy *2019 - Present*

- A python framework that let you build your convolutional neural network with the most used layers
- An easy to read numpy-only implementation
- Useful for learning and teaching purposes

Other Experiences

Academic Tutor - Mathematics *Imola, Italy*

University of Bologna - Bachelor in Science and Technology for green systems and landscape *Oct 2023 - Present*

The tutoring consisted in 40 hours annually of in-presence lessons for reviewing the main concepts of mathematics and exercises.

Academic Lessons - Machine Learning *Bologna, Italy*

University of Bologna - Ph.D. course in Health, Safety and Green Systems *2023 - 2024*

The two events consisted of 4 hours frontal lessons where the teaching focus was on programming in python for big data management and machine learning for the PhD course in Health Safety and Green Systems of the University of Bologna

Other

Bologna *2015 - 2020*

- Part-time job over a three years period in different offices at Bologna University.
- Private lessons for high school and undergraduate students in physics, mathematics and informatics