Venturi Francesca

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Personal Profile

I am a mathematical engineer with a strong enthusiasm for challenges and a natural inclination toward critical thinking. My primary interest lies in Machine Learning (ML) and its practical applications in everyday life, particularly within the biomedical field.

Education

École Polytechnique Fédérale de Lausanne (EPFL) and Politecnico di Milano *Lausanne, Switzerland - Milan, Italy*

Double Degree Program: MSc in Computational Science and Engineering *Sept 2021 - Oct 2024*

- Sept 2021 - Sept 2022: MSc in Mathematical Engineering - Computational Science and Computational Learning at Politecnico di Milano
- Sept 2022 - Sept 2024: MSc in Computational Science and Engineering at EPFL, School of Basic Sciences, Mathematics
- Master Thesis Grade at EPFL: 6/6
- Final Grade at Politecnico di Milano: 110/110 with honours

Politecnico di Milano *Milan, Italy*

BSc in Mathematical Engineering *Sept 2018 - Sept 2021*

- Final Grade: 110/110 with honours
- Scholarship as Best Freshmen

Liceo Ginnasio Luigi Galvani *Bologna, Italy*

High School *Sept 2013 - Jun 2018*

- Scientific and English Enhancement Program, in collaboration with Cambridge University for IGCSE Exams. Final grade: 100/100

Work Experience

Healthanea - AXA and Microsoft Spin-off (Digital Health) *Lausanne, Switzerland*

Data Science Intern *Sept 2023 - Feb 2024*

- Development of statistical and deep learning (DL) methods for Synthetic Data Generation in Healthcare, specifically working with tabular data.
- Applied and explored Bayesian networks, Variational AutoEncoders (VAEs), and Conditional Generative Adversarial Networks (GANs) for data modeling and generation.
- Focused on Privacy-Preserving Techniques (PPT) to ensure data security and compliance with GDPR.

University Projects

LipiMap: A Biologically-Informed VAE Reveals Lipid Metabolic Modules in the Brain *Lausanne, Switzerland*

Laboratory for Brain Development and Biological Data Science, EPFL (Master Thesis) *Feb 2024 - Sept 2024*

- Analysis of lipidomic data: mapping lipid expressions into Lipid Programs.
- Integration of prior biological knowledge into model's architecture for interpretability.

Deep Learning Models for Protein Assembly *Lausanne, Switzerland*

Laboratory for Biomolecular Modeling, EPFL *Feb 2023 - Jun 2023*

- Denoising AutoEncoder for Protein Reconstruction.
- Structural Embedding for lower-dimensional space representation of proteins and data interpretability.

Mathematical Modelling of Neurodegenerative Disorders *Milan, Italy*

MOX Lab, Politecnico di Milano *Sept 2022 - Feb 2023*

- Graph approximation of the cerebral network and numerical solution of diffusive non-linear PDEs.

Sharpness-Aware Minimization for Efficiently Improving Generalization *Lausanne, Switzerland*

Optimization for Machine Learning (CS-439), EPFL *Feb 2023 - Jun 2023*

- Optimizing the loss by simultaneously accounting for its geometric landscape.

Parameter Estimation in PDE-Regularized Spatial Regression via Parameter Cascading *Milan, Italy*

MOX Lab, Politecnico di Milano *Jan 2023 - Apr 2023*

- Optimal search of penalization parameter in a physics informed model for blood flow in cardiovascular system.

Memory Effect in Aerospace Bearings *Lausanne, Switzerland*

CSQI Lab, EPFL *Dec 2022 - Jan 2023*

- Analysis on the memory effect of aerodynamic forces on a rotor supported by two aerospace bearings. Linear regression models and Neural Networks (FNN and CNN) for prediction based on spatial coordinates of the rotor.

Skills

Programming	Python (Pandas, PyTorch, NumPy, Scikit-learn. etc.), MATLAB, C/C++.
Miscellaneous	Linux, Shell (Bash/Zsh), LaTeX(Overleaf/R Markdown), Microsoft Office, Git.
Soft Skills	Teamwork, Dedication, Self-Control in Stressful Situations, Problem-Solving, Critical Thinking, Engaging Presentation.

Interests

Sports	I'm a sports enthusiast with a background as a competitive basketball player, which got me into coaching and shaped my teamwork skills. I'm also into all kinds of sports, especially skiing and tennis.
Current events	Being aware of the world around me allows me to expand my knowledge, thus my opinions and choices.
Volunteering	I volunteered with AIL Bologna (Italian Association against Leukemia, Lymphoma, and Myeloma), helping with Christmas and Easter jumble sales. Recently, I also supported flood-affected communities in Bologna in October 2024.

Languages

Italian	Native proficiency
English	Professional proficiency, Certificate in Advanced English (CAE), C1
French	Advanced proficiency, Diplôme d'Etudes en Langue Française (DELF), B2

References available upon request.