Malek Ben Salah

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Paris, France

Summary

Second-year PhD student in Machine Learning at Université Paris-Saclay, where I work at the intersection of causal inference, representation learning, and survival analysis. I'm particularly interested in probabilistic deep learning for uncertainty-aware decision making, and in making sure survival models stay well-calibrated when pushed into counterfactual regression settings. I'm also passionate about the engineering side of research, turning ideas into clean, modular implementations that solve real problems.

Education

2025 – Present	**PhD in Machine learning applied to healthcare**
	Université Paris-Saclay — CentraleSupélec & Institut Gustave Roussy
	Causal survival modeling and calibrated counterfactual prediction for sequential treatment strategies in longitudinal healthcare data.
2023 – 2024	**MSc Mathematics for Life Sciences**
	Institut Polytechnique de Paris
	Coursework: Biostatistics, causal inference, reinforcement learning, medical imaging, high-dimentional statistics, brain-computer interface
2021 – 2024	**Double Engineering Degree in Applied Mathematics**
	ENSTA Paris — ENIT Tunisia
	Coursework: Optimization, probabilities and stochastic calculus, statistical modeling, partial differential equations, variational inference
2018 – 2021	**Pre-engineering in Mathematics and Physics** — IPEST Tunis
	Ranked **1st nationally** in engineering entrance exam

Experience

Research Internship — MICS Laboratory, CentraleSupélec   Apr 2024 – Oct 2024

– Development of a tree-based conformal prediction algorithm for individual treatment effect estimation.

– Exploration of uncertainty quantification methods providing fast approximate conditional guarantees.

Research Internship — MICS Laboratory, CentraleSupélec   Jun 2023 – Sep 2023

– Developed Bayesian Gaussian mixture models to characterize heterogeneous cardiovascular risk in pediatric cancer survivors.

– Implemented MCMC inference algorithms for parameter estimation and uncertainty quantification.

– Presented at the AppliBUGS workshop and acepted to the annual meeting of the French statistics society (SFDS)

Projects

Counterfactual Image Generation for Fetal Ultrasound   2024

Generation of synthetic fetal ultrasound images using conditional VAEs, GANs and diffusion models to improve dataset diversity for medical AI training. Collaboration with Sonio.

Causal Inference on Time Series   2024

Reimplementation of the TiMINo algorithm and benchmarking on synthetic datasets for causal discovery in time series.

Reinforcement Learning   2024

Theoretical and empirical analysis of TRPO and PPO algorithms.

Technical Skills

Programming	Python (NumPy, Pandas, PyTorch, JAX), R, C/C++
Tools	Git, Linux, Slurm, Docker, pre-commit, ruff

Languages

Arabic — Native	French — Native	English — C1+ (Cambridge Linguaskill)

Teaching

Teaching Assistant — CentraleSupélec   2024 – Present

– Teaching assistant for first-year engineering modeling.

– Professor for second-year advanced statistics.

– Supervision of modelling projects for life sciences students.

– Coding bootcamp instruction.