

# Clément Bénard

18/08/1991

06 19 96 76 96 - [clement.benard5@gmail.com](mailto:clement.benard5@gmail.com)

Montrouge 92120

## PROFESSIONAL EXPERIENCE

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**AI RESEARCH SCIENTIST** – *Thales Research*, Palaiseau, France

*Jun. 2024 - now*

- Explainable AI and Decision Aid

**MACHINE LEARNING RESEARCHER** – *Safran Tech*, Châteaufort, France

*Feb. 2018 - Jun. 2024*

- AI for numerical simulation
- **Main research topics:** explainable AI (XAI), causal inference, random forests, uncertainty quantification, Bayesian optimization, design of experiments, active learning, Gaussian processes, graph neural networks ([Google Scholar](#))
- **7 articles** in main international journals and conferences (NeurIPS, AISTATS, Biometrika, EJS), **reviewer** for AISTATS 2021-2024, Biometrika, JASA, Statistics & Computing, and the US PNAS
- Development of machine learning packages in R/C++: [sirius](#), [sobolMDA](#), [shaff](#), [kernax](#), [vimp-causal-forests](#)
- **Collaborations** with Inria, Sorbonne Université, and Ecole Polytechnique
- **Applied projects** in machine learning & statistics for **industrial design and production**
- **Management** of a research scientist and a software engineer
- **Project leader** and developer of [Lagun](#) software (platform for exploration of numerical simulations), 5 years of development, 7 contributors, collaboration with IFPEN
- **Instructor** in optimization & uncertainty quantification for engineers (multiple 2-day sessions per year)

**DATA SCIENTIST** – *Safran*, Magny-les-Hameaux, France

*Oct. 2015 – Jan. 2018*

- Data science for manufacturing processes (interpretable machine learning)

**DATA SCIENTIST** – *PayPal*, San Jose, California, USA

*Aug. 2014 – Oct. 2015*

- Consumer targeting for email campaigns: predictive and descriptive analytics (A/B tests design, machine learning, time series), and heavy use of Python, R, Teradata SQL

## EDUCATION

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**SORBONNE UNIVERSITE** – *PhD in Applied Mathematics* – Paris, France

*Oct. 2018 - Nov. 2021*

- **Thesis topic:** Random forests and interpretability of learning algorithms (Machine Learning & Mathematical Statistics) - <https://tel.archives-ouvertes.fr/tel-03478241/> - Supervisors: G. Biau, S. Da Veiga, E. Scornet
- 2021 PhD award of [GDR Mascot-Num](#)

**CORNELL UNIVERSITY** – *Master of Engineering* – Ithaca, New York, USA

*Aug. 2013 - May 2014*

- Master of Engineering in Operations Research and Information Engineering

**ECOLE CENTRALE PARIS** – *Master of Engineering* – Paris, France

*Sep. 2011 - Mar. 2015*

- Applied Mathematics concentration (Ranked 35<sup>th</sup>/521 at the end of first year)

## PUBLICATIONS

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- Bénard, C., Näf, J., and Josse, J. (2024). **MMD-based Variable Importance for Distributional Random Forest**. *In Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS 2024)*, PMLR 238:1324-1332, 2024.

- Bénard, C. and Josse, J. (2023). **Variable importance for causal forests: breaking down the heterogeneity of treatment effects.** *arXiv preprint arXiv:2308.03369*. (In revision at Journal of Causal Inference)
- Bénard, C., Staber, B., and Da Veiga, S. (2023). **Kernel Stein Discrepancy thinning: a theoretical perspective of pathologies and a practical fix with regularization.** *Advances in Neural Information Processing Systems* 36 (NeurIPS 2023), 2023.
- Bénard, C., Da Veiga, S., and Scornet, E. (2022). **Interpretability via Random Forests.** In: Lepore, A., Palumbo, B., Poggi, J.M. (eds) *Interpretability for Industry 4.0: Statistical and Machine Learning Approaches*. Springer, Cham.
- Bénard, C., Biau, G., Da Veiga, S., and Scornet, E. (2022). **SHAFF: Fast and consistent SHapley effect estimates via random Forests.** *In Proceedings of the 25<sup>th</sup> International Conference on Artificial Intelligence and Statistics (AISTATS 2022)*, pages 5563-5582. PMLR.
- Bénard, C., Da Veiga, S., and Scornet, E. (2022). **Mean decrease accuracy for random forests: inconsistency, and a practical solution via the Sobol-MDA.** *Biometrika*, 109:881-900.
- Bénard, C., Biau, G., Da Veiga, S., and Scornet, E. (2021). **Interpretable random forests via rule extraction.** *In Proceedings of the 24<sup>th</sup> International Conference on Artificial Intelligence and Statistics (AISTATS 2021)*, pages 937-945. PMLR.
- Bénard, C., Biau, G., Da Veiga, S., and Scornet, E. (2021). **SIRUS: Stable and Interpretable RULe Set for classification.** *Electronic Journal of Statistics*, 15:427-505.

## SKILLS

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### PROGRAMMING

- Python, R, C++, SQL
- **Exposure:** Scala/Spark, MongoDB (Coursera certifications), JavaScript, D3.js, html, CSS, Matlab

### LANGUAGE

- French (Native), English (Fluent), German (Basic).

## OTHER

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### ORAL EXAMINER - Lycée Saint-Nicolas, Paris, France

Sept. 2012 – Jun. 2013

- Conducted two hours a week of oral examination in Mathematics for first year student.

### STUDENT ORGANIZATION – Piston Ski, Paris, France

Mar. 2012 – Mar. 2013

- Led a fifty five-person team to organize a one-week ski trip for four hundred students.
- Managed a budget of 194,000 €, negotiated a 20% cut in suppliers costs, increased group size by 30%.

### SPORTS

- Running, Hiking, Skiing