Clément Bénard

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PROFESSIONAL EXPERIENCE

MACHINE LEARNING RESEARCHER – *Safran Tech*, Magny-les-Hameaux, France *Feb. 2018 - now*

- Research in machine learning
  - Main topics: interpretability, random forests, variable importance, causality, Shapley effects, kernel Stein discrepancy, rule learning (Google Scholar)
  - Development of machine learning packages in R/C++: sirus, sobolMDA, shaff
  - Collaborations with Sorbonne Université and Ecole Polytechnique
  - Reviewer for AISTATS 2021 and 2022, Biometrika Journal, JASA, and the US Proceedings of the National Academy of Sciences (PNAS)
- Applied machine learning & statistics projects for industrial design and production
  - Main topics: design of experiments, conditional Gaussian processes, uncertainty quantification, sensitivity analysis, optimization
  - Project leader and developer of Lagun software (platform for exploration of numerical simulations), 5 years of development, 7 contributors, collaboration with IFPEN for open source release
- Instructor in uncertainty quantification for Safran 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, rule learning)
- Technical leader for 6-month and 3-person project

DATA SCIENTIST – *PayPal*, San Jose, CA, 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

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 35th/521 at the end of first year)

PUBLICATIONS

- Bénard, C., Staber, B., and Da Veiga, S. (2023). **Kernel Stein Discrepancy thinning: a theoretical perspective of pathologies and a practical fix with regularization.** arXiv preprint arXiv:2301.13528.
- 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 25th International Conference on Artificial Intelligence and Statistics*, 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 24th International Conference on Artificial Intelligence and Statistics*, 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

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

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