Romain R. Brault

Curriculum Vitae

Antony (92160), France
+33 (0)6 82 14 72 05 (private)
mail@romainbrault.com
RomainBrault
/in/romain-brault
IFkrCzYAAAAJ

TL; DR: Dynamic and curious, I am a Machine Learning and programing enthusiast looking for a research position, in France or abroad.

Positions

Current, from December 2018 (FT)

Theresis, Thales SIX
Research Scientist

The purpose of our team is to explore, select, analyse Stat of the Art ML solutions, to adapt them to the goals and improve their Technoly Readyness Level (TRL).
We have the double role of directly conducting original research projects for clients (TRL 1-4); but also listen to the need of the Buisness Units to provide them innovative and state of the art solutions tailored to their needs.
In this context I used ML domains as Time-Series forcasting, Speech-to-text, Signal processing (source separation). My current work is focused on Deep-Metric-Learning for signals, and I'm also involved in encouraging and developing MLOps at Thales.

Current, from December 2018 (PT)

Télécom Paris
Assoc. Prof.

One-off replacement of lectures in ML (mainly Kernel Methods and supervised-learning).

October 2018, from September 2017 (FT)

Centrale-Supélec
Post-Doctoral Fellow

My research have been directed toward learning function-valued functions. The idea is that some problems such as Quantile Regression, Cost-Sensitive learning or Level-Set estimation are described by an hyperparameter. Rather than solving the problem for a specific value of the hyperparameter, we propose to learn the whole continuum of hyperparameters. Then we can enforce stronger coherence of the learned models (non-crossing quantiles, nested level sets) and sometimes improve the overall quality of the models [5]. This postdoc is done in collaboration with the CMAP laboratory at École Polytechnique.

Education

2013 – 2017 **Doctor of Philosophy**
Machine Learning
UEVE & Télécom ParisTech

2012-2013 **Master of Science**
Computer Science
Imperial College London

2010 – 2013 **Diplôme d'ingénieur**
Computer Science
ENSIIE, Paris-Saclay

2010 – 2011 **Bachelor of Science**
Mathematics
UEVE, Paris-Saclay

Technical Skills

Pandas, Python, Poetry,

Tensorflow, Pytorch, Scikit-Learn,

C/C++, x86 Assembly, Hardware,
OpenMP, MPI,
Docker, Podman, K8s,
Open-source contribs, CI/CD, MLOps

VIM lover,

LaTeX, Machine Learning, Statistics,
Functional Analysis

References

Pr. Florence d'Alché-Buc

Position: Full Professor
Employer: *LTCI*, *Télécom ParisTech*
Email: florence.dalche@enst.fr

Dr. Zoltán Szabó

Position: Associate Professor
Employer: CMAP, École Polytechnique
Email: zoltan.szabo@polytechnique.edu

Last update: June 9, 2022.

September 2013, from Mai 2013 (FT)

Department of Computing, Imperial College London

Master Thesis

Worked on Finite Elements Method: modified Fluidity's code to integrate bended elements to the FEniCS project.

July 2012, from June 2012 (FT)

CMLA, ENS Cachan

Research Intern

Implementation of a parallel lock-free SGD algorithm using OpenMP and SSE instructions. Also worked on a CUDA GPGPU implementation.

August 2011, from June 2011 (FT)

CEA[2]

Research Intern

Used Machine Learning techniques to calibrate the hyperparameters of a simulation code for nuclear reactions (TALYS).

Doctoral Research

"Large-Scale Operator-Valued Kernel Regression" [3]

My research examined the scalability of learning algorithms based on Operator-Valued Kernels (OVKs) leveraging regression in Hilbert spaces rather than reals.

We developed a stochastic approximation method called ORFF, extending the already existing random Fourier feature methodology to OVKs [1]. We provied theorical guarantees on the quality of the approximation. We applied this work to scale-up non-linear autoregressive models [2]. We also proposed a scalable splitting criteria that extend Random Forests to one-class classification [4].

My doctoral studies have been motivated by my desire to applied mathematical knowledge to practical applications. I enjoy providing robust pieces of software along with theoretical guarantees. During this thesis I have been conducted to develop and maintain the open-source library (now unmaintained) Operalib which aims at implementing operator-valued kernel based algorithms and being fully compatible with Scikit-Learn. I also had the opportunity to be a teaching assistant at UEVE and Télécom ParisTech.

Languages

French (native), **English** (Fluent),

Portuguese (beginner), **German** (notions)

Hobbys

In my spare time climbing, trekking and cycling (commuter). I used to practice archery and enjoy photography.

Publications

Proceedings

[1] Romain Brault, Markus Heinonen, and Florence d'Alché-Buc. "Random Fourier Features For Operator-Valued Kernels." In: Proceedings of Machine Learning Research 63 (16–18 Nov 2016), pp. 110–125. url: http://proceedings.mlr.press/v63/Brault39.html.

[4] Nicolas Goix et al. "One Class Splitting Criteria for Random Forests." In: Proceedings of Machine Learning Research 77 (15–17 Nov 2017), pp. 343–358. url: http://proceedings.mlr.press/v77/goix17a.html.

[5] Romain Brault et al. "Infinite-Task Learning with Vector-Valued RKHSs." In: *Proceedings of AISTATS* (2019). url: https://arxiv.org/pdf/1805.08809.pdf.

Workshop

[2] Romain Brault, Néhémy Lim, and Florence d'Alché-Buc. "Scaling up Vector Autoregressive Models With Operator-Valued Random Fourier Features." In: *AALTD: ECML/PKDD International Workshop on Advanced Analytics and Learning on Temporal Data*. 2016, p. 3. url: https://aaltd16.irisa.fr/accepted-papers/.

Thesis

[3] Romain Brault. "Large-scale operator-valued kernel regression." 2017SACLE024. PhD thesis. 2017. url: http://www.theses.fr/2017SACLE024/document.

Distinctions

2012 **Best engineering project**
National reward to our team for the best engineering project among the French Junior Entreprises.

2011 **Top Achiever Award**
Best Individual Project (out of 109)
Implemented a kernel SGD algorithm (NORMA) for house market prediction in London.