Romain R. Brault

Curriculum Vitae

Paris (75015), 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.

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 Operalib which aims at implementing state of the art 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.

Positions

Current, from December 2017 (FT)

III-V Lab, Thalès
Research Scientist

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]. We provide a Tensorflow implementation of the proposed method (https://bitbucket.org/RomainBrault/itl/). 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

Languages

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

Technical Skills

Pandas, Python, Tensorflow, Scikit-Learn,

C/C++, x86 Assembly, Hardware, OpenMP, MPI, Continuous Integration, Open-source contribs,

LaTeX, Machine Learning, Statistics, Functional Analysis

References

Pr. Florence d'Alché-Buc

Position: Full Professor
Employer: *LTCI*, *Télécom ParisTech*
Email: florence.dalche@enst.fr
Phone: +33 (0)1 45 81 79 76 (Work)

Dr. Zoltán Szabó

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

Last update: December 1, 2018.

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).

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.

Communication

[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/.

Preprint

[5] Romain Brault et al. "Infinite-Task Learning with Vector-Valued RKHSs." 2018. url: https://arxiv.org/pdf/1805.08809.pdf.

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.

Hobbys

In my spare time I enjoy practicing photography (see 500px.com/romainbrault) as well as climbing and trekking. I used to practice archery.