Pierre-Cyril Aubin-Frankowski

Born: 17/08/1994
PhD in Applied Mathematics obtained in July 2021

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Areas of expertise. Machine learning, Control theory, Optimization.
Specialist knowledge. Kernel methods, Functional analysis, Optimal control, State constraints, Infinite-dimensional convex optimization.

Appointments and Education

Sept 2023 - **Post-doctoral researcher**, *TU Wien, VADOR*, Vienna.
Optimization beyond metric spaces with A. Daniilidis, funded by FWF

Sept 2021 - Aug 2023 **Post-doctoral researcher**, *INRIA SIERRA*, Paris.
Kernel methods for constrained optimization problems with A. Rudi, funded by ERC Starting grant REAL

Sept 2018 - Aug 2021 **PhD in Applied Mathematics**, *MINES ParisTech*, Paris.
Machine learning and control theory at the CAS laboratory under the supervision of Prof. N. Petit
Estimation and Control under Constraints through Kernel Methods

Sept 2017 - Aug 2018 **Master of Public Policy**, *AgroParisTech and ENPC*, Paris.
Banking and macroeconomics, Law, Environmental dialogue
Master focusing on sustainable development and transportation issues designed for the civil servants of Corps des IPEF

April 2018 - July 2018 **Master of Public Policy internship**, *Research and Innovation Division, French Ministry of Ecological Transition (MTES).*
Theme: AI for the scientific and technical agencies of the ministry

2016 - 2017 **Master of Science (M2)**, *ENS Paris-Saclay*, Cachan.
Machine Learning and Big Data - Highest honors
Specialized in convex optimization and kernel methods
Master MVA (Mathematics-Vision-Learning)

Mars 2017- Aug. 2017 **MS internship**, *CBIO, Ecole des Mines.*
Theme: Gene regulation inference from single-cell RNA sequencing
Recovering dynamics from a time-labeled point cloud of experimental measurements under the supervision of Prof. J-P. Vert

Mars 2016 - July 2016 **Research internship**, *IfA, ETH Zurich.*
Theme: Modeling of cerebral autoregulation
Cyclical systems identification under the supervision of Prof. J. Lygeros

2013 - 2016 **Master of Science/Engineering diploma**, **Cycle ingénieur polytechnicien**, *École polytechnique*, Palaiseau.
Major: Applied Mathematics
Minor: Quantum Physics and (Neuro)biology

Journal articles

All the documents (video, pdf and slides) are available at `https://pcaubin.github.io/`. When the text is already online, just click on the title to access it.

[1] (Under review) PCAF and Alain Bensoussan, *Reproducing kernel approach to linear quadratic mean field control problems*, 2023

[2] (Under review) PCAF and Alessandro Rudi, *Approximation of optimization problems with constraints through kernel Sum-Of-Squares*, January 2023

[3] Communications in Optimization Theory — PCAF, Alain Bensoussan and Joe Qin, *Alternating minimization for simultaneous estimation of a latent variable and identification of a linear continuous-time dynamic system*, 2023 (to be published)

[4] Integral Equations and Operator Theory — PCAF and Stéphane Gaubert, *Tropical reproducing kernels and optimization*, 2022 (to be published)

[5] JMLR — PCAF and Zoltán Szabó, *Handling Hard Affine Shape Constraints in RKHSs*, 2022

[6] Pure and Applied Functional Analysis — PCAF and Alain Bensoussan, *The reproducing kernel Hilbert spaces underlying linear SDE Estimation, Kalman filtering and their relation to optimal control*, 2022 (to be published)

[7] SIAM J. on Control and Optimization — PCAF, *Linearly-constrained Linear Quadratic Regulator from the viewpoint of kernel methods*, 59(4) 2693–2716 2021

[8] Comptes Rendus. Mathématique — PCAF, *Interpreting the dual Riccati equation through the LQ reproducing kernel*, 359(2) 199–204, 2021

[9] Bioinformatics — PCAF and Jean-Philippe Vert, *Gene regulation inference from single-cell RNA-seq data with linear differential equations and velocity inference*, 36(18), 4774–4780, 2020

[10] Systems & Control Letters — PCAF, *Lipschitz regularity of the minimum time function of differential inclusions with state constraints*, 139 104677, 2020

Conference proceedings

[1] NeurIPS 22 — PCAF, Anna Korba, Flavien Léger, *Mirror Descent with Relative Smoothness in Measure Spaces, with application to Sinkhorn and EM*, May 2022

[2] IEEE CDC 22 — PCAF and Alain Bensoussan, *Operator-valued Kernels and Control of Infinite dimensional Dynamic Systems*, 2022

[3] IFAC CAO 22 — PCAF, *Stability of solutions for controlled nonlinear systems under perturbation of state constraints*, 2022

[4] ICML 21 (long oral) — Anna Korba, PCAF, Szymon Majewski and Pierre Ablin, *Kernel Stein Discrepancy Descent*, 139 5719–5730, 2021

[5] NeurIPS 20 — PCAF and Zoltán Szabó, *Hard Shape-Constrained Kernel Machines*, 33 384–395, 2020

[6] IFAC WC 20 — PCAF, Nicolas Petit and Zoltán Szabó, *Kernel Regression for Trajectory Reconstruction of Vehicles under Speed and Inter-Vehicular Distance Constraints*, 53(2) 15084–15089, 2020

[7] ECC 20 — PCAF and Nicolas Petit, *Data-driven approximation of differential inclusions and application to detection of transportation modes*, 1358-1364, 2020

Other: Students supervision, Reviewer duties, Invited talks

I have supervised three Master of Science interns: Adrien Chkirate (ENSAE), El Mahdi Khribch (Mines ParisTech), Yuxi Xie (ENSTA). I served as a referee for SIMODS, SIREV, Bernoulli,

JMLR, AMOP, JCOMP, TAC (journals) ICML, AISTATS, NeurIPS, ECC, ACC and CDC (conferences). I have been invited at over 20 national and international conferences, such as the Viennese Conference on Optimal Control and Dynamic Games (ORCOS-VC22), the European Conference on Operational Research (EURO-ESPOO), the French-German-Portugese conference on optimization (FGP22), SIAM Conference on Control and Its Applications (CT21), and more.