Igor Colin

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RESEARCH INTERESTS

Large-scale Machine Learning, Decentralized Optimization, Statistical Learning Theory, Graphs, Bandits.

EDUCATION

2016 **Ph.D. in Machine Learning,** Adapting Machine Learning Techniques to U-statistics.
Télécom ParisTech, Paris.
Supervisors: Stephan Clémençon and Joseph Salmon.

2013 **M.Sc. in Machine Learning,** Ecole Normale Supérieure, Cachan.

2013 **M.Sc. in Applied Mathematics and Computer Science,** Ecole des Ponts ParisTech.

PROFESSIONAL EXPERIENCE

Ongoing **Research Engineer,** Télécom Paris.
Robust learning on graphs, as part of FOUNDRY (PEPR IA).

2018-2024 **Senior Research Scientist** Huawei (6 years).
Development of machine learning optimization methods applied on wireless networks.

2017 **Post-doctoral researcher,** SIERRA Inria, Ecole Normale Supérieure (1 year).
Large-scale non-convex optimization (portfolio optimization), collaboration with Axa Global Direct.
Supervisor: Alexandre d'Aspremont.

2013-2015 **Freelance consultant.**
Development of an application for predicting travel times and delays in public transportations.

2013 **Research intern,** Technicolor (6 months).
Learning the influence on a social network, using cascades of information. Improvement of existing methods using stochastic submodular optimization. Supervisors: Nidhi Hegde and Francis Bach.

2012 **Research intern,** Natixis (1 year).
Implementation of machine learning methods for stock prediction.

TEACHING

2024- **Fundamentals of Machine Learning,** NYU Paris.
Introduction to statistical learning theory.

2024- **Artificial Intelligence,** NYU Paris.
Overview and implementation of machine learning main algorithms (SVM, bandits, MLP, *etc.*).

2024- **Numerical Analysis,** NYU Paris.
Floating point arithmetic, interpolation, integration, eigenpairs computation.

2017-2022 **Introduction to Machine Learning,** Télécom Evolution.
2-day formation introducing statistical learning theory and common ML methods to applied mathematics researchers.

2017-2021 **Practical Introduction to Machine Learning,** Université Paris Dauphine MASH.
Introduction to Python and ML libraries (scikit-learn, pandas, *etc.*) and application to data challenges.

2016 **Teacher Assistant,** Université Paris Diderot.
Convex optimization and first-order methods for empirical risk minimization.

2016 **Teacher Assistant,** Télécom ParisTech.
Martingales, Markov chains, stopping times and ergodicity.

RESEARCH PAPERS

Robust Distributed Estimation: Extending Gossip Algorithms to Ranking and Trimmed Means.
Anna van Elst, Igor Colin, Stephan Clémençon. *Under review.*

Differentially Private Policy Gradient.
Alexandre Rio, Merwan Barlier, Igor Colin. *Under review.*

Price of Safety in Linear Best Arm Identification.
Xuedong Shang, Igor Colin, Merwan Barlier, Hamza Cherkaoui. *Under review.*

Differentially Private Model-Based Offline Reinforcement Learning.
Alexandre Rio, Merwan Barlier, Igor Colin, Albert Thomas. *Under review.*

Adaptive Sample Sharing for Multi Agent Linear Bandits.
Hamza Cherkaoui, Merwan Barlier, Igor Colin. *ICML 2025.*

Measures of diversity and space-filling designs for categorical data.
C. Malherbe, E. Dominguez-Sanchez, M. Barlier, I. Colin, H. B. Ammar, T. Diethe. *ICML 2024.*

Stable Bounds on the Duality Gap of Finite Sum Minimization Problems.
Thomas Kerdreux, Igor Colin and Alexandre d'Aspremont. *Mathematics of Operations Research.*

Multi-Agent Best Arm Identification with Private Communications.
Alexandre Rio, Igor Colin, Marta Soare, Merwan Barlier. *ICML 2023.*

An α-No-Regret Algorithm For Graphical Bilinear Bandits.
Geovani Rizk, Igor Colin, Albert Thomas, Rida Laraki, Yann Chevaleyre. *NeurIPS 2022.*

Deciphering Lasso-based Classification Through a Large Dimensional Analysis of the Iterative Soft-Thresholding Algorithm.
Malik Tiomoko, Ekkehard Schnoor, Mohamed El Amine Seddik, Igor Colin, Aladin Virmaux. *ICML 2022.*
Best Arm Identification in Graphical Bilinear Bandits.
Geovani Rizk, Albert Thomas, Igor Colin, Rida Laraki, Yann Chevaleyre. *ICML 2021.*

A simple and efficient smoothing method for faster optimization and local exploration.
Kevin Scaman, Ludovic Dos Santos, Merwan Barlier, Igor Colin. *NeurIPS 2020.*

Theoretical limits of pipeline parallel optimization and application to distributed deep learning.
Igor Colin, Ludovic Dos Santos, Kevin Scaman. *NeurIPS 2019.*

Refined bounds for randomized experimental design.
Geovani Rizk, Igor Colin, Albert Thomas, Moez Draeif. *NeurIPS 2019, Machine Learning with Guarantees workshop.*

Parallel Contextual Bandits in Wireless Handover Optimization.
Igor Colin, Albert Thomas and Moez Draief. *ICDM 2018.*

An Approximate Shapley-Folkman Theorem.
Alexandre d'Aspremont, Igor Colin. *Preprint.*

Decentralized Topic Modelling with Latent Dirichlet Allocation.
Igor Colin, Christophe Dupuy. *NIPS 2016, PMPML workshop.*

Adapting Machine Learning Techniques to U-statistics.
Igor Colin.*Ph.D. thesis.*

Scaling-up Empirical Risk Minimization: Optimization of Incomplete U-statistics.
Stephan Clémençon, Aurélien Bellet, Igor Colin. *JMLR.*

Gossip Dual Averaging for Decentralized Optimization of Pairwise Functions.
Igor Colin, Aurélien Bellet, Joseph Salmon, Stephan Clémençon. *ICML 2016.*

Extending Gossip Algorithms to Distributed Estimation of U-statistics.
Igor Colin, Aurélien Bellet, Joseph Salmon, Stephan Clémençon. *NIPS 2015 (spotlight).*

SKILLS

Languages	French (native); English (fluent); Spanish (knowledge).
OS	UNIX/Linux, Windows, MacOS X.
Code	**Python**, Matlab, HTML/PHP/CSS, Rust, C++.