Vincent Counathe

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Education

Cornell University — United States
Ph.D. in Statistics & Machine Learning — *Aug. 2025 – Expected May 2028*

– Awarded Cornell University Fellowship

Université Paris-Saclay (Institut de Mathématiques d'Orsay) — France
M.Res in Statistics & Machine Learning (2nd year), Highest Honors — *Sep. 2024 – Aug. 2025*

– Advisors: Florent Krzakala & Lenka Zdeborová
– Advanced coursework in statistics, machine learning, discrete probability, and stochastic processes. *Full list at the end of the CV*

Université Paris-Saclay (Institut de Mathématiques d'Orsay) — France
M.Sc in Applied Mathematics (1st year), Highest Honors — *Sep. 2023 – Aug. 2024*

– Advisor: Christophe Giraud
– Ranked 2 in cohort
– Advanced coursework in applied mathematics, statistics, machine learning, probability, and optimization. *Full list at the end of the CV*

HEC Paris — France
Grande École Program, Quantitative Economics & Finance Track — *Sep. 2015 – Jun. 2019*

– Coursework in probability, statistics, econometrics, and game theory
– Visiting student, University of Tokyo – Graduate School of Economics (fall 2018)

Lycée Louis-le-Grand — France
Preparatory Class for Grandes Écoles — *Sep. 2014 – Jun. 2015*

– Ranked in the top 0.8% nationwide in competitive entrance exams (10,000+ candidates)
– Coursework in analysis, algebra, and probability

Research Experience

EPFL — Switzerland
Graduate Researcher (Advisors: Prof. Florent Krzakala and Prof. Lenka Zdeborová) — *Apr. 2025 – Aug. 2025*

– Developed a unified framework for generalized feature-augmented stochastic block models. Derived sharp information-theoretic and computational thresholds for community detection. Techniques: high-dimensional probability, spectral methods, approximate message passing, low-degree polynomial methods for computational hardness. [Under review at COLT]

Université Paris-Saclay (Institut de Mathématiques d'Orsay) — France
Graduate Researcher (Advisor: Prof. Christophe Giraud) — *Apr. 2024 – Sep. 2024*

– Analyzed statistical risk for genealogical reconstruction on random recursive trees under various attachment models, establishing non-asymptotic upper and lower bounds for a risk functional associated with a Jordan-ordering estimator. Techniques: analytic combinatorics, martingale concentration. Applications to inference in networked data. [Link]

Selected Projects

Convolutional Neural Network from scratch in C++: Implemented a CNN from scratch in C++ (no external libraries) for image classification (CIFAR-10).

Localization Schemes for Mixing Bounds in Markov Chains: Wrote an expository report on the framework developed by Chen & Eldan, detailing techniques to analyze mixing times and spectral gaps of Markov chains, with applications in high-dimensional sampling. [Link]

Community Detection in Random Graphs: Wrote an expository note on spectral methods for community detection using perturbation theory, concentration inequalities, and ϵ-net arguments to bound misclassification rates. [Link]

Workshops

Cargese Scientific Institute — France
Machine Learning & Statistical Physics Workshop (Selected Participant) — *Aug. 2025*

Hausdorff Center for Mathematics, University of Bonn — Germany
Statistical Mechanics of Spin Glasses, Neural Networks and Learning (Selected Participant) — *Jun. 2025*

EPFL — Switzerland
LemanTh: Machine Learning and Neural Network Theory (Selected Participant) — *May 2025*

Les Houches Physics School — France
Workshop: Towards a Theory for Typical-Case Algorithmic Hardness (Selected Participant) — *Jan. 2025*

Professional Experience

Clayton Dubilier & Rice — United Kingdom
Investments — *Jul. 2019 – Sep. 2023*

Skills & Coursework

Programming & Frameworks: Python, TypeScript, C++, PyTorch, JAX

Coursework

- *Statistics & Machine Learning*: High-Dimensional Statistics, Nonparametric Bayesian Statistics and Applications, Statistical Learning, Optimal Transport, Generalization Properties of Algorithms in ML, Stochastic Optimization, Sequential Learning, Mathematics of Deep Learning, Inference in Large Random Graphs, Kernel and Operator-theoretic Methods in ML, Time Series
- *Mathematics & Probability*: Functional Analysis, Topology and Metric Spaces, Convex Analysis, Brownian Motion & Stochastic Calculus, Local Times & Excursion Theory, Concentration of Measure, Random Matrix Theory, Random Graphs, Ising Model, Markov Chains, Martingales
- *Optimization & Computing*: Differentiable Optimization, Operational Research, C++

Languages: French (Native), English (Fluent), Italian (Fluent), German (Conversational), Portuguese (Conversational), Japanese (Elementary)