Pierre Bertrand

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Associate Professor (Maître de Conférences), Aix-Marseille School of Economics (AMSE)
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Current Position

Associate Professor (Maître de Conférences) 2024 – Present
Aix-Marseille School of Economics (AMSE) – Faculty of Economics and Management (FEG), Aix-Marseille University
Applied mathematics (CNU section 26)

Research Interests

Fields: couplings and optimal transport; entropy maximization and indetermination; statistical divergences and information geometry; clustering criteria and relational analysis.
Methods: stochastic global optimization in high dimension; non-convex optimization; statistical learning and neural network compression.

Peer-Reviewed Publications

Bertrand, P., & Stummer, W. (2025). Some smooth divergences for ℓ_1-approximations. *Proceedings of Geometric Science of Information.*

Bertrand, P., Broniatowski, M., & Marcotorchino, J.-F. (2022). Independence versus Indetermination: basis of two canonical clustering criteria. *Advances in Data Analysis and Classification.*

Bertrand, P., Broniatowski, M., & Marcotorchino, J.-F. (2021). Minimization with respect to divergences and applications. *Geometric Science of Information.*

Delavallade, T., Bertrand, P., & Thouvenot, V. (2016). Extracting future crime indicators from Social Media. In *Factors Driving Future Crime*, Springer.

Bertrand, P., & Lenzen, C. (2015). The 1-2-3 Toolkit for Building Your Own Balls-into-Bins Algorithm. *Algorithm Engineering & Experiments (ALENEX)*, 44–54.

Bertrand, P., & Lenzen, C. (2014). Brief Announcement: The 1-2-3 Toolkit for Building Your Own Balls-into-Bins Algorithm. *28th Symposium on Distributed Computing (DISC).*

Working Papers

Bertrand, P. *Maximizing Rényi Entropy over the Transportation Polytope: Structure and Algorithm.* Submitted to *Journal of Optimization Theory and Applications* (July 2026). Preprint hal-05457049, arXiv:2601.09347.

Bertrand, P., Broniatowski, M., & Stummer, W. *Elementwise Adaptive Random Search for High-Dimensional Constrained Continuous Global Optimization.* Submitted to *Journal of Global Optimization* (June 2026). Preprint hal-05010725, arXiv:2503.23864.

Bertrand, P., Broniatowski, M., & Marcotorchino, J.-F. (2021). *Continuous indetermination and average likelihood minimization.* Preprint hal-03215096, arXiv:2105.01348.

Conference Presentations

Geometric Science of Information (GSI), October 2025.

Journées de Probabilités, July 2025.

Spark Summit East, 2016.

Algorithm Engineering & Experiments (ALENEX), 2015.

Patents

Fingerprint recognition accelerated by Deep Learning (2017).

Monitoring system for an industrial installation (2016).

Reviewing

Referee: *Geometric Science of Information* (2025) • *Advances in Data Analysis and Classification* (2021)

Education

Ph.D., LPSM, Sorbonne University (Paris VI) 2017 – 2021
Thesis: *Properties, applications and extension of the indetermination coupling.*
Supervisors: Michel Broniatowski and Jean-François Marcotorchino.

Agrégation in Mathematics (external candidate) 2014

Normalien student in Mathematics – ENS Cachan 2011 – 2015

– M2 Probability & Statistics, Orsay – Honors 2015

– Engineering Degree, Mines de Paris – Highest Honors 2015

– M1 in Mathematics & M1 in Computer Science (MPRI) – Highest Honors in both 2013

– L3 in Mathematics & L3 in Computer Science – Highest Honors in both 2012

Preparatory Classes MPSI/MP*, Lycée Thiers 2009 – 2011

Past Positions

Lead Data Scientist – BNP Paribas CIB, Analytics Consulting 2023 – 2024
Design and supervision of data scientists on two LLM projects: data-quality control (checking database records against source documents) and datapoint extraction from document sets.

Product Owner – BNP Paribas CIB, Analytics Consulting 2021 – 2023
Built the group's ESG and GHG APIs (ESG data from 20 external providers; reference greenhouse-gas emissions) and deployed/hardened an internal carbon-footprint model.

Data Scientist – BNP Paribas CIB, Analytics Consulting 2018 – 2021
Group-wide NLP in Python/PyTorch (multi-source search, machine translation, speech-to-text/Kaldi, sentiment analysis); BI (Alteryx/Tableau, assignment algorithm); supervision of interns.

Data Scientist – Thales Communications & Security 2015 – 2017
Deep learning for industrial failure prediction (recurrent networks), fingerprint search (siamese networks) and voice recognition (convolutional networks); patents filed; European research project TENSOR.

Teaching Experience

Faculty of Economics and Management, Aix-Marseille University (2024 – Present):

Course	Level	Hours
Mathematics 1	L1	24h (lectures)
Inferential Statistics	L2	30h (lectures)
Applied Mathematics	M1	60h (tutorials)

Data Science for Actuarial Science – Institut des Actuaires (10h) 2017 – 2024
Oral examiner (colles), MP class – Lycée Hoche 2013 – 2015

University Service

Student flow analysis for the Faculty of Economics and Management: interactive visualization of student pathways and success rates since 2012, built on anonymized enrolment data.

Member of the second-year (L2) examination board.

Examiner of master's theses.

Academic tutor for apprenticeship students.

Chair of a *baccalauréat* examination board (2026).

Technical Skills

Programming & Big Data: Python, Scala, SQL, Spark
Machine & Deep Learning: PyTorch; Transformers, LLMs; recurrent, convolutional and siamese neural networks
NLP: speech-to-text (Kaldi), machine translation, sentiment analysis, text mining, information extraction
Computer Vision: image classification and generation, fingerprint recognition
Optimization & Statistics: non-convex optimization, statistical testing, estimation, clustering
BI & Data Visualization: Alteryx, Tableau, Power BI
Software: LaTeX, Git, Docker