Abdessalam Ed-dib

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RESEARCH INTERESTS

Data-driven decision making under uncertainty · Machine learning · Stochastic control · Information geometry

EDUCATION

New York University, Tandon School of Engineering — New York, NY
Ph.D. in Electrical and Computer Engineering — *Sep. 2024 – Present*

- Research: Data-driven decision making under uncertainty, machine learning, and information geometry
- Passed the Ph.D. qualifying examination
- GPA: 4.0 / 4.0

Institut Polytechnique de Paris — Paris, France
M.Sc. in Mathematics, Vision, Learning (MVA) — *Oct. 2023 – Sep. 2024*

- Highly selective research master's program in applied mathematics and machine learning
- Key courses: Statistical Learning, Theoretical Foundations of Deep Learning, Convex Optimization, Geometric Data Analysis, ML for Time Series
- GPA: 4.0 / 4.0

École Polytechnique — Palaiseau, France
Ingénieur Polytechnicien (B.Sc. + M.Sc.), Applied Mathematics — *Oct. 2020 – Sep. 2024*

- France's foremost science and engineering institution; admission by nationally competitive examination
- Key courses: Advanced Machine Learning, Optimization and Control, Stochastic Processes, Markov Chains, Operations Research, Game Theory
- GPA: 3.94 / 4.0

Lycée d'Excellence de Benguérir — Benguérir, Morocco
Classes Préparatoires aux Grandes Écoles (MPSI/MP)* — *Sep. 2018 – Jun. 2020*

- Two-year intensive program in advanced mathematics, physics, and computer science for nationally competitive entrance examinations
- GPA: 4.0 / 4.0

PUBLICATIONS

Peer-Reviewed

[1] A. Ed-dib, Z. Datbayev, A. Aboussalah. "GeLoRA: Geometric Adaptive Ranks for Efficient LoRA Fine-Tuning." *Findings of EMNLP*, 2025. [paper]

Under Review

[2] A. Ed-dib, A. Aboussalah. "Aggregation Dispersion: An Information-Geometric Diagnostic of Oversmoothing in Graph Neural Networks." Under review, *NeurIPS* 2026.

Under Preparation

[3] A. Forel, A. Ed-dib, A. Parmentier, T. Vidal. "End-to-End Sample-Average Approximations for Contextual Stochastic Optimization."

[4] A. Ed-dib, R. Crowell, X. Zhang. "Bayesian Information Acquisition."

[5] A. Aboussalah, A. Ed-dib, J. R. Birge. "Geometry of Systemic Risk Emergence: From Local Strategic Behaviors to Global Patterns."

Preprints

[6] A. Ed-dib, A. Aboussalah. "GeoHNNs: Geometric Hamiltonian Neural Networks." arXiv:2507.15678.

RESEARCH EXPERIENCE

New York University, Tandon School of Engineering New York, NY
Visiting Researcher *Mar. 2024 – Aug. 2024*

- Formulated graph neural networks (GNNs) learning as a constrained optimization problem where the objective is the training loss and the constraints encode the graph adjacency structure, and derived its Lagrangian and dual formulations.
- Studied the convergence of the optimization-based approach for different graph learning tasks (node classification, graph classification, and link prediction), and how it compares to back-propagation approaches.

Polytechnique Montréal, Dept. of Mathematics and Industrial Engineering Montréal, Canada
Visiting Researcher — Advisor: Prof. Thibaut Vidal *Mar. 2023 – Jul. 2023*

- Conducted a comprehensive survey of contextual stochastic optimization methods, identifying that no existing approach jointly trains a predictive model with a sample average approximation objective using neural networks.
- Collaborated on developing the first such end-to-end neural pipeline.
- Evaluated the method on both synthetic benchmarks and real-world datasets (portfolio optimization, newsvendor problem, ...) against state-of-the-art baselines; manuscript in preparation.

SNCF Réseau – DGEX Solutions Paris, France
Research Intern *Jun. 2022 – Aug. 2022*

- Developed deep reinforcement learning agents (DQN, PPO) for real-time train rescheduling on the French national rail network, inspired by the European railway competition *Flatland*.
- Designed a custom reward function that penalizes cumulative delays and conflicts, enabling the agents to learn dispatching policies that outperformed the existing rule-based heuristic.

AiVidence Paris, France
Research Intern *Sep. 2021 – Apr. 2022*

- Developed an interpretability method for tree-based models that quantifies each feature's contribution to a prediction using the Banzhaf power index from cooperative game theory, analogous to measuring a voter's influence in an election.
- Benchmarked against SHAP and LIME on standard tabular datasets; exploited the recursive structure of decision trees to compute Banzhaf values efficiently, achieving comparable explanations at lower computational cost.

GRANTS & FUNDING

Contributor to two research industrial grants (combined total approximately USD 600,000). Drafted the proposals, developed proof-of-concept implementations to demonstrate feasibility, and pitched the underlying research ideas to the funders.

Research Grant, Nace.ai 2024 – 2025
Research Grant, HDRB Management 2024 – 2025

TEACHING EXPERIENCE

Machine Learning in Finance (Undergraduate) NYU Tandon School of Engineering
Instructor *Fall 2026*

- Sole instructor for a 13-week undergraduate course on machine learning methods applied to financial data: regression, classification, resampling, regularization, tree-based methods, and neural networks.
- Designed the course from scratch: syllabus, lecture slides and notes, homework assignments, midterm examination, and a final project built on a Kaggle competition.

Information Geometry and Its Applications in ML, Finance, and Beyond NYU Tandon School of Engineering
Teaching Assistant *Spring 2025 – Spring 2026*

- TA for a graduate course covering differential geometry on statistical manifolds, and applications to machine learning and financial modeling.
- Co-designed the syllabus and prepared the core teaching materials: the lecture slides, full course notes, and homework assignments.

Vertically Integrated Projects: Active Portfolio Management & Mergers and Acquisitions NYU Tandon School of Engineering
Teaching Assistant *Spring 2025 – Spring 2026*

- Designed the homework assignments and reading list.
- Supervised the student teams and gave feedback in weekly meetings.
- Handled grading and debugging sessions with the students.

Q Code: Quantitative Interview Preparation NYU Tandon School of Engineering
Teaching Assistant *Summer 2025*

- TA for a master's-level course preparing students for quantitative interviews, with a focus on LeetCode-style algorithmic problems and core machine learning fundamentals.
- Co-designed the syllabus and wrote the bulk of the course content, including conceptual explanations, worked sample exercises, take-home assignments, and quizzes.

Machine Learning in Financial Engineering NYU Tandon School of Engineering
Graduate Student Adjunct – Recitation Lead and Teaching Assistant *Fall 2024 – Spring 2026*

- Led weekly recitations covering machine learning concepts applied to finance.
- Designed and graded the homework assignments for the course.

Financial Computing NYU Tandon School of Engineering
Graduate Student Adjunct – Recitation Lead *Fall 2024*

- Led recitations on option pricing in C++, covering stochastic calculus, Monte Carlo simulation, and finite-difference methods.

- Supported students in debugging and optimizing numerical pricing algorithms.

SELECTED PROJECTS

Consensus-Based Fact-Checking Agents for Mathematical Reasoning NYU Tandon
Course project — Advisor: Prof. G. Sandoval *Fall 2024*

- Built an ensemble of heterogeneous LLM-based agents, each fine-tuned via LoRA on curated mathematical datasets, to assess solution correctness through consensus voting.
- Demonstrated improved robustness to domain shift compared to single-model baselines.

Cross-Modal Molecule Retrieval via Contrastive Learning Institut Polytechnique de Paris
Course project — Advisor: Prof. M. Vazirgiannis *Spring 2024*

- Designed a contrastive learning pipeline to align natural-language molecule descriptions with graph-based molecular representations.
- Achieved label ranking average precision of 0.86, a $2.5\times$ improvement over the provided baseline (0.35).

HONORS & AWARDS

Fellowships & Scholarships

International PhD Program Fellowship, Mohammed VI Polytechnic University (UM6P)	2024
School of Engineering Fellowship, NYU Tandon School of Engineering	2024
Merit Scholarship (1 year), Fondation de l'École Polytechnique – M.Sc. at Institut Polytechnique de Paris	2023
Merit Scholarship (3 years), Fondation Firsi – Ingénieur cycle at École Polytechnique	2020
Merit Scholarship (3 years), Fondation Mohammed VI – outstanding baccalaureate	2018
Excellence Grant, Fondation Mohammed VI de la Sûreté Nationale – outstanding baccalaureate	2018

Academic Competitions

National Finalist, Moroccan National Mathematical Olympiad	2018
1st Place, Regional Mathematical Olympiad, Guelmim	2017

PROFESSIONAL SERVICE

Sub-reviewer: ICLR, ICML, EMNLP
Mentoring: Supervision of master's theses, capstone projects, independent studies, and research interns (NYU Tandon, ongoing)

TECHNICAL SKILLS

Programming:	Python, C++, C, Java, R, LaTeX
ML & Scientific Computing:	PyTorch, NumPy, Pandas, Scikit-Learn, Gurobi, Matplotlib
Tools & Platforms:	Git, Linux, Jupyter, Streamlit, Django, SQL
Languages:	Arabic (native), French (fluent), English (fluent; TOEFL 106), Spanish (elementary)

SERVICE & OUTREACH

Lycée Julie-Victoire Daubié Argenteuil, France
Mathematics and Programming Tutor *Oct. 2020 – Apr. 2021*

- Taught mathematics, physics, and introductory Python programming to underserved high school students.
- Prepared students for mathematical olympiads and advanced-track admissions.

Association des Professeurs de Mathématiques de Guelmim (APMG) Guelmim, Morocco
Mathematics Mentor *2018 – 2019*

- Coached high school students for selective regional and national mathematics competitions.
- Co-organized local and regional events to promote mathematical enrichment.