Mohammed Amine Bennouna

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EDUCATION

Massachusetts Institute of Technology   Aug 2019 – Present

Ph.D candidate in Operations Research   *Cambridge, MA*

- Coursework includes: Mathematical programming, Reinforcement Learning, Semidefinite Optimization, Robust Optimization, Statistical Learning, Probabilities, Mathematical Statistics. GPA: 5.0/5

Ecole Polytechnique   Aug 2016 – May 2019

Bachelor of Science and Master of Science in Applied Mathematics   *Paris, France*

- Coursework includes: Operations Research, Statistics, Stochastic Processes, MonteCarlo Methods, Game Theory, Advanced Algorithmics, Numerical Approximation and Optimization. GPA: 3.9/4 - Major GPA: 4.0/4

Lycée Louis-le-Grand   Aug 2014 – May 2016

Classes préparatoires, Mathematics, Physics, Computer Science   *Paris, France*

- Admitted to ENS ULM Paris program and Ecole Polytechnique (4th). Coursework includes: Real and Complex Analysis, Probability Theory, General Topology, General Algebra, Linear Algebra. GPA: 4.0/4

RESEARCH & INDUSTRY EXPERIENCE

Massachusetts Institute of Technology, ORC   Aug 2019 – Present

Doctoral Research Assistant, *advised by Prof. Bart Van Parys*   *Cambridge, MA*

- *Research interests*: Robust Machine Learning, Data-driven Decision Making, Distributionally Robust Optimization, Reinforcement Learning, Neural Networks architectures, Domain Generalization.
- Designed novel robust machine learning methods. Provably outperforms state-of-art methods.
- Introduced a novel interpretable Reinforcement Learning approach. Applied the approach to COVID-19 cases and deaths forecasting. Currently used by the CDC and raking among top 10 forecasting methods.

Columbia University, IEOR   May 2019 – Aug. 2019

Research Assistant, *advised by Prof. Vineet Goyal*   *New York, NY*

- Designed novel robust optimization policies that are near-optimal for a large class of problems.

Ecole Polytechnique, CMAP   Sep. 2018 – Apr. 2019

Research Assistant   *Paris, France*

- Worked with Prof. Stephane Gaubert & Prof. Xavier Allamigeon on the complexity of interior point methods, with Prof. Emmanuel Gobet on simulation methods of stochastic processes

Crédit Agricole CIB   Summer 2018

Data scientist intern   *Singapore*

- Designed and deployed a prediction-based optimization and pattern detection solution for budget optimization.

PAPERS

Holistic Robust Data-Driven Decisions (`arXiv`)
with Bart Van Parys. Submitted

Learning and Decision-Making with Data: Optimal Formulations and Phase Transitions (`arXiv`)
with Bart Van Parys. Submitted
Winner of MIT Operations Research Center best student paper 2022

A Novel RL approach: Learning the Minimal Representation of a Dynamic System from Transition Data (`ssrn`)
with Dessislava Pachamanova, Georgia Perakis & Omar Skali Lami. Submitted

The Representation Power of Neural Networks: Breaking the Curse of Dimensionality (`arXiv`)
with Moïse Blanchard. Accepted in ICLR 2022

The Power of Analytics in Epidemiology for COVID-19: Prediction, Prevalence and Vaccine Allocation
with Georgia Perakis et al. Minor Revision MSOM, 2021
Finalist of INFORMS Doing Good with Good OR 2021
INFORMS ICSS Best Conference Paper 2021

Near Optimal Tractable Threshold Policies for Two-stage Robust Optimization Problems
with Omar El Housni & Vineet Goyal. Working Paper.
Winner of Ecole Polytechnique's 1st prize of research internship in Applied Mathematics.

Complexity of Interior-point Algorithms: Tropical Computations
with Yassine El Maazouz, Stéphane Gaubert & Xavier Allamigeon.

TEACHING EXPERIENCE

Massachusetts Institute of Technology, Head Teaching Assistant	Fall 2021
Optimization Methods 15.093/6.255, Graduate, 200 students	*Cambridge, MA*

Massachusetts Institute of Technology, Teaching Assistant	Fall 2020
Optimization Methods 15.093/6.255, Graduate, 120 students	*Cambridge, MA*
Mathematical Olympiad, Instructor	2016 – 2019
Morocco's national team IMO training	*Rabat, Morocco*
Institut Bossuet, Instructor	Fall 2017, Spring 2018
Advanced mathematics for undergraduate students of top french classes préparatoires	*Paris, France*

SKILLS

Languages — *Fluent:* English. *Native:* French, Arabic.
Programming — *Proficient:* Python, Julia. *Prior experience:* SQL, Maple, Java, C++, OCaml, HTML.

AWARDS

Winner of MIT Operations Research Center best student paper	2022
1st Prize Operations Research Center's Common Experience Deep Learning Challenge	2021
Top 2% in Kaggle Brain Tumor Classification Competition (Silver Medal)	2021
Runner-up of the Doing Good with Good OR Competition, INFORMS	2021
ICSS Best Conference Paper Award	2021
Robert B. Guenassia Award, MIT Office of Graduate Education	2021
1st prize of research internship in Applied Mathematics, *Ecole Polytechnique.*	2019
Chanoine Pierre Garand award for outstanding undergraduate pathway, *Institut Bossuet.*	2016
Moroccan merit scholarship for outstanding results in entrance examination.	2016
Honorable Mention in national French national Physics Olympiad.	2016
Honorable Mention in **International Mathematical Olympiad (IMO)**, Cape Town, South Africa.	2014

COMMUNITY WORK

Moroccan Mathematical Olympiad Society	Nov 2016 – Nov 2019
President and co-founder	*Casablanca, Morocco*

- NGO, Math&Maroc, dedicated to the preparation of Moroccan high school students to international mathematical competitions in partnership with the Ministry of education.

OUTSIDE ACTIVITIES

Soccer, Piano, Biking, Reading, Hiking, Debating.

REFERENCES

Prof. Bart Van Parys	`vanparys@mit.edu`
Prof. Georgia Perakis	`georgiap@mit.edu`
Prof. Patrick Jaillet	`jaillet@mit.edu`