Amine Mohamed Aboussalah

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EDUCATION

University of Toronto, Toronto, Canada 2017-present
- Ph.D. in Operations Research & Artificial Intelligence, GPA: 4.0/4.0
- Thesis: High-dimensional continuous reinforcement learning for finance.
- Improve reinforcement learning by exploiting topological properties (symmetries) of dynamical systems and time series.

Polytechnique Montréal, Montreal, Canada 2016-2017
- Started M.S. in Applied Mathematics & Data Science, GPA: 3.91/4.0. Transferred to Ph.D. program at University of Toronto.
- Canada Excellence Research Chair in Data Science for Real-Time Decision Making.

HEC Paris, Paris, France 2013
- Postgraduate Diploma, Innovation Management in Aviation & Aerospace, GPA: 4.0/4.0
- Thesis: Can the problems faced by the Boeing 787 "Dreamliner" be explained by Boeing's innovative supply chain strategy?

ISAE-SUPAERO, Toulouse, France and **Polytechnique Montréal,** Montreal, Canada 2008-2013
- Integrated Bachelor and Master in Engineering Physics, Aerospace Engineering, Astrophysics and Applied Mathematics.
- Thesis: Revealing the nature of a new black hole "Swift J1745-26" in outburst.
- Mention d'Excellence.

RESEARCH EXPERIENCE

Fujitsu Co-Creation Research Laboratory at the University of Toronto, Toronto, Canada 8/2019-9/2020
- Research assistant – Solving complex optimization problems using quantum-inspired computing.

Canada Excellence Research Chair in Data Science for Real-Time Decision Making, Montreal, Canada 1/2016-8/2017
- Research assistant – Development of RNNs for estimation and prediction of time series with missing data.

Cancer University Institute of Toulouse Oncopole, Toulouse, France 9/2014-8/2015
- Research assistant – Algorithm development for automatic organ delineation in adaptive radiation therapy.

French Alternative Energies and Atomic Energy Commission (CEA-Saclay), Paris, France 6/2013-12/2013
- Research assistant – Photometric and Spectroscopic analysis of a black hole candidate in outburst (Swift J1745-26).

Thin Film Physics and Technology Research Group (GCM), Montreal, Canada 4/2011-8/2011
- Research assistant – Study of the transport of electric charges and spin dynamics in materials and magneto-devices.

Canadian Space Agency (CSA), Montreal, Canada 4/2010-8/2010
- Research assistant – Modeling thin film growth and evaluating the emissivity of thermochromic materials.

ENTREPRENEURIAL EXPERIENCE

Cofounder of DeepAlpha Inc., Toronto, Canada 4/2020-present
- Quantitative research firm applying scientific techniques, AI, and Quantum Computing to find patterns in large, noisy real-world financial data sets. Currently in R&D phase.

Cofounder of Maidan Analytics Ltd., Toronto, Canada 12/2019-present
- Political Risk Consultancy leveraging AI and Quantum Computing to forecast protest-related risk.

Cofounder of YopiCar, Rabat, Morocco 9/2014-12/2015
- Carpooling start-up to address the problematic isolation of regions that are poorly served by public transportation.
- 17,000+ subscribers when I left.

TEACHING EXPERIENCE

Teaching Assistant, University of Toronto, Toronto, Canada 9/2018-present
- MIE567H1 – Dynamic and Distributed Decision Making (4 semesters). Teaching, lab, grading, office hours.
- MIE367H1 – Cases in Operations Research (2 semesters). Lab, grading, office hours.
- MIE364H1 – Quality Control and Improvement (2 semesters). Teaching, lab, grading, office hours.

Volunteer High School Tutor, SUPAERO Diversity Program, Toulouse, France 9/2012-12/2014
- Physics I – Motion, Mechanics, Electricity and Magnetism (6 hours a week).

SCHOLARSHIPS & AWARDS

- NSERC Canada Graduate Scholarship – Michael Smith Foreign Study Supplements (CGS-MSFSS) – $6,000 (2021).
- Alexander Graham Bell Canada Graduate Fellowship (CGS D) – Ranked 7th Nationwide – $70,000 (2019-2021).
- Fonds de Recherche du Québec – Nature et Technologies (FRQNT) – $42,000 (2017-2019).
- Barbara and Frank Milligan Graduate Fellowship – $5,460 (2017).
- CAE-R. Fraser Elliott Scholarship – $2,000 (2017).
- Polytechnique Montréal Graduate Scholarship Award – $20,000 (2016).
- Award of Excellence of the Director General of Polytechnique Montréal (2014).
- Exchange Student Mobility Scholarship – $10,000 (2011-2013).
- Roasters Foundation Distinction Scholarship – $2,500 (2011).
- Unit Participation and Initiation Research Scholarship – $1,500 (2011).
- Arthur Yelon and John Brebner Low Award – $4,800 (2011).
- Québec Advanced Materials Group Award (RQMP) – $5,000 (2010).
- Distinction scholarship (Ministry of Higher Education Morocco-Canada cooperation program) – $28,000 (2008-2011).

PUBLICATIONS

- **Aboussalah, A.M.**, Lee, C-G. Symmetry Augmentation Using Direct Sum for Time Series Reinforcement Learning. Available at SSRN (In preparation for INFORMS – Mathematics of Operations Research).
- **Aboussalah, A.M.**, Lee, C-G. Reinforcement Learning with Symmetry Augmentation for Portfolio Management. Available at SSRN (In preparation for Quantitative Finance).
- **Aboussalah, A.M.**, Xu, Z., Lee, C-G. What is the Value of Cross-Sectional Approach to Deep Reinforcement Learning? Available at SSRN (In preparation for Quantitative Finance).
- **Aboussalah, A.M.**, Ananth, R. Attacking the COVID-19 Pandemic Spread with Reinforcement Learning (working paper).
- **Aboussalah, A.M.**, El Mesbahi, Y., Zhang, D. Building Financial Baskets with Quantum Computing. Submitted to Physica A: Statistical Mechanics and its Applications (2020).
- **Aboussalah, A.M.**, Orban, D. An Optimal Control Based Approach for Simulating Black Holes. Submitted to Journal of Physics: Conference Series (JPCS) (2020).
- **Aboussalah, A.M.**, Lee, C-G. Continuous Control Deep Dynamic Recurrent Reinforcement Learning for Portfolio Optimization. Expert Systems With Applications (ESWA-112891) (2020).
- Taib, B., **Aboussalah, A.M.**, Moniruzzaman, M., Chen, S., Haughey, N.J., Kim, S.F., Ahima, R. S. Lipid Accumulation and Oxidation in Glioblastoma Multiforme. Scientific Reports - Nature, volume 9, Article number: 19593 (2019).
- **Aboussalah, A.M.**, Neal, C. Forecasting Local Warming: Missing Data Generation and Future Temperature Prediction. Cahiers du Gerad. G-2016-76, ISSN: 0711-2440 (2016).
- Lopez-Oramas, A., Chaty, S., Coleiro, A., **Aboussalah, A.M.** Infrared and Optical Observations of the Black Hole X-Ray Transient Swift J1745-26. Submitted to Mon. Not. R. Astron. Soc. 1-6, ISSN: 1365-2966 (2015).

SEMINARS AND PRESENTATIONS

- Symmetry-Augmented Representation for Time Series. COSMO – Stochastic Mine Planning Laboratory, McGill University, Canada (2020).
- High-Dimensional Reinforcement Learning for Finance. Canadian Imperial Bank of Commerce (CIBC Capital Markets), Toronto, Canada (2020).
- High-Dimensional State Space Representation for Portfolio Management, The Canadian Operational Research Society (CORS) Annual Conference, Toronto (2020) (Moved to 2021 due to COVID19).
- Deep Reinforcement Learning and Quantum Annealing for Risk Management in Financial Portfolio Optimization, The Canadian Operational Research Society (CORS) Annual Conference, Toronto (2020) (Moved to 2021 due to COVID19).
- Continuous Control with Deep Dynamic Recurrent Reinforcement Learning for Portfolio Optimization, 4th Industrial-Academic Workshop on Optimization and Artificial Intelligence in Finance, The Fields Institute, Toronto (2018).
- Optimization-Based Approach for Simulating Interstellar's Wormhole. Institute for Data Valorization (IVADO), Montreal, Canada (2017).
- Forecasting Local Warming: Missing Data Generation and Future Temperature Prediction. CERC-Data Science, Montreal, Canada (2016).