Salem Lahlou

Researcher in Machine Learning

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Research interests : Uncertainty in machine learning, Sample-efficient reinforcement learning, Theoretical guarantees in machine learning, AI for science, LLM Reasoning.

Research experiences in the industry

2024 – current **Senior Researcher**, ***Technology Innovation Institute***, **Abu Dhabi**.
Reasoning with LLMs

2020 **Research Intern**, ***Google Research***, **Paris**.
Research on emergence of hierarchies in social reinforcement learning.

2015 **Research Intern**, ***IBM Research Collaboratory***, **Singapore**.
Research on tradable credits scheme for binary choice games and applications to transport.

Education

2018 – 2023 **Mila - Université de Montreal**, *Montréal - Canada*, PhD, Advances in uncertainty modelling : from epistemic uncertainty estimation to generalized generative flow networks.
Under the supervision of Yoshua Bengio.

2015 – 2016 **Ecole Normale Supérieure**, *Cachan - France*, M.Sc., Mathematics, Vision, Learning (MVA).
Graduated with Very High Honors.

2012 – 2016 **Ecole Polytechnique**, *Palaiseau - France*, Cycle Ingénieur polytechnicien (equivalent of B.Sc. + M.Sc.), **Major :** Applied Mathematics.
Additional degree from **Télécom ParisTech** for the 2015-2016 school year.

2010 – 2012 **Classes préparatoires**, *Fès - Morocco*, Two-year intensive program in Mathematics, Physics, and Philosophy. Preparation for the competitive entry exams of French Grandes Ecoles .

Selected publications (* denotes equal contribution in authorship)

2023 **A Theory of Continuous Generative Flow Networks**, *Salem Lahlou, Tristan Deleu, Pablo Lemos, Dinghuai Zhang, Alexandra Volokhova, Alex Hernández-García, Lena Nehale Ezzine, Yoshua Bengio, Nikolay Malkin. ICML 2023.*

2022 **GFlowNets and variational inference**, *Nikolay Malkin*, Salem Lahlou*, Tristan Deleu*, Xu Ji, Edward Hu, Katie Everett, Dinghuai Zhang, Yoshua Bengio. ICLR 2023.*

2022 **GFlowNet Foundations**, *Yoshua Bengio*, Salem Lahlou*, Tristan Deleu*, Edward J. Hu, Mo Tiwari, Emmanuel Bengio. JMLR 2023.*

2021 **DEUP : Direct Epistemic Uncertainty Estimation**, *Salem Lahlou*, Moksh Jain*, Hadi Nekoei, Victor I Butoi, Paul Bertin, Jarrid Rector-Brooks, Maksym Korablyov, Yoshua Bengio. TMLR 2023.*

2018 **BabyAI : A Platform to Study the Sample Efficiency of Grounded Language Learning**, *Maxime Chevalier-Boisvert*, Dzmitry Bahdanau*, Salem Lahlou, Lucas Willems, Chitwan Saharia, Thien Huu Nguyen, Yoshua Bengio. ICLR 2019.*

2016 **A Nash equilibrium formulation of a tradable credits scheme for incentivizing transport choices : From next-generation public transport mode choice to HOT lanes**, *Salem Lahlou, Laura Wynter. Transportation Research Part B 2017.*

Services

2021 – 2023 **Supervision or co-supervision**.
- Victor Livernoche (M.Sc. student at Mila) - Research project on automatic curriculum learning
- Anas Krichel (M.Sc. student - intern at Mila) - Research project on exploration in GFlowNets
- Laura Sanchez Fernandez (M.Sc. student at Mila) - Technical guidance for AI+education start-up proof of concept
- Shawn Whitfield (M.Sc. student at Mila) - Mentorship during internship in AI+bio start-up

2021 – 2023 **Reviewer in major Machine Learning conferences (ICLR, ICML, NeurIPS).**

2019 **Creation of the exercises section for the Deep Learning book.**

Other professional experiences

2022 **(Part-time) Scientist in Residence**, ***NextAI***, **Montréal.**
Consulting and technical guidance for 8 early stage startups using Machine learning in their pipeline.

2017 **(Full-time) Data Scientist**, ***Booking.com***, **Amsterdam.**
Analysis of customers' behaviors in different parts of the website - design and implementations of website features.

2016 **(Internship) Data Scientist**, ***AXA Data Innovation Lab***, **Paris.**
Research on Bayesian Optimization for hyperparameter optimization - Development of an AutoML platform for prospect acquistion.

2014 **(Internship) Data Scientist**, ***Infosys***, **Bangalore.**
Study and implementation of Natural Language Processing techniques (TF-IDF, Latent Dirichlet Allocation...) for keyword extraction in large corpora.

Teaching experiences

2019 – 2020 **Teaching Assistant for graduate level courses**, IFT 6135, IFT 6390 - Université de Montréal.

2021 **Teaching Assistant for IVADO/Mila Deep Learning School**, Graduate level training in deep learning.

2012 – 2015 **Instructor for high-school and undergraduate (classes préparatoires) level courses**, Mathematics, Physics.

Selected contributions in open-source code repositories

GFlowNet library : generic codebase for GFlowNets in pytorch.

Minigrid : collection of discrete grid-world environment for reinforcement learning.

Languages

Moroccan : Mother tongue

French : Mother tongue

Arabic : Fluent

English : Fluent

Spanish : Moderate level

Miscellaneous

Practiced sports : Football, Squash, Bouldering