Sanae Lotfi

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Research Interests

Probabilistic Modeling, Bayesian Learning, Out-of-Distribution Generalization, Large-Scale Optimization, and Time Series Modeling.

Education

2020–current   **Ph.D. in Data Science, New York University**, USA
GPA: 4.0/4.0
○ Theory track. Supervisor: Andrew Gordon Wilson.

2018–2020   **M.Sc. in Applied Mathematics, Polytechnique Montreal**, Canada
GPA: 4.0/4.0
○ Supervisors: Andrea Lodi and Dominique Orban.
○ Affiliations: MILA, CERC, and GERAD.

2015–2018   **M.Eng. in Applied Mathematics, Centrale Paris**, France
GPA: 3.97/4.33

Publications

2022   Bayesian Model Selection, the Marginal Likelihood, and Generalization   [arxiv]
Sanae Lotfi, Pavel Izmailov, Gregory Benton, Micah Goldblum, Andrew Gordon Wilson
International Conference on Machine Learning (ICML), **long oral presentation, top 2% submissions**
Outstanding Paper Award

2022   Adaptive First- and Second-Order Algorithms for Large-Scale Machine Learning   [arxiv]
Sanae Lotfi, Tiphaine Bonniot de Ruisselet, Dominique Orban, Andrea Lodi
Annual Conference on Machine Learning, Optimization, and Data Science (LOD), **oral presentation**

2022   Evaluating Approximate Inference in Bayesian Deep Learning   [pmlr]
Andrew Gordon Wilson, **Sanae Lotfi**, Sharad Vikram, Matthew D. Hoffman, Yarin Gal, Yingzhen Li, Melanie F. Pradier, Andrew Foong, Sebastian Farquhar, Pavel Izmailov
NeurIPS Competition and Demonstration Track, Proceedings of Machine Learning Research (PMLR)

2021   Dangers of Bayesian Model Averaging under Covariate Shift   [arxiv]
Pavel Izmailov, Patrick Nicholson, **Sanae Lotfi**, Andrew Gordon Wilson
Neural Information Processing Systems (NeurIPS)

2021   Loss Surface Simplexes for Mode Connecting Volumes and Fast Ensembling   [arxiv]
Gregory W. Benton, Wesley J. Maddox, **Sanae Lotfi**, Andrew Gordon Wilson
International Conference on Machine Learning (ICML), **spotlight presentation**

2020   Stochastic Damped L-BFGS with Controlled Norm of the Hessian Approximation   [arxiv]
Sanae Lotfi, Tiphaine Bonniot de Ruisselet, Dominique Orban, Andrea Lodi
SIAM Conference on Optimization, 2021, **oral presentation**
NeurIPS Optimization for Machine Learning Workshop, 2020, **spotlight presentation**

Work Experience

Summer 2022   **Applied Scientist Intern, Amazon AWS**, Santa Clara, USA
○ Supervisors: Yuyang (Bernie) Wang and Richard Kurle.
○ Research on time series modeling under distribution shift.

2018   **Research Intern, Air Liquide**, Paris, France
○ Designing algorithms to predict gas consumption and optimize the production planning.

2017	**Research Intern, BeeBryte**, Singapore
	○ Developing and optimizing strategies for trading and hedging in electricity markets.
Summer 2016	**Research Assistant, USTEM (Electron Microscopy Laboratory)**, Vienna, Austria
	○ Conducting mathematical and numerical simulations of atomic diffusion in dissimilar materials.

Awards

2022	**Outstanding Paper Award, International Conference on Machine Learning (ICML)**
	Awarded for first-authored paper *Bayesian Model Selection, the Marginal Likelihood, and Generalization*
2020 – 2021	**DeepMind Fellowship,**
	One of three DeepMind Fellows to join NYU in 2020–2021
2020	**McKinsey First Generation Achievement Award**
	Prize for outstanding individuals who are the first in their family to earn a higher-education degree
2020 – 2025	**Data Science Graduate Fellowship**
	5-year graduate fellowship awarded by NYU Center for Data Science
2020	**Best Master's Thesis Award at Polytechnique Montreal**
	Awarded by the department of Mathematics and Industrial Engineering at Polytechnique Montréal
2015 – 2018	**French Government Scholarship for Excellence**
	3-year scholarship. Awarded for ranking 2nd in CentraleSupélec's entrance exam
2013 – 2021	**Académie Hassan II Scholarship for Excellence**
	8-year scholarship. Awarded for ranking 1st in nationwide open competition in mathematics
2010 – 2013	**Various first prizes in regional mathematics and physics Olympiads in Morocco**

Selected Talks

Bayesian Model Selection, the Marginal Likelihood, and Generalization

2022	ML Collective, Deep Learning: Classics and Trends (upcoming)
2022	Amazon Web Services, Forecast Science Talks
2022	International Conference on Machine Learning (ICML), Long Oral
2022	INRIA Social Data Group
2022	Morocco AI, Webinar Series, [video]
2022	Center for Data Science Graduate Student Seminar

Understanding and Quantifying Generalization in Deep Learning Models

2021	DeepMind Montreal
2021	Women in Data Science at NYU

Dangers of Bayesian Model Averaging under Covariate Shift

2021	Women in Mathematics at NYU, Research Talks
2021	Neural Information Processing Systems (NeurIPS), [video]

Adaptive First and Second Order Algorithms for Large-Scale Machine Learning

2022	Annual Conference on Machine Learning, Optimization, and Data Science (LOD) (upcoming)
2021	SIAM Conference on Optimization
2020	NeurIPS Optimization for ML Workshop, Spotlight Presentation, [video]
2019	Montreal Machine Learning and Optimization Group

Teaching

2021 - 2022	New York University
	○ Section Leader and Grader for "DS-GA 3001: Introduction to Data Science for PhD Students"
	○ Grader for "DS-GA 1004: Big Data"

2019 - 2020	University of Montreal
	○ Teaching Assistant and Grader for "IFT 6135: Representation Learning"
	○ Section Leader and Grader for "MTH3302: Probability and Statistics for AI"

Summer Schools

2021	Deep Learning Theory Summer School at Princeton
2021	Harnessing Quantum Matter Data Revolution, Virtual Symposium and Summer School, Teaching Assistant

Other Activities

Organizing and Leadership

2022	Co-leader of the "Robustness of Deep Learning Models to Distribution Shift" session at Women in Machine Learning Workshop, ICML 2022
2021	Founding organizer of research talks, *Tea-Talks*, at the NYU Association of Women in Mathematics
2021	Co-organizer of the NeurIPS 2021 competition "Approximate Inference in Bayesian Deep Learning"
2017	Leader of a mental health campaign to promote emotional well-being and prevent suicide among hundreds of students at Centrale Paris
2016	Co-founder of the competitive programming association at Centrale Paris

Reviewing

Conferences	NeurIPS 2022, ICML 2022
Workshops	NeurIPS 2021 Bayesian Deep Learning Workshop, NeurIPS 2019 Women in Machine Learning Workshop

Research Mentorship

2021	Deep Learning Indaba Mentorship Programme: mentored Feliciana Manuel to conduct her undergraduate research on *Cataract Identification using Deep Learning on Retinal Images* at Lúrio University, Mozambique.

Outreach and Volunteering

2022	Student volunteer at the International Conference on Machine Learning (ICML), 2022
2022	Invited panelist: Affinity Group Supported Pathways to ML Research Panel and Social, International Conference on Artificial Intelligence and Statistics (AISTATS), 2022
2021	Invited panelist: Data Science Career Panel, Women in Data Science (WiDS) at NYU
2016-2018	Mathematics and physics instructor for students from disadvantaged backgrounds at Renovo

Selected Media Coverage

Scholar Q&A: Sanae, DeepMind, 2021

DeepMind Fellow Profile: Sanae Lotfi, NYU Center for Data Science, 2020

Skills

Proficient	Python (Scikit-learn, SciPy stack, PyTorch), Git, Latex
Experienced	TensorFlow, Julia, Matlab, R