Clara Lacroce

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Personal Profile

I am a passionate and fast-learning scientist with over eight years of experience in AI and machine learning and a strong background in mathematics. Currently pursuing opportunities in data science and consulting.

Work Experience

McGill University - Mila, Quebec AI Institute *Montréal, Canada*

Postdoctoral Researcher *2022 - 2023*

- Investigated the learning capabilities of transformers and their connections with models from formal language theory.
- Co-led the efforts and mentored the work of 3 graduate students resulting in 2 papers at AISTATS2024.

Teaching Assistant *2017 - 2020*

- Led tutorials and Q&A sessions with 50 students.

Université Jean Monnet *Saint-Étienne, France*

Invited Visiting Researcher *2023*

- Funded to work for a month at Laboratoire Hubert Curien.

Education

McGill University - Mila, Quebec AI Institute *Montréal, Canada*

PhD in Computer Science *2016 - 2022*

- Thesis: *The approximate minimization problem of weighted finite automata and applications to language modelling: an approach based on Adamyan-Arov-Krein theory*
- Supervisors: Prakash Panangaden, Doina Precup.

Concordia University *Montréal, Canada*

MSc in Mathematics, ALGANT Erasmus Mundus *2015 - 2016*

- Thesis: *Deformations of Galois Representations.*
- Supervisor: Adrian Iovita.

Università degli Study di Padova *Padova, Italy*

Master in Mathematics, ALGANT Erasmus Mundus *2014 - 2016*

- Specialization: Algebra, Geometry, Number Theory

BSc in Mathematics *2010 - 2014*

- Specialization: Mathematics, Minor in Physics

Selected Publications

Optimal Approximate Minimization of One-Letter Irredundant WFAs
Clara Lacroce* , Borja Balle, Prakash Panangaden and Guillaume Rabusseau
Under review in the Journal Mathematical Structure in Computer Science (2023). 2023

Simulating weighted automata over sequences and trees with transformers
Michael Rizvi* and Maude Lizaire and Clara Lacroce and Guillaume Rabusseau
To appear in Proceedings of the Twentyseventh International Conference on Artificial Intelligence and Statistics, AISTATS 2024, 2024

Length independent PAC-Bayes bound for saturated Simple RNNs
Volodimir Mitarchuck* and Clara Lacroce and Remi Emonet and Remi Eyraud and Amaury Habrard and Guillaume Rabusseau
To appear in Proceedings of the Twentyseventh International Conference on Artificial Intelligence and Statistics, AISTATS 2024, 2024

The approximate minimization problem of weighted finite automata and applications to language modelling: an approach based on Adamyan-Arov-Krein theory
Clara Lacroce
McGill University (2022). 2022

Towards an AAK Theory Approach to Approximate Minimization in the Multi-Letter Case
Clara Lacroce*, Prakash Panangaden and Guillaume Rabusseau
CoRR abs/2206.00172 (2022). 2022

Extracting Weighted Automata for Approximate Minimization in Language Modelling
Clara Lacroce*, Prakash Panangaden and Guillaume Rabusseau
Proceedings of the Fifteenth International Conference on Grammatical Inference, 2021

Optimal Spectral-Norm Approximate Minimization of Weighted Finite Automata
Borja Balle and Clara Lacroce* and Prakash Panangaden and Doina Precup and Guillaume Rabusseau
48th International Colloquium on Automata, Languages, and Programming, ICALP 2021, July 12-16, 2021, Glasgow, Scotland (Virtual Conference), 2021

* Corresponding author.

Awards

Outstanding Teaching Assistant Award	McGill University	*2019*
Graduate Excellence Award	McGill University	*2017 - 2018*
Cryptoworks21 Scholarship	NSERC (Declined)	*2016 - 2017*
Armand C. Archambault Fellowship	Concordia University	*2016*
International ALGANT Award	Algant Consortium	*2015 - 2016*

Selected Invited Talks

Approximate minimization for WFAs and language modelling: an approach based on AAK theory
- Laboratoire Hubert Curien, Université Jean Monnet, Saint-Étienne, France *2023*
- Workshop Algorithmic aspects of dynamical systems, Holetown, Barbados *2023*
- Seminar on Formal Languages and Neural Networks (FLaNN), online *2022*

Optimal Spectral-Norm Approximate Minimization
- QUALOG 2023, Boston, USA *2023*
- ICALP 2021, online *2021*
- Online Worldwide Seminar on Logic and Semantics, Cambridge *2021*
- Reasoning and Learning Lab at McGill Montréal *2021*

Towards an AAK Theory Approach to Approximate Minimization in the Multi-Letter Case
- LEARNAUT 2022, Paris, France *2022*

Extracting Weighted Automata for Approximate Minimization in Language Modelling
- ICGI 2020-2021, online *2021*

Community Service

Reviewer	Mathematical Structures in Computer Science, AISTATS2023, ICGI2023.	*2022 - 2023*
Surgical Floor Volunteer	Montréal Children Hospital. *Provided relief for babies post surgery*.	*2019 - 2022*
Mentor	Collegio Mazza, Padova. *Advised a group of women in their freshman year*.	*2013 - 2015*

Skills

Programming	Python, Pandas, NumPy, Scikit-learn, PyTorch, SQL.
Software/OS	Git, Matlab, Unix, LaTeX, Microsoft Office.
Technical Skills	Deep Learning, Machine Learning, Problem-solving, Quantitative Research.

Languages

English	Full professional proficiency.
French	Professional working proficiency (TEFAQ: Listening C2, Speaking C1)
Italian	Native proficiency.