Clara Lacroce

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Qualifications summary

- Fast-learning scientist with over eight years of experience in AI and machine learning.
- PhD in computer science with a strong mathematical background from a double degree international master in mathematics.
- Excellent problem solving, project management, analytical and interpersonal skills.

Work Experience

McGill University *Montréal, Canada*

Postdoctoral Researcher *Oct 2022 - Current*

- Investigated the learning capabilities of deep sequence models and connections with models from formal language theory.
- Led a team of 2 graduate students, resulting in an article accepted at a major machine learning conference.
- Presented the findings of my research as an invited speaker at international conferences.

PhD Researcher, Doctoral Candidate *2016 - 2022*

- Developed cutting-edge algorithms and produced high-quality peer-reviewed research papers.
- Collaborated with leading experts in AI from both industry and academia.

Teaching Assistant *2017 - 2020*

- Led tutorials and Q&A sessions with 50 students.
- Won the CS Department Outstanding Teaching Award (nominated by faculty and students).

Invigilator *2017 - 2019*

- Provided a safe environment to allow each student to perform to the best of their abilities on the exam.

Université Jean Monnet *Saint-Étienne, France*

Invited Visiting Researcher *2023*

Received a grant to work for a month at Laboratoire Hubert Curien.
Carried on an international research collaboration leading to a peer-reviewed publication.

Boulangerie Arte & Farina *Montréal, Canada*

Baker and Cashier *2018 - 2019*

- Multitasked front and customer service in English, French and Italian.

Concordia University *Montréal, Canada*

Teaching Assistant *2016 - 2027*

- Graded assignments and provided feedback to students.

University of Padova, Board of Directors *Padova, Italy*

Student Representative, BofD *2015 - 2015*

- Advocated for students needs, elected to represent ∼60K students.

Education

McGill University *Montréal, Canada*

PhD in Computer Science *2016 - 2022*

- Specialization: Machine learning, automata theory, Hankel operators.
- 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*

- Specialization: Number theory.
- 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

BSc in Mathematics *2010 - 2014*

- Specialization: Group Theory

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 Talks

The approximate minimization problem of weighted finite automata and applications to language modelling: an approach based on Adamyan-Arov-Krein theory

- Laboratoire Hubert Curien, Université Jean Monnet, Saint-Étienne *2023*
- Workshop Algorithmic aspects of dynamical systems, Barbados *2023*
- Seminar on Formal Languages and Neural Networks (FLaNN), online *2022*

Optimal Spectral-Norm Approximate Minimization
- QUALOG 2023, Boston *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 *2022*

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

An Introduction to Algebraic Geometry
- Graduate Seminar at McGill, Montréal *2017*

Deformations of Galois Representations
- ALGANT Seminar, Bordeaux *2016*

An Introduction to Modular Forms
- McGill Graduate Seminar, Montréal *2016*

Hilbert Ramification Theory
- Graduate Seminar at UniPD, Padova *2015*

Community Service

Reviewer	Mathematical Structures in Computer Science, AISTATS2023, ICGI2023	*2022 - Current*
Surgical Floor Volunteer	Montréal Children Hospital. Provided relief for babies post surgery.	*2019 - 2022*
Student Representative	University of Padova. Advocated for students in the Math Department.	*2012 - 2015*
Mentor	Collegio Mazza, Padova. Advised a group of women in their freshman year.	*2013 - 2015*
Librarian	Collegio Mazza, Padova. Supervised a University Library on weekly shifts.	*2013 - 2015*
Promoter	AVIS (Italian Blood Donors Association).	*2008 - 2011*

Skills

Programming/Software	Python, Pandas, NumPy, Scikit-learn, PyTorch, SQL, Git, Matlab, Unix, LaTeX, Microsoft Office.

Languages

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