Clara Lacroce

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Personal Profile

I am a Postdoctoral Researcher at McGill University and Mila. My current research focuses on knowledge distillation of black box models on sequential data. To make these models more interpretable, I use tools from functional and harmonic analysis, formal language theory and control theory.

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

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.
- Co-led the efforts and mentored the work of 3 graduate student.
- Invited to present my work at international venues.

Teaching Assistant *2017 - 2020*

- Led tutorials and Q&A sessions with 50 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*

- Funded to spend a month at Laboratoire Hubert Curien

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.

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

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
Under review at NEURIPS (2023). 2023

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

Deformations of Galois representations
Clara Lacroce
Concordia University (2016). 2016

* Corresponding author.

Awards

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

Selected Invited 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

- 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*
Child Educator	CPE Childcare, McGill, Montréal. Supervised 12 toddlers.	*2017 - 2019*
Student Representative	University of Padova. Advocated for students in the Math Department.	*2011 - 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	Python.
Software/OS	Git, Matlab, Unix, LaTeX, Microsoft Office.

Languages

English	Full professional proficiency.
French	Professional working proficiency.
Italian	Native proficiency.