

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 Adamyman-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.

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 their exam.

Boulangerie Arte & Farina

Montréal, Canada

Baker and Cashier

2018 - 2019

- Coordinated a team of four and increased packaging productivity by 20 %.
- 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

PAC-Bayes Bounds for Saturated RNNs

Volodimir Mitarchuck* and Clara Lacroce and Remi Eyraud and Amaury Habrard and Guillaume Rabusseau

Under review at ICML (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* and Prakash Panangaden and Guillaume Rabusseau

CoRR abs/2206.00172 (2022). 2022

Extracting Weighted Automata for Approximate Minimization in Language Modelling

Clara Lacroce* and Panangaden Prakash and Rabusseau Guillaume

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 Talks

The approximate minimization problem of weighted finite automata and applications to language modelling:

an approach based on Adamyan-Arov-Krein theory

- Tensor Group at Mila, Montréal

Mar 2023

- Seminar on Formal Languages and Neural Networks (FLaNN)

Dec 2022

Towards an AAK Theory Approach to Approximate Minimization in the Multi-Letter Case

- LEARNAUT 2022

Jul 2022

Extracting Weighted Automata for Approximate Minimization in Language Modelling

- ICGI 2020-2021

Aug 2021

Optimal Spectral-Norm Approximate Minimization

- ICALP 2021

Jul 2021

- Online Worldwide Seminar on Logic and Semantics, Cambridge

Jul 2021

- Reasoning and Learning Lab at McGill Montréal

Jun 2021

An Introduction to Algebraic Geometry

- Graduate Seminar at McGill, Montréal

Feb 2017

Deformations of Galois Representations

- ALGANT Seminar, Bordeaux

Jul 2016

An Introduction to Modular Forms

- McGill Graduate Seminar, Montréal

Nov 2016

Hilbert Ramification Theory

- Graduate Seminar at UniPD, Padova

Jan 2015

Community Service

Reviewer	Mathematical Structures in Computer Science, AISTATS2023	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.