

# Guillaume Rabusseau

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## Current Position

2018-present Since September 2018 I am an assistant professor at *Université de Montréal* and at the *Mila* research institute.

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## Education

2016-2018 **IVADO post-doctoral scholar**, *McGill University, School of Computer Science, Reasoning and Learning Lab* (working with Professors Joelle Pineau, Doina Precup and Prakash Panangaden).

2013-2016 **PhD in Computer Science**, *Aix-Marseille Université, Laboratoire d'Informatique Fondamentale*, Qarma team (Machine Learning and Multimedia).

- Title: *A Tensor Perspective on Weighted Automata, Low-Rank Regression and Algebraic Mixtures*.
- Main contributions: introduction of a new computational model on graphs generalizing weighted automata over strings and trees; design and theoretical analysis of an algorithm for approximate minimization of weighted tree automata; design and theoretical analysis of a novel algorithm for regression with tensor-structured outputs under multilinear rank constraints; extension of the tensor method of moments to algebraic mixtures (mixtures of distributions with negative weights).
- Supervisors: François Denis and Hachem Kadri.
- Defense date: October 20, 2016.

2012-2013 **MSc in Theoretical Computer Science**, *Aix-Marseille Université*, (grade: 18.4/20, rank: 1/13).  
Master Thesis: *Using a Linear Representation of Trees in the context of Structured Data Learning: A First Approach* (published in the international conference ICGI 2014)

2011-2012 **MSc in Computer Science, 1st year**, *Université de Franche-Comté*, (grade: 17.2/20, rank: 1/103).

2008-2011 **BSc in Computer Science**, *Université de Provence*, (grade: 17.3/20).

2003-2005 **DEM of Classical Guitar**, *ENMD de Châtellerauld*.

2000-2005 **MSc in Musicology**, *UFR de Tours*, (grade: 16.9/20).

Master Thesis: *Conlon Nanncarrow's Language: Compositional Method and Structure of Study #2a for Player Piano*

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## Teaching and Professional Experience

2018 **IVADO summer school**, *Introduction to machine learning*, first day of the summer school.  
*Lecturer at McGill University*

2017 **COMP-652/ECSE-608: Machine Learning course for graduate students**, *co-teaching with Prof. Doina Precup in Winter 2017 and with Riashat Islam (PhD student) in Fall 2017*.

*Teaching Assistant at École Centrale Marseille (graduate school of engineering)*

- 2013-2016
- **Big Data and Data Science, Lecturer (3rd year students, 40h)**
  - **Databases, Teaching Assistant (2nd year students, 65h)**
  - **Algorithmic, Teaching Assistant (1st year students, 85h)**

## Professional Experience

- 2002-2010 **Experimental Music Performer**, based in Tours (FR) from 2002 to 2005 - Brussels (BE) from 2005 to 2008 - Berlin (GE) from 2008 to 2010.  
My work focused on developing a live-oriented computer interface (with the programming environment Pure Data) to incorporate sound synthesis in free improvisation.
- 2000-2010 **Guitar and Music Theory Teacher**.

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## Publications

### Articles in Peer-Reviewed Journals

Raphaël Bailly, Guillaume Rabusseau, and François Denis. Recognizable series on graphs and hypergraphs. *Journal of Computer and System Sciences*, 2018 (in press).

### Articles in Peer-Reviewed International Conferences

Philip Amortila and Guillaume Rabusseau. Learning graph weighted models on pictures. *ICGI*, 2018.

Tianyu Li, Guillaume Rabusseau, and Doina Precup. Nonlinear weighted finite automata. In *International Conference on Artificial Intelligence and Statistics*, pages 679–688. 2018.

Guillaume Rabusseau. Minimization of graph weighted models over circular strings. In *International Conference on Foundations of Software Science and Computation Structures*, pages 513–529. 2018.

Guillaume Rabusseau, Borja Balle, and Joelle Pineau. Multitask spectral learning of weighted automata. In *Advances in Neural Information Processing Systems 30*, pages 2585–2594. 2017.

Matteo Ruffini, Guillaume Rabusseau, and Borja Balle. Hierarchical methods of moments. In *Advances in Neural Information Processing Systems 30*, pages 1899–1908. 2017.

Guillaume Rabusseau, Borja Balle, and Shay B. Cohen. Low-Rank Approximation of Weighted Tree Automata. In *Proceedings of the 19th International Conference on Artificial Intelligence and Statistics*, pages 839–847, 2016.

Guillaume Rabusseau and Hachem Kadri. Low-rank regression with tensor responses. In *Advances In Neural Information Processing Systems 29*, pages 1867–1875. 2016.

Raphaël Bailly, François Denis, and Guillaume Rabusseau. Recognizable Series on Hypergraphs. In *Proceedings of the 9th International Conference on Language and Automata Theory and Applications*, pages 639–651, 2015.

Guillaume Rabusseau and François Denis. Maximizing a Tree Series in the Representation Space. In *Proceedings of the 12th International Conference on Grammatical Inference*, pages 124–138, 2014.

### Technical Reports / Preprints

Eric Crawford, Guillaume Rabusseau, and Joelle Pineau. Sequential coordination of deep models for learning visual arithmetic. 2018.

Guillaume Rabusseau, Tianyu Li, and Doina Precup. Connecting weighted automata and recurrent neural networks through spectral learning. *arXiv preprint arXiv:1807.01406*, 2018.

Guillaume Rabusseau and François Denis. Learning Negative Mixture Models by Tensor Decompositions. *CoRR*, abs/1403.4224, 2014.

### Workshop Contributions

Philip Amortila and Guillaume Rabusseau. Learning graph weighted models on pictures. *2nd workshop on Learning and Automata (LearnAut at FLoC 2018)*, 2018.

Tianyu Li, Guillaume Rabusseau, and Doina Precup. Neural network based nonlinear weighted finite automata. *LICS workshop on Learning and Automata*, 2017.

Guillaume Rabusseau and Joelle Pineau. Multitask spectral learning of weighted automata. *LICS workshop on Learning and Automata*, 2017.

Raphaël Bailly and Guillaume Rabusseau. Graph learning as a tensor factorization problem. *NIPS workshop on Learning with Tensors*, 2016.

Guillaume Rabusseau and François Denis. Learning Negative Mixture Models by Tensor Decompositions. *Workshop on Method of Moments and Spectral Learning (ICML 2014)*, 2014.

### Articles in Peer-Reviewed French Conferences

Guillaume Rabusseau. Régression de faible rang pour réponses tensorielles. *Conférence sur l'Apprentissage Automatique*, 2016.

Guillaume Rabusseau, Borja Balle, and Shay B. Cohen. Minimisation approximée d'automates pondérés d'arbres. *Conférence sur l'Apprentissage Automatique*, 2016.

Guillaume Rabusseau, Hachem Kadri, and François Denis. Régression de faible rang non-paramétrique pour réponses tensorielles. *Colloque International Francophone de Traitement du Signal et de l'Image*, 2015.

Guillaume Rabusseau and François Denis. Décompositions Tensorielles pour l'Apprentissage de Modèles de Mélanges Négatifs. *Conférence sur l'Apprentissage Automatique*, 2014. **Best paper award.**

### Thesis

Guillaume Rabusseau. *A Tensor Perspective on Weighted Automata, Low-Rank Regression and Algebraic Mixtures*. PhD thesis, Aix-Marseille Université, 2016.

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## Invited Talks

### Multitask Spectral Learning of Weighted Automata.

July 2018 *MAGNET team seminar*, INRIA Lille, France.

### Machine Learning with Tensors for Structured Data.

June 2018 *RIKEN Center for Advanced Intelligence Project*, AIP, Japan.

March 2018 *Séminaires de doctorat en informatique cognitive*, UQAM, Canada.

Feb. 2018 *Colloque du DIRO*, Université de Montréal, Canada.

### Higher-Order Low-Rank Regression.

May 2016 *Mathematics and Statistics Seminar*, Lancaster University, UK.

Nov. 2015 *Workshop on Tensor Decompositions and Covariance Matrix Estimation*, Aix-Marseille University, France.

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## Grants

April 2017 **IVADO postdoctoral fellowship**, two year funding for a postdoctoral position at McGill.

2017 **NVIDIA GPU grant**, donation of one NVIDIA TITAN Xp GPU.

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## Other Research Activities

- Supervision
- I am working or worked with the following students at the Reasoning and Learning Lab: Philip Amortila (MSc), Xingwei Cao (BSc), Eric Crawford (PhD), Andy Huang (BSc), Tianyu Li (PhD) and Di Wu (PhD)
  - Co-supervisor of 2nd year student Claire Béhue's internship on *Artificial Intelligence for the Game of Gomoku* (LIF, 2014).
  - Co-supervisor of 1st year student Yoan Chaillan's internship on *Computer Vision for Gender Recognition* (LIF, 2013).

Organization

- Co-organizer of the UAI 2018 workshop on Safety, Risk and Uncertainty in Reinforcement Learning.
- Co-organizer of the *Learning and Automata workshop* at FLoC 2018.
- Co-organizer of the *Hackday* (24 hours machine learning hackathon) for the machine learning french conference CAP 2016.

Reviewer

- Conferences: AISTATS 2019, CAI 2018, IJCAI 2018, NIPS 2018, NIPS 2014 (and sub-reviewer for ECML 2014, NIPS 2015, AAAI 2015, AISTAS 2016, ALT 2018).
- Journals: Machine Learning.

Responsibilities

- Elected representative of the LIF PhD students on the Doctoral School Counsel (2014-2016).

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## Computer Science Skills

Languages	Python, C, C#, Java, Matlab/Octave, Scheme, Haskell, Bash	Web	HTML, PHP, SQL
Music	Pure Data, Max/msp	Other	L <sup>A</sup> T <sub>E</sub> X, Arduino

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## Languages

French	<b>mother tongue</b>
English	<b>fluent</b>
Spanish/German	<b>notions</b>