Curriculum Vitae

MAXIME GASSE

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EDUCATION

Ph.D. in Machine Learning *2013 - 2017*
Université Lyon 1
Probabilistic graphical models, multi-label classification

Master in Artificial Intelligence and Decision Making *2011 - 2012*
Université Lyon 1
Machine learning, bio-inspired systems, combinatorial problems

Engineer in Computer Science and Communication Networks *2008 - 2011*
CPE Lyon
Mathematics, computer architectures, signal processing
System programming, embedded systems, web, databases, networks

Bachelor's Degree in Computer Science (eq.) *2006 - 2008*
IUT A Lyon 1, Bourg-en-Bresse
Mathematics, algorithms, databases, networks

French Baccalaureate in Sciences *2003 - 2006*
Lycée René Cassin, Mâcon
Engineering track : mechanics, electronics

PROFESSIONAL EXPERIENCE

Class I researcher, Polytechnique (Montréal) *2020.08 - présent*
Machine learning research.

Post-doc, MILA/Polytechnique (Montréal) *2018 - 2020.08*
Supervisors : Laurent Charlin and Andrea Lodi
Deep learning for combinatorial optimization.

Post-doc, CREATIS/INSA (Lyon) *2017 - 2018*
Supervisors : Fabien Millioz and Denis Friboulet
Deep learning for ultrasound imaging.

Ph.D. student, LIRIS/Université de Lyon (Lyon) *2013 - 2017*
Supervisors : Haytham Elghazel and Alexandre Aussem
Probabilistic graphical model structure learning, structured prediction.

Junior engineer, Logica IT Services (Lyon) *2008 - 2011*
Java JEE, C++, Oracle SQL, PL/SQL.

TEACHING EXPERIENCE

Machine Learning *2017/18*
5th year engineer students, CPE Lyon
Decision theory, supervised / unsupervised / reinforcement learning
Lectures (6h) + hands-on sessions (8h)

C programming *2017/18*
4th year engineer students, CPE Lyon
Compilation, programming, data structures
Hands-on sessions (24h)

Probabilistic Graphical Models *2016/17*
Graduate students (master 2), Université Lyon 1
Structure learning, causality, do-calculus
Hands-on sessions (8h)

Algorithmics and programming *2013/14, 14/15, 15/16*
Undergrad students (license 2), Université Lyon 1
Types, memory management, complexity, advanced data structures
Tutorials (36h) + hands-on sessions (136h)

Java / Object-Oriented Programming *2013/14*
4th year engineer students, CPE Lyon
Inheritance, interfaces, abstraction, collections, types, GUI (Swing)
Hands-on sessions (24h)

ACCOMPLISHMENTS

Research Grant
Winner of the 11th GERAD postdoctoral fellowship competition, in 2018 (25 000 CAD).

Peer Reviewing Service
Conferences :

- ICML '21
- ICLR '21 - outstanding reviewer (top 10%)
- NeurIPS '20 - top reviewer (top 10%)
- ICML '20 - top reviewer (top 30%)
- ICRA '20
- NeurIPS '19 - best reviewer (top 40%)
- Montreal AI symposium '18

Journals :

- ESWA
- IJAR
- TUFFC
- TMI
- Ultrasonics
- INFORMS Journal of Optimization

Calls for projects :

- Croatian Science Foundation (HRZZ) - external reviewer

Scientific Supervision
PhD students :

- Brice Rauby : Deep Learning for spatiotemporal ultrasound localization microscopy

Master students :

- Avrech Ben-David : RL for cut selection (2020)

Lara Scavuzzo : RL for branching (2020)
Vincent Fortin : MCTS for combinatorial optimisation (2020)
Giacomo Neri : architectures for solving time prediction (2018)
Nicola Ferroni : GNN architectures for branching (2018)
Denis Lecoeuche : multi-label classification (2017)

Interns :
Bhanu Bhandari : RL for node selection (2020)
William Ngo : DAgger for branching (2019)

Science Popularization

Introduction to mathematics research in primary school :
Math à Modeler, Sathonay-Camp elementary school, 5x4h seminars (2015)

Introduction to machine learning for researchers :
LIRIS lab (2016)
CREATIS lab (2017)
GERAD lab (2018)
ZIB institute (2019)
CORS conference (2021, scheduled)
CRM school on column generation (2021, scheduled)

Public lectures :
Lyon Data Science MeetUp (2017)

Personal Interests

Open-source enthusiast.
Curious about space, physics, history, science in general.
I enjoy reading books, playing board games, running, climbing.

Languages

French : native speaker.
English : fluent.

PUBLICATIONS

Conference Proceedings

[Gup+20] Gupta, Prateek, Gasse, Maxime, Khalil, Elias, Kumar, M. Pawan, Lodi, Andrea et Bengio, Yoshua. « Hybrid Models for Learning to Branch. » In : *NeurIPS*. 2020.

[Mül+20] Müller, Benjamin, Muñoz, Gonzalo, Gasse, Maxime, Gleixner, Ambros, Lodi, Andrea et Serrano, Felipe. « On Generalized Surrogate Duality in Mixed-Integer Nonlinear Programming ». In : *Integer Programming and Combinatorial Optimization*. Sous la dir. de Bienstock, Daniel et Zambelli, Giacomo. Springer International Publishing, 2020, p. 322–337.

[SGC20] Subakan, Cem, Gasse, Maxime et Charlin, Laurent. « On the Effectiveness of Two-Step Learning for Generative Models with Learnable Priors. » In : *IEEE 30th International Workshop on Machine Learning for Signal Processing (MLSP)*. 2020.

[Gas+19c] Gasse, Maxime, Chetelat, Didier, Ferroni, Nicola, Charlin, Laurent et Lodi, Andrea. « Exact Combinatorial Optimization with Graph Convolutional Neural Networks. » In : *NeurIPS*. 2019.

[GA16a] Gasse, Maxime et Aussem, Alexandre. « Algorithmes de factorisation d'une loi de probabilité jointe en facteurs indépendants et minimaux ». In : *Journées Francophones sur les Réseaux Bayésiens et les Modèles Graphiques Probabilistes (JFRB)*. 2016.

[GA16b] Gasse, Maxime et Aussem, Alexandre. « F-Measure Maximization in Multi-Label Classification with Conditionally Independent Label Subsets. » In : *ECML/PKDD*. Sous la dir. de Frasconi, Paolo, Landwehr, Niels, Manco, Giuseppe et Vreeken, Jilles. T. 9851. Lecture Notes in Computer Science. Springer, 2016, p. 619–631.

[GA16c] Gasse, Maxime et Aussem, Alexandre. « Identifying the irreducible disjoint factors of a multivariate probability distribution. » In : *PGM*. Sous la dir. d'Antonucci, Alessandro, Corani, Giorgio et de Campos, Cassio Polpo. T. 52. JMLR Workshop and Conference Proceedings. JMLR.org, 2016, p. 183–194.

[GAE15b] Gasse, Maxime, Aussem, Alexandre et Elghazel, Haytham. « On the Optimality of Multi-Label Classification under Subset Zero-One Loss for Distributions Satisfying the Composition Property. » In : *ICML*. Sous la dir. de Bach, Francis R. et Blei, David M. T. 37. JMLR Proceedings. JMLR.org, 2015, p. 2531–2539.

[Aus+14] Aussem, Alexandre, Caillet, Pascal, Klemm, Zara, Gasse, Maxime, Schott, Anne-Marie et Ducher, Michel. « Analysis of risk factors of hip fracture with causal Bayesian networks. » In : *IWBBIO*. Sous la dir. de Rojas, Ignacio et Guzman, Francisco M. Ortuño. Copicentro Editorial, 2014, p. 1074–1085.

[Le +14] Le Goff, Ronan, Garcia, David, Gasse, Maxime et Aussem, Alexandre. « Optimal Sensor Locations for Polymer Injection Molding Process ». In : *ESAFORM*. T. 611. Key Engineering Materials. Trans Tech Publications, 2014, p. 1724–1733.

[GAE12] Gasse, Maxime, Aussem, Alexandre et Elghazel, Haytham. « An Experimental Comparison of Hybrid Algorithms for Bayesian Network Structure Learning. » In : *ECML/PKDD*. Sous la dir. de Flach, Peter A., Bie, Tijl De et Cristianini, Nello. T. 7523. Lecture Notes in Computer Science. Springer, 2012, p. 58–73.

Conference Communications

[Gas+19a] Gasse, Maxime, Chetelat, Didier, Charlin, Laurent et Lodi, Andrea. « Learning to Branch With Graph Convolutional Neural Networks ». In : *Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*. 2019.

[Gas+19b] Gasse, Maxime, Chetelat, Didier, Charlin, Laurent et Lodi, Andrea. « Learning to Branch With Graph Convolutional Neural Networks ». In : *Canadian Operational Research Society (CORS) 61st Annual Conference*. 2019.

[Gas+18] Gasse, Maxime, Chetelat, Didier, Charlin, Laurent et Lodi, Andrea. « Reinforcement Learning of Branching Strategies ». In : *Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting*. 2018.

[Gas+17b] Gasse, Maxime, Millioz, Fabien, Roux, Emmanuel, Liebgott, Hervé et Friboulet, Denis. « Accelerating plane wave imaging through deep learning-based reconstruction : An experimental study ». In : *2017 IEEE International Ultrasonics Symposium (IUS)*. 2017.

[GAE15a] Gasse, Maxime, Aussem, Alexandre et Elghazel, Haytham. « On the Factorization of the Label Conditional Distribution in the context of Multi-Label Classification ». In : *ECML-PKDD Workshops, International Workshop on Big Multi-Target Prediction*. 2015.

Journals

[Gas+17a] Gasse, Maxime, Millioz, Fabien, Roux, Emmanuel, Garcia, Damien, Liebgott, Hervé et Friboulet, Denis. « High-Quality Plane Wave Compounding Using Convolutional Neural Networks ». In : *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* 64.10 (2017), p. 1637–1639.

[GAE14] Gasse, Maxime, Aussem, Alexandre et Elghazel, Haytham. « A hybrid algorithm for Bayesian network structure learning with application to multi-label learning. » In : *Expert Systems with Applications* 41.15 (2014), p. 6755–6772.

Ph.D. Thesis

[Gas17] Gasse, Maxime. « Probabilistic Graphical Model Structure Learning : Application to Multi-Label Classification ». Theses. Université de Lyon, 2017.

Invited Lectures

[Gas18] Gasse, Maxime. « Ultrasound image reconstruction using deep learning : a new paradigm ». IEEE International Ultrasonics Symposium (IUS), invited speaker. 2018.

Tutorials

[Ché+20] Chételat, Didier, Gasse, Maxime, Khalil, Elias B., Prouvost, Antoine, Zarpellon, Giulia, Charlin, Laurent et Lodi, Andrea. « Machine Learning for Combinatorial Optimization. » In : *IJCAI-PRICAI tutorials*. 2020.

[Kha+20] Khalil, Elias B., Lodi, Andrea, Dilkina, Bistra, Chételat, Didier, Gasse, Maxime, Prouvost, Antoine, Zarpellon, Giulia et Charlin, Laurent. « Recent Advances in Integrating Machine Learning and Combinatorial Optimization. » In : *AAAI tutorials*. 2020.

Seminars

[Gas21a] Gasse, Maxime. « Data-Driven Combinatorial Optimization. » Schloss Dagstuhl Seminar 20421, Leibniz Center for Informatics (scheduled). 2021.

[Gas21b] Gasse, Maxime. « Ecole : A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers. » IPAM : Deep Learning and Combinatorial Optimization. 2021.

[Gas20] Gasse, Maxime. « Combinatorial Optimization : what can Machine Learning do ? » Mathematical Optimization group, TU Braunschweig. 2020.

[Gas19a] Gasse, Maxime. « Learning to branch ». Konrad-Zuse-Zentrums für Informationstechnik Berlin (ZIB). 2019.

[Gas19b] Gasse, Maxime. « Learning to branch in MILP solvers ». TTI-C Workshop on Automated Algorithms Design. 2019.

[Gas19c] Gasse, Maxime. « Statistical Learning for Combinatorial Optimization ». Polytechnique Montréal, Séminaire département GIGL. 2019.

Software

[Gam+20] Gamrath, Gerald, Anderson, Daniel, Bestuzheva, Ksenia, Chen, Wei-Kun, Eifler, Leon, Gasse, Maxime, Gemander, Patrick, Gleixner, Ambros, Gottwald, Leona, Halbig, Katrin, Hendel, Gregor, Hojny, Christopher, Koch, Thorsten, Le Bodic, Pierre, Maher, Stephen J., Matter, Frederic, Miltenberger, Matthias, Mühmer, Erik, Müller, Benjamin, Pfetsch, Marc E., Schlösser, Franziska, Serrano, Felipe, Shinano, Yuji, Tawfik, Christine, Vigerske, Stefan, Wegscheider, Fabian, Weninger, Dieter et Witzig, Jakob. *The SCIP Optimization Suite 7.0*. Technical Report. Optimization Online, 2020.

[Pro+20] Prouvost, Antoine, Dumouchelle, Justin, Scavuzzo, Lara, Gasse, Maxime, Chételat, Didier et Lodi, Andrea. *Ecole : A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers*. 2020. arXiv : `2011.06069 [cs.LG]`.