MAXIME GASSE

ServiceNow Research, 6650 St Urbain Street, Suite 500, Montreal, QC H2S3G9
maxime.gasse@gmail.com

PROFESSIONAL EXPERIENCE

Researcher, **ServiceNow Research** *2022 - present*
Causality, statistical decision-making Montréal, Canada

Researcher, **MILA/Polytechnique Montréal** *2020 - 2022*
Machine learning, causality Montréal, Canada

Post-doc, **MILA/Polytechnique Montréal** *2018 - 2020*
Supervisors: Laurent Charlin and Andrea Lodi Montréal, Canada
Machine learning for combinatorial optimization

Post-doc, **CREATIS/INSA Lyon** *2017 - 2018*
Supervisors: Fabien Millioz and Denis Friboulet Lyon, France
Machine learning for ultrasound imaging

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

Software developer, **Logica IT Services** *2008 - 2011*
Java JEE, C++, Oracle SQL, PL/SQL Lyon, France

EDUCATION

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

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

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

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

French Baccalaureate, **Engineering Sciences** *2006*
Lycée René Cassin, Mâcon
Mathematics, physics, mechanics, electronics

TEACHING EXPERIENCE

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

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

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

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

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

ACCOMPLISHMENTS

Awards and Distinctions

ICML 2021 expert reviewer

ICLR 2021 outstanding reviewer (top 10%)

NeurIPS 2020 top reviewer (top 10%)

ICML 2020 top reviewer (top 30%)

NeurIPS 2019 best reviewer (top 40%)

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

Program Committee

Conferences: NeurIPS 2022, 2021, 2020, 2019, NeurIPS Competition Track 2022, ICML 2022, 2021, 2020, CLeaR 2022, ICLR 2021, ICRA 2020.

Journals: TMLR, TPAMI, Machine Learning, ESWA, IJAR, TUFFC, TMI, Ultrasonics, INFORMS Journal of Optimization.

Competitions: Machine Learning for Combinatorial Optimization (ML4CO) at NeurIPS 2021, lead organizer.

Funding Agencies

Croatian Science Foundation (HRZZ) 2021 - "Installation Research Projects"

France's Agence Nationale de Recherche (ANR) 2022 - "CE48 Fondements du numérique : informatique, automatique, traitement du signal"

Supervision

Current

Brice Rauby (PhD): deep learning for spatiotemporal ultrasound localization microscopy

Past

Jefferson Lam (Intern): implementing a learning to cut environment (2021)

Feng Yang Chen (Intern): actor-critic methods for learning to branch (2021)

Vincent Fortin (Master): MCTS for combinatorial optimisation (2020)

Lara Scavuzzo (Intern): RL for branching (2020)

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

Bhanu Bhandari (Intern): RL for node selection (2020)

William Ngo (Intern): DAgger for branching (2019)

Giacomo Neri (Intern): architectures for solving time prediction (2018)

Nicola Ferroni (Intern): GNN architectures for branching (2018)

Denis Lecoeuche (Intern): multi-label classification (2017)

Science Popularization

Machine learning crash course

CORS conference, 1h30 lecture + 1h30 hands-on (2021)

ZIB institute, 2h lecture (2019)

GERAD lab, 2h lecture (2018)

CREATIS lab, 4h lecture (2017)

LIRIS lab, 4h lecture (2016)

Math à Modeler, introducing children to research in mathematics

Sathonay-Camp elementary school, 5x4h seminars (2015)

Public lectures

Lyon Data Science MeetUp, 1h lecture (2017)

Spoken Languages

French (native), English (fluent).

PUBLICATIONS, PEER-REVIEWED

Ongoing Work

[Gas+21] Gasse, Maxime, Grasset, Damien, Gaudron, Guillaume, and Oudeyer, Pierre-Yves. "Causal Reinforcement Learning using Observational and Interventional Data." In: *ArXiv*. 2021.

Journals & Proceedings

[Gup+22] Gupta, Prateek, Khalil, Elias B., Chetélat, Didier, Gasse, Maxime, Bengio, Yoshua, Lodi, Andrea, and Kumar, M. Pawan. "Lookback for Learning to Branch". In: *Transactions on Machine Learning Research (TMLR)* (2022).

[Sca+22] Scavuzzo, Lara, Chen, Feng Yang, Gasse, Maxime, Chételat, Didier, Lodi, Andrea, Yorke-Smith, Neil, and Aardal, Karen. "Learning To Branch with Tree MDPs." In: *NeurIPS*. 2022.

[Mil+21] Milecki, Léo, Porée, Jonathan, Belgharbi, Hatim, Bourquin, Chloé, Damseh, Rafat, Delafontaine-Martel, Patrick, Lesage, Frédéric, Gasse, Maxime, and Provost, Jean. "A Deep Learning Framework for Spatiotemporal Ultrasound Localization Microscopy". In: *IEEE Transactions on Medical Imaging* 40.5 (2021), pp. 1428–1437.

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

[Mül+20] Müller, Benjamin, Muñoz, Gonzalo, Gasse, Maxime, Gleixner, Ambros, Lodi, Andrea, and Serrano, Felipe. "On Generalized Surrogate Duality in Mixed-Integer Nonlinear Programming". In: *Integer Programming and Combinatorial Optimization*. Ed. by Bienstock, Daniel and Zambelli, Giacomo. Springer International Publishing, 2020, pp. 322–337.

[SGC20] Subakan, Cem, Gasse, Maxime, and 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, and Lodi, Andrea. "Exact Combinatorial Optimization with Graph Convolutional Neural Networks." In: *NeurIPS*. 2019.

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

[GA16a] Gasse, Maxime and 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 and Aussem, Alexandre. "F-Measure Maximization in Multi-Label Classification with Conditionally Independent Label Subsets." In: *ECML/PKDD*. Ed. by Frasconi, Paolo, Landwehr, Niels, Manco, Giuseppe, and Vreeken, Jilles. Vol. 9851. Lecture Notes in Computer Science. Springer, 2016, pp. 619–631.

[GA16c] Gasse, Maxime and Aussem, Alexandre. "Identifying the irreducible disjoint factors of a multivariate probability distribution." In: *PGM*. Ed. by Antonucci, Alessandro, Corani, Giorgio, and de Campos, Cassio Polpo. Vol. 52. JMLR Workshop and Conference Proceedings. JMLR.org, 2016, pp. 183–194.

[GAE15b] Gasse, Maxime, Aussem, Alexandre, and Elghazel, Haytham. "On the Optimality of Multi-Label Classification under Subset Zero-One Loss for Distributions Satisfying the Composition Property." In: *ICML*. Ed. by Bach, Francis R. and Blei, David M. Vol. 37. JMLR Proceedings. JMLR.org, 2015, pp. 2531–2539.

[Aus+14] Aussem, Alexandre, Caillet, Pascal, Klemm, Zara, Gasse, Maxime, Schott, Anne-Marie, and Ducher, Michel. "Analysis of risk factors of hip fracture with causal Bayesian networks." In: *IWBBIO*. Ed. by Rojas, Ignacio and Guzman, Francisco M. Ortuño. Copicentro Editorial, 2014, pp. 1074–1085.

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

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

[GAE12] Gasse, Maxime, Aussem, Alexandre, and Elghazel, Haytham. "An Experimental Comparison of Hybrid Algorithms for Bayesian Network Structure Learning." In: *ECML/PKDD*. Ed. by Flach, Peter A., Bie, Tijl De, and Cristianini, Nello. Vol. 7523. Lecture Notes in Computer Science. Springer, 2012, pp. 58–73.

Ph.D. Thesis

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

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, and 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, and Lodi, Andrea. *Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers*. NeurIPS LMCA Workshop. 2020.

Competition

[Gas+22] Gasse, Maxime, Bowly, Simon, Cappart, Quentin, Charfreitag, Jonas, Charlin, Laurent, Chételat, Didier, Chmiela, Antonia, Dumouchelle, Justin, Gleixner, Ambros, Kazachkov, Aleksandr M., Khalil, Elias, Lichocki, Pawel, Lodi, Andrea, Lubin, Miles, Maddison, Chris J., Morris, Christopher, Papageorgiou, Dimitri J., Parjadis, Augustin, Pokutta, Sebastian, Prouvost, Antoine, Scavuzzo, Lara, Zarpellon, Giulia, Yang, Linxin, Lai, Sha, Wang, Akang, Luo, Xiaodong, Zhou, Xiang, Huang, Haohan, Shao, Shengcheng, Zhu, Yuanming, Zhang, Dong, Quan, Tao, Cao, Zixuan, Xu, Yang, Huang, Zhewei, Zhou, Shuchang, Binbin, Chen, Minggui, He, Hao, Hao, Zhiyu, Zhang, Zhiwu, An, and Kun, Mao. "The Machine Learning for Combinatorial Optimization Competition (ML4CO): Results and Insights". In: *Proceedings of the NeurIPS 2021 Competitions and Demonstrations Track*. Ed. by Kiela, Douwe, Ciccone, Marco, and Caputo, Barbara. Vol. 176. Proceedings of Machine Learning Research. PMLR, June 2022, pp. 220–231.

COMMUNICATIONS, NO PEER-REVIEW

Invited Lectures & Seminars

[Gas22a] Gasse, Maxime. "Causal Machine Learning." Mila TechAide AI Conference. 2022.

[Gas22b] Gasse, Maxime. "Data-Driven Combinatorial Optimization." Schloss Dagstuhl Seminar 22431, Leibniz Center for Informatics (scheduled). 2022.

[Gas22d] Gasse, Maxime. "Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers." ICCOPT: International Conference on Continuous Optimization. 2022.

[Gas21a] Gasse, Maxime. "Causal Reinforcement Learning using Observational and Interventional Data." Microsoft Research (MSR) Montreal Seminar. 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.

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

Tutorials

[Gas21d] Gasse, Maxime. "Foundations of Neural Networks." In: *Canadian Operational Research Society (CORS) Neural Networks Workshop*. 2021.

[Ché+20] Chételat, Didier, Gasse, Maxime, Khalil, Elias B., Prouvost, Antoine, Zarpellon, Giulia, Charlin, Laurent, and 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, and Charlin, Laurent. "Recent Advances in Integrating Machine Learning and Combinatorial Optimization." In: *AAAI tutorials*. 2020.

Conferences

[Gas22c] Gasse, Maxime. "Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers." In: *Canadian Operational Research Society (CORS) 63rd Annual Conference*. 2022.

[Gas22e] Gasse, Maxime. "Learning to Branch with Tree MDPs." In: INFORMS Computing Society Conference (ICS). 2022.

[Gas21c] Gasse, Maxime. "Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers." In: European Conference on Operational Research (EURO). 2021.

[Gas+19a] Gasse, Maxime, Chetelat, Didier, Charlin, Laurent, and 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, and 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, and 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, and Friboulet, Denis. "Accelerating plane wave imaging through deep learning-based reconstruction: An experimental study". In: *IEEE International Ultrasonics Symposium (IUS)*. 2017.

[GAE15a] Gasse, Maxime, Aussem, Alexandre, and 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.