Maxime Wabartha

Montréal, QC, Canada
(+1) 438 824 0908
maximewabartha@gmail.com
https://maxwab.github.io

Research interests

Better understand the exploration mechanisms in deep reinforcement learning; study the gap between theory and practice brought by the use of (non-linear) function approximation in reinforcement learning.

Education

2019 – to date **Ph.D. in Computer Science**, *McGill University / Mila*, Canada, *GPA: 4.0*.

Reinforcement learning

I am interested in studying the use of (non-linear) function approximation in model-free reinforcement learning, for instance its link with deep exploration mechanisms or its consequences on the dynamics of training of value functions.

Currently, I am working on the imputation of medical data in the scope of a Covid-19 project in collaboration with researchers and doctors from McGill and the CHUM. Before that, I was looking at the out-of-distribution behaviour of neural networks to train ensembles that better detect outliers.

More broadly, I am interested in the theoretical foundations of reinforcement learning, and the assumptions that can be made to enhance the scalability of the problem.

As part of my PhD, I have taken classes in reinforcement learning (COMP767) and probabilistic analysis of algorithms (COMP690).

My PhD is supervised by Prof. Joelle Pineau.

2017 – 2018 **M.Sc. in Applied Mathematics**, *École Normale Supérieure Paris-Saclay*, France, *highest honours*.

Mathematics, computer vision and machine learning. (*Master program "MVA"*)

Selection of classes taken, in no particular order: probabilistic graphical models, graphs in machine learning (project: graph exploration using Thompson Sampling), kernel methods, computer vision (project: segmentation with atrous convolutions), convex optimization, unsupervised learning.

2013 – 2017 **M.Eng.**, *École Centrale de Lille*, France.

Machine learning major – Entrepreneurship minor

Top 10 french engineering schools program

- Specialization in machine learning, statistical estimation, reinforcement learning,
- Solid foundations in engineering (mechanics, electronics, embedded systems) and business (strategy, change management, assertivity),
- Extra-curricular: co-founder of the school's movie club.

2010 – 2013 **Mathematics & Physics undergraduate**, *Lycée Kléber*, France.

Intensive preparatory classes for competitive entrance to the french "Grandes Écoles".

Professional experience

May 2018 to Dec. 2018 **Research intern in reinforcement learning**, *Reasoning and Learning Lab / Mila*, McGill University, Canada.

Study of methods using uncertainty over neural networks to encourage exploration in reinforcement learning. Development of a model-based approach leveraging the diversity of several neural networks to solve a low-dimensional RL problem. Supervised by Audrey Durand, Vincent François-Lavet and Joelle Pineau.

May 2017 to Sep. 2017 **Research intern in computer vision and deep learning**, *NeuroPoly (neuroimaging laboratory)*, Polytechnique Montréal, Canada.

Development of AxonDeepSeg, a CNN using a variation of the U-net architecture to segment microstructures from spinal cord microscopy data. Open-source software (coded in TensorFlow) available online. Lead co-author of a scientific article published in Nature Scientific Reports.

Apr. 2016 to Aug. 2016 **Business Intelligence analyst**, *Shopwings (startup)*, Canada.
Uber-like start-up delivering supermarket groceries directly to the customers' doorstep.
Responsible of extending the operations and data analysis tools during a business expansion period (launch of the service in 3 new cities). In charge of the technical and organizational implementation (solution's choice, coding, processes update, change management) of 2 strategic partnerships.

Apr. 2014 to Mar. 2015 **Internal vice-president**, *Centrale Lille Projets, €100k-turnover consulting firm*, France.
Student-managed consulting firm providing programming and marketing services.
In charge of the objectives and strategy of each division alongside their respective supervisors. Project manager for 5 projects (€15k) with entrepreneurs and industry leaders: business meetings, contract redaction.

References available upon request.

Teaching experience

2020 – 2020 **Teaching assistant**, *McGill University*, Canada.
90 hours. Class on Artificial Intelligence (COMP424). Included giving office hours, tutorials, invigilating and grading.

Talks

Jan. 2021 5-min spotlight-like talk, IJCAI contribution.

Jun. 2019 Invited talk at the NeuroPoly lab to present my submitted work on using diverse ensembles for out-of-distribution detection

Publications

Zaimi, A.*, **Wabartha, M.***, Herman, V., Antonsanti, P. L., Perone, C. S., & Cohen-Adad, J. (2018). *AxonDeepSeg: automatic axon and myelin segmentation from microscopy data using convolutional neural networks*. Nature Scientific reports, 8(1), 1-11.

Wabartha, M., Durand, A., François-Lavet, V., & Pineau, J. (2018). *Sampling diverse neural networks for exploration in reinforcement learning*. NeurIPS Workshop on Bayesian Deep Learning.

Wabartha, M., Durand, A., François-Lavet, V., & Pineau, J. (2019). *Handling Black Swan Events in Deep Learning with Diversely Extrapolated Neural Networks*. NeurIPS Workshop on Safety and Robustness in Decision Making.

Wabartha, M., Durand, A., Francois-Lavet, V., & Pineau, J. (2020). *Handling Black Swan Events in Deep Learning with Diversely Extrapolated Neural Networks*. International Joint Conference on Artificial Intelligence, 2140-2147.

Mangeat, G., Ouellette, R., **Wabartha, M.**, De Leener, B., Plattén, M., Danylaité Karrenbauer, V., ... & Granberg, T. (2020). *Machine Learning and Multiparametric Brain MRI to Differentiate Hereditary Diffuse Leukodystrophy with Spheroids from Multiple Sclerosis*. Journal of Neuroimaging.

* denotes an equal contribution.

Languages

English Fluent written and oral (TOEFL: 111/120, TOEIC: 985/990).

German Occasional practice, B1-level equivalent.

Italian Elementary.

Skills

Programming Python, Pytorch, TensorFlow, C, SQL

Softwares/OS Git, Unix, Slurm, LaTeX, Matlab

Extracurricular activities

Sport	Practice of competitive badminton for 10 years
Misc. interests	Cinema - Technology