Valentin Thomas, PhD

Researcher in machine learning

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valthom.github.io
valthom
French citizenship

Interests Reinforcement learning, optimization for machine learning, representation learning, deep learning

Education

2017–2023 **PhD in Computer Science**, *Mila, Université de Montréal*, Montréal, Canada, Supervised by Y. Bengio and Nicolas Le Roux.
Working mainly on reinforcement learning (planning, control as inference and optimization).

2015–2016 **MSc in Machine Learning & Computer vision**, *École Normale Supérieure*, Cachan, France, *(Mention très bien)*.
Known as *Master MVA*, leading master in France for machine learning & computer vision.
Courses: computer vision, discrete optimization, graphical models, kernel methods, random matrices, graph theory, text processing.

2013–2016 **MSc in Applied Mathematics**, *Mines ParisTech*, *Paris, France*, *(Mention très bien)*.
Top-ranking French engineering school. School's acceptance rate below 3%. *Majoring in applied mathematics & automatic control.*
- Specialization courses: control theory, optimization, stochastic processes, signal processing
- Fundamental courses: Mathematics (variation calculus, probability, statistics, complex analysis, PDEs), Physics (statistical, quantum, fluid, solid, thermodynamics, material sciences), Computer science

2010–2013 **Classes préparatoires**, *Lycée Clemenceau*, Nantes, France, Ranked $1^{st}/43$ the last year.
Preparation for the national exam for admission to the Grandes Écoles. Specializing in mathematics, physics & theoretical computer science.

Publications

Stars * indicate first authorship.

Papers

- **Bridging the Gap Between Target Networks and Functional Regularization** (Alexandre Piché*, **Valentin Thomas***, Joseph Marino, Rafael Pardiñas, Gian Maria Marconi, Christopher Pal, Mohammad Emtiyaz Khan), `https://arxiv.org/abs/2106.02613` *In TMLR 2023*.
- **On the role of overparameterization in off-policy Temporal Difference learning with linear function approximation** (**Valentin Thomas***). `https://openreview.net/forum?id=g-H3oNARs2`, *In NeurIPS 2022*.
- **The Role of Baselines in Policy Optimization** (Jincheng Mei*, Wesley Chung, **Valentin Thomas**, Bo Dai, Csaba Szepesvari and Dale Schuurmans). To be added on arxiv, *In NeurIPS 2022*.
- **Beyond variance reduction: Understanding the true impact of baselines on policy optimization** (Wesley Chung*, **Valentin Thomas***, Marlos C. Machado, Nicolas Le Roux), *In ICML 2021*.
- **Information matrices and generalization** (**Valentin Thomas***, Fabian Pedregosa, Bart van Merriënboer, Pierre-Antoine Mangazol, Yoshua Bengio, Nicolas Le Roux), *Oral talk at the 2020 Workshop on theory of deep learning at the Institute for Advanced Studies, Princeton / published in AISTATS 2020*.
- **Probabilistic Planning with Sequential Monte Carlo methods** (**Valentin Thomas***, Alexandre Piché*, Cyril Ibrahim, Yoshua Bengio and Chris Pal), *Contributed talk at NeurIPS 2018 workshop Infer to Control/published in ICLR 2019*.
- **Planning with Latent Simulated Trajectories** (Alexandre Piché*, **Valentin Thomas**, Cyril Ibrahim, Yoshua Bengio, Julien Cornebise and Chris Pal), *In ICLR 2019 Workshop on Structure & Priors in Reinforcement Learning*.
- **Disentangling the independently controllable factors of variation by interacting with the world** (**Valentin Thomas***, Emmanuel Bengio*, William Fedus*, Jules Pondard, Philippe Beaudoin, Hugo Larochelle, Joelle Pineau, Doina Precup and Yoshua Bengio), *Oral at NeurIPS 2017 workshop on Learning Disentangled Representations: from Perception to Control*.
- **Independently Controllable Factors** (**Valentin Thomas***, Jules Pondard*, Emmanuel Bengio*, Marc Sarfati, P. Beaudoin, MJ. Meurs, J. Pineau, D. Precup and Y. Bengio), *Presented at the Montreal AI Symposium*.

- **Independently Controllable Features** (Emmanuel Bengio*, **Valentin Thomas**, Joelle Pineau, Doina Precup and Yoshua Bengio), *In RLDM 2017*.
- **Decoupling Backpropagation using Constrained Optimization Methods** (Akhilesh Gotmare*, **Valentin Thomas***, Johanni Brea and Martin Jaggi), *In ICML 2018 workshop on Efficent Credit Assignement*.

Projects

2014–2015 (10 months) **Spacecube project QB50**, *Mines ParisTech and École Polytechnique with the CNES (french NASA equivalent)*, Budget: €180,000.
Building a nano-satellite for a scientific mission in the thermosphere. Successfully deployed from ISS in January 2017.
- Responsible for the Attitude Determination & Control System: guidance, non linear estimation, sensor fusion
- Working in a team of 15 engineering students and 5 technical degree students
- Modeling the system with MATLAB, Implementing the algorithms in C++

Reviewing

Reviewer for JMLR, Neurips (Outsanding reviewer award 2021), ICLR and for workshops at Neurips, CVPR, ICML, ICLR.

Experience

Summer 2022 (4 months) **Research Scientist Intern**, *Deepmind*, Paris, France.
Supervised by Bilal Piot and Rémi Munos. Working on credit assignment in Reinforcement Learning.

2019-2020 (1 year) **Graduate student researcher (part-time)**, *Google Brain*, Montréal, Canada.
Supervised by Nicolas Le Roux and Marlos C. Machado. Working on reinforcement learning and optimization.

2017-2018 (1 year) **Part-time Research Intern**, *ElementAI*, Montréal, Canada.
Supervised by Philippe Beaudoin. Working on reinforcement learning and unsupervised learning alongside with my PhD.

Summer 2017 (5 months) **Research Intern**, *University of Montréal, Mila*, Montréal, Canada.
Supervised by Yoshua Bengio.
Working on deep learning, reinforcement learning and unsupervised learning.

Fall/Winter 2016 (5 months) **Research Intern**, *École Polytechnique Fédérale de Lausanne, Machine Learning and Optimization lab*, Lausanne, Switzerland.
Supervised by Martin Jaggi. Working on distributed stochastic optimization methods for training deep neural networks.

Summer 2016 (4 months) **Research Intern**, *Inria, team* THOTH, Grenoble, France.
Supervised by: Karteek Alahari and Cordelia Schmid.
Master's thesis: *Discrete optimization for jointly estimating optical flow and segmentation labels.*

Summer 2015 (4 months) **R&D Intern**, *General Electric Global Research, Embedded Systems and Control lab*, Munich, Germany.
Supervised by Luca Parolini and Florent Di Meglio.
Parameter estimation (e.g mass flow of oil) in a large network of pipes equipped with pressure sensors.

2014–2015 (7 months) **Part-time research assistant**, *Mines ParisTech, Systems and Control Centre*, Paris, France.
Supervised by Pierre Rouchon.
Quantum mechanics and control theory for state estimation & feedback control of the entanglement of two qubits.

Computer skills

General

- Linux: using it since 2010 on a daily basis
- Git
- Windows

Programming

- Scientific Python (very proficient): pytorch, numpy, scipy, scikit-learn and tensorflow
- LaTeX (very proficient)
- MATLAB (proficient)
- C++ (intermediate)
- Java (intermediate)

Languages

- English: Fluent
- French: Native language
- German: Intermediate
- Japanese: Notions