Thomas George

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Citizenship: France

Research interests

My research focuses on improving the explainability of machine learning models and developing efficient training techniques adapted for industrial use cases.

Education

2017 – 2023	**Mila - Université de Montréal** – Montréal, Canada PhD in Computer Science Thesis: *Deep networks training and generalization: insights from linearization* Mentors: Professors Pascal Vincent and Guillaume Lajoie
2015 – 2017	**Université de Montréal** – Montréal, Canada Master of research in Computer Science Thesis: *Factorized second order methods in neural networks* Mentor: Professor Pascal Vincent
2010 – 2013	**École des Mines** – Paris, France Master of Science and Executive Engineering
2009 – 2010	**University of Bristol** – Bristol, United-Kingdom Bachelor in mathematics, 1 year exchange student
2007 – 2010	**Sorbonne Université (Pierre et Marie Curie)** – Paris, France Bachelor in mathematics, with minors in computer science, physics and mechanics

Industry experience

2024 – present	**Orange Innovation (Permanent researcher)** – Châtillon, France Explainability of AI and causality.
2023 – 2024	**Orange Innovation (Postdoctoral researcher)** – Châtillon, France Methods for automated detection of mislabeled examples in machine learning datasets.

2013 – 2015   **Eco-Adapt (Hardware/software engineer)** – Paris, France
I led the design of hardware and implemented software for a wireless communicating electrical meter aimed at detecting faults.

Summer 2013   **FieldBox.ai (Research engineer internship)** – Paris, France
I designed a scripting framework for automated analysis of time series.

Selected publications

for a full list including pre-prints and workshop papers, please go to my scholar page.

2024   **Mislabeled examples detection viewed as probing machine learning models: concepts, survey and extensive benchmark**
Thomas George, Pierre Nodet, Alexis Bondu, Vincent Lemaire
TMLR 2024

2023   **Deep networks training and generalization: insights from linearization**
Thomas George
PhD thesis

2022   **Lazy vs hasty: linearization in deep networks impacts learning schedule based on example difficulty**
Thomas George, Guillaume Lajoie, Aristide Baratin
TMLR 2022

2021   **Implicit Regularization via Neural Feature Alignment**
Aristide Baratin*, Thomas George*, César Laurent, R Devon Hjelm, Guillaume Lajoie, Pascal Vincent, and Simon Lacoste-Julien
AISTATS 2021

2018   **Fast Approximate Natural Gradient Descent in a Kronecker-factored Eigenbasis**
Thomas George*, César Laurent*, Xavier Bouthillier, Nicolas Ballas, Pascal Vincent
NeurIPS 2018

2017   **Factorized second order methods in neural networks**
Thomas George
MSc thesis

Software

2024   **Model-probing mislabeled examples detection in machine learning datasets**
https://github.com/Orange-OpenSource/mislabeled
Pierre Nodet, Thomas George

2020   **NNGeometry: Easy and Fast Fisher Information Matrices and Neural Tangent Kernels in PyTorch**
https://github.com/tfjgeorge/nngeometry/
Thomas George

Teaching experience

October 2019 | **Invited lecturer, IFT3395: Fundamentals of machine learning (Université de Montréal)**
Material design and lecture for a 2hrs course on the backpropagation algorithm.

March 2019 | **Invited lecturer, IFT6760A: Matrix and tensor factorization techniques for machine learning (Université de Montréal)**
Material design and lecture for a 2hrs course on efficient factorized natural gradient in deep networks.

Fall 2016, 2018, 2019, 2020 | **Teaching assistant, IFT6390: Fundamentals of machine learning (Université de Montréal)**
Lab content design and labs teaching. Kaggle competition leading. Homework and exams grading.

Spring 2010 | **Teaching assistant: Mathematics and physics refresher course for 1st year students (Sorbonne Université)**
Tutorial teaching during a 3-weeks intensive class aimed at prospective 1st year students.

Talks and tutorials

July 2023 | Lazy vs hasty: linearization in deep networks impacts learning schedule based on example difficulty
Conférence sur l'apprentissage automatique 2023, Strasbourg, France

June 2021 | Implicit Regularization via Neural Feature Alignment
Conférence sur l'apprentissage automatique 2021, Saint-Étienne, France (remote)

February 2021 | Optimization and generalization through the lens of the linearization of neural networks training dynamics
Weekly seminar of Roger Grosse's group at Vector Institute, Toronto, Canada (remote)

Technical skills

Programming languages and libraries

Proficient in: Python, PyTorch, Scikit-learn

Familiar with: Javascript

Software

LaTeX, Git

Languages

French (fluent), English (professional working proficiency)

Other interests

Olympic handball, Sport climbing, Savate boxe française