

Guillaume Dalle

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Postdoctoral researcher in machine learning and optimization



Professional Experience

École polytechnique fédérale de Lausanne

POSTDOCTORAL RESEARCHER

Lausanne, Switzerland

2023 - present

- Theoretical study of graph neural networks

Électricité de France R&D

RESEARCH INTERN

Chatou, France

2018

- Markovian models for soiling estimation & cleaning optimization in solar power plants

Foris AI

SOFTWARE DEVELOPMENT INTERN

Santiago, Chile

2017

- Linear Programming & local search for university timetabling

Education

École Nationale des Ponts et Chaussées

PHD IN APPLIED MATHEMATICS

Champs-sur-Marne, France

2019 - 2022

- Thesis: *Machine Learning and Combinatorial Optimization Algorithms, with Applications to Railway Planning*

École Normale Supérieure Paris-Saclay

MASTER OF SCIENCE IN APPLIED MATHEMATICS

Cachan, France

2018 - 2019

- Coursework in machine learning and optimization
- Thesis: *Delay propagation on suburban railway networks*

École polytechnique

ENGINEERING DEGREE

Palaiseau, France

2015 - 2018

- Coursework in applied mathematics, computer science and humanities

Lycée Louis-le-Grand

SCIENTIFIC PREPARATORY CLASSES

Paris, France

2013 - 2015

- Coursework in mathematics and physics

Lycée Jeanne d'Arc

BILINGUAL FRENCH-GERMAN HIGH SCHOOL

Clermont-Ferrand, France

2010 - 2013

Publications

- [1] L. Bouvier, G. Dalle, A. Parmentier, and T. Vidal, "Solving a Continent-Scale Inventory Routing Problem at Renault," *Transportation Science*, Oct. 2023, doi: [10.1287/trsc.2022.0342](https://doi.org/10.1287/trsc.2022.0342).
- [2] L. Clarté, A. Vandenbroucq, G. Dalle, B. Loureiro, F. Krzakala, and L. Zdeborova, "Analysis of Bootstrap and Subsampling in High-dimensional Regularized Regression," in *The 40th Conference on Uncertainty in Artificial Intelligence*, Jun. 2024. Accessed: Nov. 21, 2024. [Online]. Available: <https://openreview.net/forum?id=yZaXk3OxVS>
- [3] G. Dalle, "HiddenMarkovModels.JI: Generic, Fast and Reliable State Space Modeling," *Journal of Open Source Software*, vol. 9, no. 96, p. 6436, Apr. 2024, doi: [10.21105/joss.06436](https://doi.org/10.21105/joss.06436).
- [4] G. Dalle, L. Baty, L. Bouvier, and A. Parmentier, "Learning with Combinatorial Optimization Layers: A Probabilistic Approach." [Online]. Available: <http://arxiv.org/abs/2207.13513>
- [5] G. Dalle, "Machine Learning and Combinatorial Optimization Algorithms, with Applications to Railway Planning," 2022. Accessed: Apr. 05, 2024. [Online]. Available: <https://pastel.hal.science/tel-04053322>
- [6] G. Dalle and Y. de Castro, "Minimax Estimation of Partially-Observed Vector AutoRegressions." [Online]. Available: <http://arxiv.org/abs/2106.09327>
- [7] P. Stephan and G. Dalle, "Method for Determining a Soiling Speed of a Photovoltaic Generation Unit," Jun. 2020 [Online]. Available: <https://patents.google.com/patent/WO2020115431A1/en>

Talks

Conferences

2024

- JuliaCon: *Gradients for everyone: a quick guide to autodiff in Julia* ([abstract](#))
- JuliaCon: *Fast and generic Hidden Markov Models* ([abstract](#))
- JuliaCon: *Interfaces.jl: base and package interface tests for your objects* ([abstract](#))

2023

- Workshop “Exploring synergies: Machine Learning Meets Physics & Optimization”: *Every solution, everywhere, all at once: turning optimization solvers into probability distributions* ([abstract](#))
- JPOC: *What is the gradient of a Linear Program? Automatic differentiation on a polytope*
- Julia and Optimization Days: *Graphs in Julia - on the edge of glory* ([slides](#))
- Julia and Optimization Days: *Writing fast Julia code* ([slides](#))

2022

- JuliaCon: *InferOpt.jl: combinatorial optimization in ML pipelines* ([recording](#))
- JuliaCon: *ImplicitDifferentiation.jl: differentiating implicit functions* ([recording](#))
- Journées SMAI-MODE: *Recherche d'itinéraires dans un réseau ferroviaire : apprendre à mieux optimiser* ([abstract](#))
- ROADEF: *Learning to Solve Stochastic Multi-Agent Path Finding* ([abstract](#))

2020

- ROADEF: *Delay propagation on a suburban railway network* ([abstract](#))

2019

- PGM Days: *Delay propagation on a suburban railway network* ([abstract](#))

Invitations & seminars

2024

- Institut de Mathématiques de Bourgogne: *Deep learning meets combinatorial optimization - a tale of missing gradients* ([abstract](#))

2023

- Swiss Data Science Center: *Every solution, everywhere, all at once: turning optimization solvers into probability distributions*

2022

- MIT CSAIL: *Learning with Combinatorial Optimization Layers: A Probabilistic Approach*

2021

- Institut de Recherche Mathématique de Rennes: *Pourquoi les trains sont-ils toujours en retard?* ([abstract](#))
- École des Ponts ParisTech: *Understanding railway delay propagation through latent variable models* ([abstract](#))

Teaching

École polytechnique fédérale de Lausanne

Lausanne, Switzerland

TEACHING ASSISTANT

2023 - present

- Statistical physics for optimization & learning ([course page](#))
- Modèles stochastiques pour les communications ([course page](#))

Massachusetts Institute of Technology

Cambridge (MA), United States

TEACHING ASSISTANT & GUEST LECTURER

2022 - 2023

- Julia - solving real-world problems with computation ([course page](#))

École des Ponts ParisTech

Champs-sur-Marne, France

TEACHING ASSISTANT & LECTURER

2019 - 2022

- Introduction to optimization
- Operations research ([course page](#))
- Design of optimization challenges on:
 - facility location with Air Liquide
 - train shunting with SNCF
 - inventory routing with Renault

Lycée Jean-Baptiste Corot

Savigny-sur-Orge, France

CIVIC SERVICE

2015

- Scientific courses and mentoring for struggling high school and undergraduate students

Mentoring

École polytechnique fédérale de Lausanne

Lausanne, Switzerland

STUDENT ADVISOR

2023 - present

- [Chun-Tso Tsai](#) (2023): *Multi-Agent Pathfinding with Mixed-Integer Linear Programming and Lagrange Relaxation*
- [Oleg Fafurin](#) (2023): *Graph algorithms in Julia*

- [Louis Bouvier](#) (2021): *Large Neighborhood Search and Structured Prediction for the Inventory Routing Problem*
- Various group projects:
 - train shunting (2020)
 - multimodal transit routing (2020)
 - pathfinding in historical maps (2022)
 - optimized dorm room assignment (2022)

Community service

PEER REVIEW

- Journals: [Transactions on Machine Learning Research](#), [Journal of Open Source Software](#), [Transportation Research](#)
- Conferences: [JuliaCon](#) (2021-2024), [NeurIPS](#) (2023), [ICML](#) (2023), [Learning on Graphs](#) (2024)

Awards

- 2023 **PhD award for mathematics in industry**, [AMIES](#)
- 2021 **Prix Pasquet for an outstanding engineering student**, [École des Ponts ParisTech](#)
- 2015 **1st place in the nationwide entrance exam**, [École polytechnique](#)

Skills

Languages	English French German Spanish
Programming	Julia Python Git(Hub) LaTeX
Personal Interests	Music Songwriting Board games Bouldering