Seta Rakotomandimby

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Summary

PhD student at Cermics lab at École Nationale des Ponts et Chaussées, my research topics are losses based on subdifferential representations for multiclassification in machine learning and nonconvex dual methods to solve sparse minimization problems. I graduated from the highly recognized engineering school ENSTA Paris in applied mathematics and from the Parisian operational research master MPRO.

Research experiences

Visiting period at the Interactive Optimization and Learning research lab
Zuse Institute Berlin — March 2025 - May 2025

Supervisor: Sebastian Pokutta. During this 3 month visiting period, I am implementing a (nonlinear) Capra-cutting planes method in `Julia` using the mixed integer linear solver `SCIP`. I am also contributing to the `FrankWolfe.jl` package by implementing a second order conditional gradient sliding method.

PhD: Algorithms in Generalized Convexity Application to Sparse Optimization
Cermics, École nationale des ponts et chaussées — November 2023 - present

Supervisor: Michel De Lara. I study nonconvex dual methods to solve sparse minimization problems from compressive sensing. I also design convex new losses for multiclassification in machine learning, using convex representations of maximal monotone operators.

Perturbation-Duality Scheme in Combinatorial Optimization and Algorithms in Generalized Convexity
Cermics, École des Ponts ParisTech — April 2023 - September 2023

Supervisor: Michel De Lara. During this internship, I studied the (Rockafellar) perturbation-duality scheme applied to integer linear programming duality. In a second independent part, I implemented in `Julia` the Capra cutting plane method for sparse problems.

Information Theoretic Clustering Based on Data Compression Principles
University of Eastern Finland — Mai 2022 - August 2022

During this internship in Finland, I studied the minimum description length principle and implemented in `C/C++` the corresponding methods for parameter selection in K-Means.

Education

2022 - 2023 Operational Research Master (MSc) (GPA: $\sim$ 4.0)
at **Conservatoire Nationale des Arts et Métiers (CNAM)**

2020 - 2023 Applied Mathematics Engineering Degree (MSc) (GPA: 3.96)
at **École Nationale des Techniques Avancées (ENSTA)**

2017 - 2020 *Classe Préparatoire* at Lycée Kléber, Strasbourg, France

Three years of very demanding courses (about 35 hours per week of science courses, mostly in Mathematics and Physics, with about the same amount of personal work) are dedicated to the preparation for nationwide, extremely competitive exams.

Publications

[1] S. Rakotomandimby, J.-P. Chancelier, M. De Lara, and M. Blondel. Learning with fitzpatrick losses. In *The Thirty-eighth Annual Conference on Neural Information Processing Systems*, 2024. link.

[2] S. Rakotomandimby, J.-P. Chancelier, M. De Lara, and A. Le Franc. Subgradient selector in the

generalized cutting plane method with an application to sparse optimization. preprint, link, 2024.

Award

2024 Operations Research and Decision Support Master's Thesis Prize