

Nathan Buskulić

PH.D. · OPTIMIZATION AND MACHINE LEARNING FOR INVERSE PROBLEMS

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🔍 Google Scholar

Positions

Genova, Italy

JANUARY 2025-TODAY

Post-Doc, MACHINE LEARNING GENOA CENTER (MALGA), UNIVERSITÀ DEGLI STUDI DI GENOVA

Supervisor: [Luca Calatroni](#)

Education

Caen, France

SEPTEMBER 2021 - NOVEMBER 2024

PhD in Computer Science

SUPERVISED BY [JALAL FADILI](#) AND [YVAIN QUÉAU](#) AT UNIVERSITÉ DE CAEN

Convergence and reconstruction guarantees of self-supervised deep learning methods applied to inverse problems. Theoretical results for various optimization schemes (continuous/discrete, first/second order) with generic loss functions, and a variety of empirical results on image problems that validate the different developed theoretical insights.

Paris, France

2019-2020

MSc Data Science and Machine Learning

SORBONNE UNIVERSITÉ, *graduated with honors*

Delft, The Netherlands

2018-2019

MSc Data Science and Machine Learning

TU DELFT (TECHNISCHE UNIVERSITEIT DELFT) - ONE YEAR ERASMUS EXCHANGE IN THE NETHERLANDS

Paris, France

2017-2018

BSc Computer Science

SORBONNE UNIVERSITÉ (PREVIOUSLY UPMC)

Research interests

INVERSE PROBLEMS · SELF-SUPERVISED LEARNING · OPTIMIZATION · PHYSICS-INFORMED LEARNING

Publications

Implicit Regularization of the Deep Inverse Prior Trained with Inertia

NATHAN BUSKULIC, JALAL FADILI, YVAIN QUÉAU

Arxiv (Submitted), 2025

Recovery Guarantees of Unsupervised Neural Networks for Inverse Problems trained with

Gradient Descent

NATHAN BUSKULIC, JALAL FADILI, YVAIN QUÉAU

EUSIPCO, **Best paper award Finalist**, 2024

Convergence and recovery guarantees of unsupervised neural networks for inverse problems

NATHAN BUSKULIC, JALAL FADILI, YVAIN QUÉAU

JMIV, 2023

Convergence Guarantees of Overparametrized Wide Deep Inverse Prior

NATHAN BUSKULIC, YVAIN QUÉAU, JALAL FADILI

SSVM, **Best paper award**, 2023

Labelling sulcal graphs across individuals using multigraph matching

NATHAN BUSKULIC, FRANÇOIS-XAVIER DUPÉ, SYLVAIN TAKERKART, GUILLAUME AUZIAS

ISBI, 2021

Maximizing drift is not optimal for solving OneMax

NATHAN BUSKULIC, CAROLA DOERR

GECCO, 2019

Presentations

September 2025	<i>Mathematical Aspects of Data Science (Summer School)</i> POSTER PRESENTATION
July 2025	<i>Maths4DL Conference on Inverse Problems and Deep Learning (Conference)</i> ORAL PRESENTATION (INVITED)
May 2025	<i>Unrolling and un/self-*/supervised learning for inverse problems (Workshop)</i> ORAL PRESENTATION
January 2025	<i>Mathematical Image Analysis 2025 (Conference)</i> ORAL PRESENTATION
August 2024	<i>EUSIPCO 2024 (Conference)</i> ORAL PRESENTATION AND POSTER PRESENTATION FOR BEST PAPER AWARD
October 2023	<i>Fondements mathématiques de l'IA (Workshop)</i> ORAL PRESENTATION
May 2023	<i>Scale Space and Variational Methods 2023 (Conference)</i> POSTER PRESENTATION
March 2023	<i>Imaging inverse problems - regularization, low dimensional models and applications (Workshop)</i> ORAL PRESENTATION

Research experience

Marseille, France

FEBRUARY 2020 - AUGUST 2020

INT (Institut de Neurosciences de la Timone) - CNRS

SUPERVISOR: GUILLAUME AUZIAS AND SYLVAIN TAKERKART

Worked on developing multi-graph matching algorithms with a subsequent soft labeling of graph nodes in order to create a prototype on sulcal pits graphs

Paris, France

JUNE. 2018 - AUGUST 2018

LIP6 (Computer Science Laboratory of Paris 6) - CNRS

SUPERVISOR: CAROLA DOERR

Found optimal values for evolutionary algorithms applied to the OneMax problem

Teachings

Université de Caen:

2021 and 2022

IMAGE AND SOUND PROCESSING - TEACHING ASSISTANT

Fundamentals of variational methods for inverse problems, Master Level

2022 and 2023

IMAGE SYNTHESIS - TEACHING ASSISTANT

Ray-tracing methods and creation of a ray-tracer, Master Level