MICHAEL E. SANDER

Born March 12th, 1995 in Paris (France) ◇ +33 6 60 48 34 87 ◇ michael.sander@ens.fr
Personal webpage: `https://michaelsdr.github.io/`

EDUCATION

Ecole Normale Supérieure de Paris, France *2020 – 2024 (expected)*
Ph.D. candidate in Machine Learning
Dissertation: "Differentiable Efficient Learning through Discretized Dynamics"
Advisor: Gabriel Peyré

Sorbonne Université *2019 - 2020*
M.S. in Mathematics: "Mathematics of the modeling"

Ecole Normale Supérieure Paris-Saclay *2019 - 2020*
M.S. in Machine Learning: Mathematics, Vision and Learning (MVA)

Ecole polytechnique *2016 - 2020*
B.S. in Mathematics: "Cursus Ingénieur Polytechnicien"
Mathematics, Applied Mathematics, Computer Science

RESEARCH EXPERIENCE

Visiting student, Tokyo University and RIKEN AIP, Tokyo *May - August 2023*
In context-learning in Transformers, with Prof. Taiji Suzuki

Student Researcher, Google Deepmind, Paris *September 2022 - March 2023*
Differentiable programming with Dr. Mathieu Blondel

M.S. internship. DMA, Ecole Normale Supérieure, Paris *April 2020 - September 2020*
Deep invertible neural networks, with Prof. Gabriel Peyré and Dr. Mathieu Blondel

M.S. internship. Benhia Lab, Colombia University, New York *April 2019 - August 2019*
Processing properties of color pathways in the eye and statistics of natural visual scenes, with Prof. Rudy Behnia

B.S. internship. SOPHiA Genetics, Geneva *June 2018 - September 2018*
Statistical modeling of DNA sequencing, with Dr. Christian Pozzorini

PUBLICATIONS

[1] Pierre Marion*, Yu-Han Wu*, Michael E. Sander, Gérard Biau. Implicit regularization of deep residual networks towards neural ODEs. Preprint

[2] Michael E. Sander, Joan Puigcerver, Josip Djolonga, Gabriel Peyré, Mathieu Blondel. Fast, Differentiable and Sparse Top-k: A convex analysis perspective. *International Conference on Machine Learning*, 2023.

[3] Michael E. Sander, Pierre Ablin, Gabriel Peyré. Do Residual Neural Networks discretize Neural Ordinary Differential Equations? *Advances in Neural Information Processing Systems*, 2022.

[4] Samy Jelassi, Michael E. Sander, Yuanzhi Li. Vision Transformers provably learn spatial structure. *Advances in Neural Information Processing Systems*, 2022.

[5] Michael E. Sander, Pierre Ablin, Mathieu Blondel, Gabriel Peyré. Sinkformers: Transformers with Doubly Stochastic Attention. *International Conference on Artificial Intelligence and Statistics*, 2022.

[6] Michael E. Sander, Pierre Ablin, Mathieu Blondel, Gabriel Peyré. Momentum Residual Neural Networks. *International Conference on Machine Learning*, 2021.

OPEN SOURCE PYTHON SOFTWARE

Summary on my GitHub page: `https://github.com/michaelsdr`

-momentumnet, sinkformers, resnets-nodes, sparse-soft-topk: lead developer

-jaxopt: contributor

PROFICIENCY IN CODING LANGUAGES

Python, Pytorch, JAX

TALKS

CMStatistics, London, 2021. *Deep Invertible Residual Neural Networks*

SODA seminar, Saclay, 2021. *Momentum Residual Neural Networks*

Curves and Surfaces, Arcachon, 2022. *Momentum Residual Neural Networks*

MIND seminar, Saclay, 2022. *Sinkformers: Transformers with Doubly Stochastic Attention*

ICSDS, Florence, 2022. *Do Residual Neural Networks discretize Neural Ordinary Differential Equations?*

Google, Slope Team, Paris, 2023. *Transformers and Neural Ordinary Differential Equations*

Cornell University, Peter McMahon's group, Online, 2023. *Second order Ordinary Differential Equations for Physical Neural Networks*

Tokyo University, 2023 *Do Residual Neural Networks discretize Neural Ordinary Differential Equations?*

MIND Seminar, Saclay, 2023 *On the relationship between Residual Neural Networks and Neural Ordinary Differential Equations*

Center for data science, Ecole Normale Supérieure, Paris, 2023 *On the relationship between Residual Neural Networks and Neural Ordinary Differential Equations*

PGMODAYS, Saclay, 2023 *Smooth and Sparse top-k operator*

COMMUNITY SERVICE

Reviewer at NeurIPS 2023 and AISTATS 2024

TEACHING

Teacher in Statistics and Probability theory, Ecole Normale Supérieure, Paris *2020 - 2024*
In full charge of a mathematical course for students at Ecole Normale Supérieure

Teaching assistant in Machine Learning, Ecole Normale Supérieure, Paris *2023-2024*
Optimization for Machine Learning

Mathematical examiner for B.S. students at Lycée Henri IV, Paris *2017 - 2020*
In charge of evaluating students on theoretical mathematical concepts during oral sessions.

LANGUAGES

French (mother tongue), **English** (fluent), **Hebrew** (fluent), **Chinese** (good speaking)