Sébastien Herbreteau

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Current position

Sep. 2024 - **Assistant Professor**
École Nationale de la Statistique et de l'Analyse de l'Information — Bruz, France
Department of Computer Science - Research laboratory: CREST

Previous positions

Jan. 2024 **Post-doctoral fellow**
Aug. 2024 *École polytechnique fédérale de Lausanne (EPFL)* — Lausanne, Switzerland
Biomedical image restoration using machine learning methods in Michael Unser's research team (Biomedical Imaging Group)

Oct. 2020 **PhD student**
Dec. 2023 *Centre Inria de l'Université de Rennes* — Rennes, France
- Thesis subject: "*Machine learning and interpretable convolutional networks for supervised and unsupervised image denoising with application to satellite imagery*"
- Under the supervision of Charles Kervrann, SERPICO research team

Publications

2026 S. Herbreteau and E. Meunier, "Divergence-free neural networks with application to image denoising," in *International Conference on Learning Representations (ICLR)*, 2026. (**h5-index: 362**)

M. Messaoudi, Q. Rapilly, S. Herbreteau, A. Badoual, and C. Kervrann, "Designing Affine-Invariant Neural Networks for Photometric Corruption Robustness and Generalization," in *International Conference on Learning Representations (ICLR)*, 2026. (**h5-index: 362**)

2025 S. Herbreteau and M. Unser, "Self-calibrated variance-stabilizing transformations for real-world image denoising," in *IEEE/CVF International Conference on Computer Vision (ICCV)*, pp. 10496-10506, 2025. (**h5-index: 256**)

S. Herbreteau and C. Kervrann, "A unified framework of non-local parametric methods for image denoising," *SIAM Journal on Imaging Sciences*, vol. 18, no 1, pp. 89-119, 2025. (**IF: 2.3**)

2024 S. Herbreteau and C. Kervrann, "Linear combinations of patches are unreasonably effective for single-image denoising," *IEEE Transactions on Image Processing*, vol. 33, pp. 4600-4613, 2024. (**IF: 13.7**)

2023 S. Herbreteau, E. Moebel and C. Kervrann, "Normalization-equivariant neural networks with application to image denoising," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2023. (**h5-index: 371**)

2022 S. Herbreteau and C. Kervrann, "DCT2net: An interpretable shallow CNN for image denoising," *IEEE Transactions on Image Processing*, vol. 31, pp. 4292-4305, 2022. (**IF: 13.7**)

S. Herbreteau and C. Kervrann, "Towards a unified view of unsupervised non-local methods for image denoising: the NL-Ridge approach," in *IEEE International Conference on Image Processing (ICIP)*, pp. 3376-3380, 2022. (**h5-index: 55**)

Preprint

2024 S. Herbreteau and C. Kervrann, "On normalization-equivariance properties of supervised and unsupervised denoising methods: a survey," *arXiv preprint arXiv:2402.15352*, 2024.

Patent

2021 T. Guionnet and S. Herbreteau, "Method for image processing and apparatus for implementing the same," *US Patent App. 17/307,419*, 2021.

Communications

International conferences:

2026 S. Herbreteau and E. Meunier, "Incompressible neural networks with application to image denoising," in *AI Wild West*, CentraleSupélec, Rennes, France, 2026.

2022 S. Herbreteau and C. Kervrann, "NL-Ridge: a novel statistical patch-based approach for image denoising," in *10th International Conference on Curves and Surfaces, organised by SMAI-SIGMA*, Arcachon, France, 2022.
S. Herbreteau and C. Kervrann, "DCT2net: a DCT-based interpretable shallow CNN method for efficient and fast image denoising," in *SIAM Conference on Imaging Science (IS22)*, virtual conference, 2022.

Seminars:

2025 S. Herbreteau, "On the effectiveness of linear combinations of patches for unsupervised image denoising", *given on May 22, 2025 at INSEE, Montrouge (France).*

S. Herbreteau, "Self-calibrated variance-stabilizing transformations for real-world image denoising", *given on Jan. 10, 2025 at ENSAI, Rennes (France).*

2024 S. Herbreteau, "Towards better conditioned and interpretable neural networks : a study of the normalization-equivariance property", *given on Feb. 15, 2024 at Institut de Mathématiques de Bordeaux (France) and on Mar. 4, 2024 at Institut Montpelliérain Alexander Grothendieck (France).*

2023 S. Herbreteau, "Towards better conditioned and interpretable neural networks: a study of the normalization-equivariance property with application to image denoising", *given on Sep. 6, 2023 at TU Darmstadt (Germany) and on Oct. 6, 2023 at EPFL (Switzerland).*

2021 S. Herbreteau, "Image denoising: from traditional methods to neural networks", *given on Oct. 29, 2021 at Institut de recherche mathématique de Rennes (IRMAR)*, France.

Teaching

2024 - **Lecturer**
École Nationale de la Statistique et de l'Analyse de l'Information — Bruz, France
Numerical Optimization (L3 course, **33h** per year)
Statistical Language: Python (M2 course, **12h** per year)
Large-Scale Machine Learning (M2 course, **9h** per year)

2024 **Teaching Assistant**
École polytechnique fédérale de Lausanne (EPFL) — Lausanne, Switzerland
Image processing (**3h**)

2023 **Teaching Assistant**
Université de Nantes — Nantes, France
Advanced statistical learning, reinforcement learning (**14h**)

2021 - 2023 **Teaching Assistant**
Institut National des Sciences Appliquées (INSA) de Rennes — Rennes, France
Linear algebra and probability (**84h**)

2018 - 2019 **Student associated with mathematics workshops**
La Prépa des INP — Grenoble, France
Analysis, linear algebra and introduction to probability (**30h**)

Intern supervision

Summer 2025 **Research intership**
ENSAI — Bruz, France
Divergence-free methods for image denoising and development of a Napari Plugin
• Intern: Ibrahima Alain Gueye.

Internships

Summer 2020 **End-of-studies project in R&D**
Ateme — Rennes, France
Artificial intelligence-based video pre-processing for optimized encoding performance
• Internship supervisor: Thomas Guionnet.

Summer 2019 **Start-up internship**
TP qube — Bègles, France
Development of statistical learning models to predict the profitability of independent companies
• Internship supervisor: Thibaut Roques.

Software development

Title	Link GitHub
Divergence-free networks	github.com/sherbret/divergence_free_nn
Noise2VST	github.com/sherbret/Noise2VST
Normalization-equivariant networks	github.com/sherbret/normalization_equivariant_nn
LIChI	github.com/sherbret/LIChI
NL-Ridge	github.com/sherbret/NL-Ridge
DCT2net	github.com/sherbret/DCT2net

Education

Oct. 2020 – Dec. 2023 **PhD in signal, image, vision at Rennes University**
Centre Inria de l'Université de Rennes — Rennes, France
• Under the supervision of Charles Kervrann, SERPICO research team, doctoral school Matisse
• Thesis subject: "*Machine learning and interpretable convolutional networks for supervised and unsupervised image denoising with application to satellite imagery*"

2017 - 2020 **École nationale supérieure d'informatique et de mathématiques appliquées**
Grenoble INP - Ensimag — Grenoble, France
Engineering degree obtained in 2020, in mathematical modeling, image and simulation.

2019 **Academic exchange in Tomsk Polytechnic University** (TPU)
Master Big Data Solutions — Tomsk, Russia

2016 - 2017 **Institut de Statistique de Sorbonne Université** (ISUP)
Sorbonne Université — Paris, France

2014 - 2016 **Preparatory Class for Grandes Écoles** (MPSI/MP*)
Lycée Michel de Montaigne — Bordeaux, France

2013 **Science High School Diploma**
Lycée Sud Médoc La Boétie — Le Taillan-Médoc, France
2^e runner-up in the 2012 Olympiades de Mathématiques for the scientific series