Nils Laurent Curriculum vitae (September 25, 2023)

Born the 7th of April 1994 in Thiers (France)
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Background

2022 - October 2023

Gipsa-lab (France): Post-doc, supervised by **Nicolas Le-Bihan** (Gipsa-lab), **Salem Said** (LJK) and **Florent Bouchard** (L2S), on *geometrical machine learning: new approaches beyond Riemannian geometry - application to the Stiefel manifold.*

2022

LJK, MSTII, Grenoble INP (France): PhD thesis, supervised by **Sylvain Meignen** (LJK), co-supervised by **Bertrand Rivet** (GIPSA-Lab) and **Julie Fontecave-jallon** (TIMC-IMAG) on *time-frequency analysis of noisy multicomponent signals.*
This thesis was defended the 9th of september 2022 in front of the jury:

- Pierre Chainais – (président du jury)
- Maria Sandsten – (rapportrice)
- Roland Badeau – (rapporteur)
- Patrick Flandrin – (examinateur)
- Jérôme Mars – (examinateur)
- Sylvain Meignen – (directeur)
- Bertrand Rivet – (co-directeur)

2019

ENSIMAG (France): **Engineering degree** with applied mathematics specialization in *modeling, calculus and simulation.* Apprenticeship at Kalray on code coverage for custom processor architecture.

2016

IUT Lyon 1 (France): **Two-year university degree** in computer science.

2014

Sundsgården (Sweden): Culture and communication studies, **camaraderie award**.

2013

Pierre Desgranges (France): **Baccalaureate** of a vocational high school in electronic and numerical systems, specialized in telecommunication and networking.

Research activities

Published articles,

[1] Juan M Miramont, François Auger, Marcelo A Colominas, Nils Laurent, and Sylvain Meignen. Unsupervised classification of the spectrogram zeros with an application to signal detection and denoising. *Signal Processing*, page 109250, 2023.

[2] Laurent Nils, Bouchard Florent, Said Salem, and Le Bihan Nicolas. Estimation de barycentres sur variétés de stiefel : une approche par projection. In *29e colloque du Groupe de Recherche et d'Etudes du Traitement du Signal et des Images (GRETSI)*, 2023.

[3] N. Laurent, S. Meignen, M. A. Colominas, J. M. Miramont, and F. Auger. A novel approach based on voronoï cells to classify spectrogram zeros of multicomponent signals. In *2023 International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, page to appear. IEEE, 2023.

[4] Sylvain Meignen, Nils Laurent, and Thomas Oberlin. One or two ridges? an exact mode separation condition for the gabor transform. *IEEE Signal Processing Letters*, 29:2507–2511, 2022.

[5] N Laurent and S Meignen. A new adaptive technique for multicomponent signals reassignment based on synchrosqueezing transform. In *2022 30th European Signal Processing Conference (EUSIPCO)*, pages 2136–2140. IEEE, 2022.

[6] Nils Laurent, Marcelo A Colominas, and Sylvain Meignen. On local chirp rate estimation in noisy multicomponent signals: With an application to mode reconstruction. *IEEE Transactions on Signal Processing*, 70:3429–3440, 2022.

[7] Nils Laurent and Sylvain Meignen. A novel ridge detector for nonstationary multicomponent signals: development and application to robust mode retrieval. *IEEE Transactions on Signal Processing*, 69:3325–3336, 2021.

[8] Nils Laurent, Sylvain Meignen, Julie Fontecave-Jallon, and Bertrand Rivet. A novel algorithm for heart rate estimation based on synchrosqueezing transform. In *2021 29th European Signal Processing Conference (EUSIPCO)*, pages 1286–1290. IEEE, 2021.

[9] Nils Laurent and Sylvain Meignen. A novel time-frequency technique for mode retrieval based on linear chirp approximation. *IEEE Signal Processing Letters*, 27:935–339, 2020.

Teaching

Note that L1, L2, L3 correspond to undergraduate levels and M1, M2 graduate levels.

* 2023 Teaching assistant at **Université Grenoble Alpes**:
  System and programming, Bash and C, L1 (≈ 40 hours).

* 2021 Teaching assistant at **Ensimag** engineering school:
  Lebesgue integration, Fourier, norms and Banach spaces, L3 (≈ 37 hours).

* 2021 Lecturer at **Ensimag** engineering school:
  continuity, Taylor expansions, numerical methods, L3 apprentices (≈ 49 hours)

* 2020 Lab work supervisor at **Ensimag** engineering school:
  numerical analysis, L3 (≈ 6 hours)

* 2020 Lecturer and teaching assistant at **Université Grenoble Alpes**:
  limits and asymptotic analysis, L1 (≈ 22 hours)

* 2020 Lab work supervisor at **Université Grenoble Alpes**:
  image processing, L1 (≈ 18 hours)

During my thesis, I also passed a label on *research and teaching in higher education*. In this context, I have studied theories and methods associated to teaching.

Other skills

Programming	Most used: Julia, Matlab, C, C++.
Languages	**French** : native. **Swedish** : everyday language, I regularly speak with my Swedish family. **English** : everyday language, reading/writing articles.

Service

* Developed DAO team website `https://dao.imag.fr/`

* Organizer and animator of an event in Pierre Desgranges high school (in France) to introduce methodologies, theoretical concepts and prepare for higher education.

My experience in Sweden

I had this experience in 2013-2014 after high school, it helped me to think about my future and reinforced the fact that I wanted to do more theoretical studies. Here is an overview of what I did when I was in Sweden at that time:

Courses at Sundsgården	Literature, history, mathematics, English, biological and environmental science.
Self-taught	Integration, Taylor expansions, numerical integration, computer languages (C++, Python)