Research Internship

Interpretable Methods for Time Series Analytics

Inria Paris & Ecole normale supérieure (ENS–PSL)

Duration: 6 months (February–July 2026, flexible)

Supervision: Félix Chavelli, Paul Boniol, Michaël Thomazo

Keywords: interpretable machine learning; time series; algorithms; segmentation; hierarchical graphs; nearest neighbor aggregation.

Context

Machine learning for time series has made substantial progress over the last decade, yet most high-performing methods remain black boxes with limited interpretability. This limitation hinders adoption in sensitive domains such as health, industry, environmental monitoring, and public services, where practitioners require transparent models to trust and act upon analytical insights. The VALDA team at ENS–PSL and Inria Paris is investigating new approaches that reconcile predictive power with interpretability for complex temporal data.

Objectives

This 6-month master-level internship (*stage de fin d'étude/césure*) aims to design and prototype an interpretable segmentation framework for time series, leveraging hierarchical graph-based structures inspired by HNSW (Hierarchical Navigable Small World). The project focuses on constructing a multi-scale representation where subsequences are aggregated based on nearest-neighbor relationships. This approach will allow for efficient and interpretable navigation through the temporal structure, defining segments at various levels of granularity. The intern will be responsible for designing the hierarchical aggregation mechanism and evaluating the method using interpretable segmentation measures [1], quantifying the trade-off between explanatory power and accuracy.

Working Environment

The intern will join the VALDA team, based at École normale supérieure (45 rue d'Ulm, Paris), and will be supervised by Félix Chavelli, Paul Boniol and Michaël Thomazo. VALDA offers access to high-performance computing resources, and periodic seminars fostering interdisciplinary discussions.

Candidate Profile

- Master's student (or equivalent) in computer science, applied mathematics, or related fields.
- Strong background in machine learning, algorithms, statistics and data systems.
- Programming skills in Python and experience with scientific libraries (NumPy, PyTorch, sklearn).
- Autonomy, scientific curiosity, and good communication skills in English (French is a plus).

Application

To apply, please send a CV, and a brief statement of interest to `felix.chavelli@inria.fr` and `paul.boniol@inria.fr`.

References

[1] Félix Chavelli, Paul Boniol, Michaël Thomazo. *Toward Interpretable Evaluation Measures for Time Series Segmentation*. Proceedings of the Thirty-Ninth Conference on Neural Information Processing Systems (NeurIPS 2025), San Diego, USA, December 2025.