IRIMAS UNIVERSITÉ HAUTE-ALSACE
Institut de Recherche en Informatique, Mathématiques, Automatique et Signal

Master Internship Position

Efficiency and reliability of compact models for time series classification

1 Information about the internship

- **Supervisors:**
  - Laurent Thiry, MCF-HDR
  - Maxime Devanne, MCF-HDR
- **Location:** UHA/IRIMAS EA 7499, Mulhouse, France
- **Duration:** 6 months (starting from February or March 2027)
- **Salary:** 670€ monthly
- **Keywords:** Deep Learning, time series classification, efficient models, software performance, reproducibility

2 Context

Time series classification is central to many applications, from health monitoring to industrial sensing. Compact deep learning architectures and random-kernel methods such as MiniRocket reach state-of-the-art accuracy at a low computational cost [1, 2]

However, the actual cost of these models in time, memory and energy, as well as the reproducibility of their results, also depends on the software stack used to run them: programming language, numerical libraries and numerical precision. This dependency is rarely studied in a controlled way, although it is key to deploying such models on resource-constrained devices.

3 Goals

The goal of this internship is to study how the software stack (e.g. Python, Julia, C) and numerical precision affect the cost and reliability of compact time series classifiers, without sacrificing accuracy.

In particular, the candidate will work on the following tasks:

- **Reproducing compact classifiers:** implementing and evaluating state-of-the-art compact models (e.g. LITE, MiniRocket, MultiRocket) on benchmark datasets of the UCR/UEA archives.
- **Porting to other software stacks:** developing inference implementations in other languages (e.g. Julia, C) and checking their numerical equivalence with the reference implementation.
- **Measuring cost and precision effects:** measuring computation time, memory and energy consumption, and studying the impact of reduced numerical precision (e.g. float16, int8) on accuracy and prediction stability.
- **Statistical analysis:** comparing models and software stacks with appropriate statistical tools, and releasing code and results openly.

4 Profile of applicant

The candidate must fit the following requirements:

- Registered in Master 2 or last year of Engineering School (or equivalent) in **Computer Science**
- Advanced skills in Python and low-level programming (C) are mandatory
- Good skills in **Machine Learning & Deep Learning** using related libraries (scikit-learn, Tensorflow, Pytorch, etc.) are required
- Knowledge in Julia programming will be appreciated
- Knowledge in time series analysis will be appreciated

5 Research environment

The proposed internship will be carried out within the MSD (Modeling and Data Science) team from the IRIMAS Institute.

6 Application

For further information or for applying, candidates should send a **CV, academic records, personal projects (e.g. github repo) and a motivation letter** to laurent.thiry@uha.fr and maxime.devanne@uha.fr

References

[1] A. Ismail-Fawaz, M. Devanne, S. Berretti, J. Weber, and G. Forestier, "Look into the lite in deep learning for time series classification," *International Journal of Data Science and Analytics*, vol. 20, no. 4, pp. 4029–4049, 2025.

[2] A. Dempster, D. F. Schmidt, and G. I. Webb, "Minirocket: A very fast (almost) deterministic transform for time series classification," in *Proceedings of the 27th ACM SIGKDD conference on knowledge discovery & data mining*, pp. 248–257, 2021.