

Master 2 Internship proposal

Multivariate time series analysis with IIS features

University of Lorraine, Nancy

The analysis of multi-dimensional time series is a fundamental problem in most areas of science and industry. Often, linear models are insufficient to capture the structure present in data.

The internship shall focus on the improvement of machine learning techniques for multivariate time series analysis based on specific features encoding dependencies between the components and known as the iterated-integrals signature (IIS) [1]. Equipped with mathematical guarantees, the IIS is a means to extract (almost all) multilinear features of a time series. The IIS can then be combined with Kernel methods as in [2] to perform classical machine learning tasks as classification. We intend to extend classical kernel approaches for statistical testing and change point detection with this new framework.

The internship will be divided into two parts : understanding of the IIS features and the kernelized framework, and thereafter application to statistical testing.

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Références

- [1] I. Chevyrev and A. Kormilitzin. A primer on the signature method in machine learning, 2016. <http://arxiv.org/abs/1603.03788> arXiv :1603.03788.
- [2] Franz J Király and Harald Oberhauser. Kernels for sequentially ordered data. *Journal of Machine Learning Research*, 2019.