Post-doc proposal. Duration : one year
Multivariate time series analysis with IIS features
University of Lorraine, Nancy

Context

The AIHD project (`https://aihd.loria.fr`) is an interdisciplinary project that aims at providing data-driven Artificial Intelligence (AI) solutions for medical diagnosis and prognosis applications related to heart diseases, and more specifically Atrial Fibrillation (AF).

One application consists in the automated detection of AF episodes from a short single lead electrocardiogram (ECG) recording obtained with a mobile device. This could lead to the early detection of paroxysmal atrial fibrillation episodes, therefore allowing a better care and preventing adverse events such as stroke or heart failure.

From the mathematical point of view, ECG recording are multi-dimensional time series. We propose to develop and improve statistical learning methods using new features developed for multivariate time series analysis and encoding dependencies between the components, the iterated integral signature (IIS) [1].

The signature method has shown its effectiveness in a large range of applications : as classification of hand written characters in different languages as arabic [4] or chinese [3], clustering of financial time series [2].

The latest up-to-date methods using the IIS are neural networks based and inherit the accuracy and computational efficiency of deep learning approaches.

In this post doc we intend to explore IIS for semi-supervised learning and clustering and compare it to other classical approaches.

Contacts

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Term and tenure

This one-year position will be based at the IECL Laboratory, Campus scientifique, Vandoeuvre-lès-Nancy, France. The target start date for the position is September 2019, with some flexibility on the exact start date.

How to apply

Applicants are requested to submit the following materials :

1. A cover letter applying for the position
2. Full CV and list of publications
3. Academic transcripts (unofficial versions are fine)

Deadline for application is February 15, 2020. Applicants will be interviewed by an Ad Hoc Commission by March, 1, 2020.
Applications are only accepted through email. All document must be sent to `marianne.clausel@univ-lorraine.fr`, `fabien.lauer@Loria.fr` and `julien.oster@inserm.fr`

Job location
IECL, Campus Scientifique, Vandoeuvre-lès-Nancy, Lorraine, France

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] L.J. Gurkyó, T. Lyons, M. Kontkowski, and J. Field. Extracting information from the signature of a financial data stream, 2014. http ://arxiv.org/abs/1307.7244 arXiv :1307.7244.

[3] S. Lai, L. Jin, and W. Yang. Online signature verification using recurrent neural network and length-normalized path signature, 2017. http ://arxiv.org/abs/1705.06849 arXiv :1705.06849.

[4] D. Wilson-Nunn, T. Lyons, A. Papavasiliou, and H. Ni. A path signature approach to online arabic handwriting recognition. In *2018 IEEE 2nd International Workshop on Arabic and Derived Script Analysis and Recognition (ASAR)*, pages 135–139. IEEE, 2018.