Research project offer

Location : ISAE SUPAERO, Toulouse, France **Department** : Department of Complex Systems Engineering (DISC) **Research group** : SD **Supervisor** : Dennis Wilson **Email** : dennis.wilson@isae-supaero.fr	
OFFER DESCRIPTION	
Title : Prediction of irregular timeseries with limited data **Proposed duration and period** : May 1 to Nov 1, 2021	
Context	Timeseries prediction is a challenging domain in artificial intelligence which relies on data which is often incomplete, sampled over irregular intervals, and limited in total size. While new machine learning methods, especially deep learning, have shown powerful prediction ability on large, regular timeseries, the best method for smaller and irregular datasets is still unknown. This internship will study the prediction problem for shoreline topography estimation.
Possibility to continue with a PhD (Yes/No) : No	
REQUIRED APPLICANT PROFILE AND SKILLS	
Study Level	☐ Undergraduate students (3rd or 4th year) ☐ **Master students (2nd year)** ☐ PhD students
Objectives and work	Real-world data in temporal domains often comes from heterogeneous sources which integrate various timescales, sometimes sampled in irregular intervals. While integrating these different timescales poses problems for machine learning algorithms, these additional data are often useful for the problem domain. In this project, we will focus on shoreline evolution where data from multiple timescales, ie daily wave measurements, monthly topography estimations, and longer climate indicators, are essential for modelling [1]. Specifically, we will focus on the integration of multiple timescales for genetic programming, which has been demonstrated as a competitive regression approach for small datasets [2]. This project will join an ongoing thesis on the topic with the CNES and the OMP. [1] Montaño, Jennifer, et al. "Blind testing of shoreline evolution models." *Scientific reports* 10.1 (2020): 1-10. [2] Orzechowski, Patryk, William La Cava, and Jason H. Moore. "Where are we now? A large benchmark study of recent symbolic regression methods." Proceedings of the Genetic and Evolutionary Computation Conference. 2018.
Required profile and skills	Experience in machine learning is a requirement. Experience in earth observation and the Julia programming language are recommended.
Other useful information	