Junior engineer position
Project: HelioCity, diagnostic analysis of solar energy systems

Scientific aim

The aim of the project is to investigate AI methods applied to time series originating from solar energy power plants. Such systems are characterized by cyclostationary signals that are impacted by several factors such as weather conditions, geographical location, local environment (shadows and so on), plant equipment.

Currently, experts conduct anomaly detection and classification by analysing the signals associated with a temporal window that highlights the variety of operating conditions (weather, solar radiation and so on). Such an analysis relies on human expertise and cannot be deployed at scale. However, it provides a confident dataset that enables machine learning methods to be optimized in a supervised way. Nevertheless, the amount of data is limited and cannot ensure good generalization of the learnt models.

In addition, the time series produced during the powerplant operating period, despite being not expertised, can also provide relevant information that would help machine learning methods to better generalize and even identify operating modes in an unsupervised way. Still, it must be performed while considering expert's knowledge to guide methods towards actionable models.

Consequently, the proposed project aims to identify semi-supervised methods that would benefit from both supervised and unsupervised learning methods to produce accurate anomaly detection and classification automated tools.

Context

The startup Heliocity, incubated at SATT Linksium in Grenoble, France, was created to boost the performance of solar energy in the built environment through novel software solutions for auditing and remote monitoring based on a software core developed at the University of Savoie Mont Blanc. As a DeepTech certified company supported by the Banque Publique d'Investissement (BPI), Heliocity has launched a new programme of innovation to further advance its algorithms that combine physical modeling of buildings and solar systems with complex data analysis methods. Current efforts are focussed on automating the detection and identification of anomalies related to faults and environmental phenomena.

The Computer Science, Systems, Information and Knowledge Processing Laboratory (LISTIC) is a Research Unit (UR) of the Savoie Mont Blanc University (USMB), recognized

since 2003 by the French Research Ministry. Its scientific project focuses on machine learning and information fusion as well as networks and systems. Its work focuses on modelling, specification and development of theories, algorithms and systems for knowledge extraction and management, particularly in the fields of Earth observation and human behaviour.

Heliocity is partnering with LISTIC through the Solar Academy graduate school (https://www.univ-smb.fr/solaracademy/), which is located on the INES (National Institute for Solar Energy) campus in Savoie and whose mission is to become a national and international leader in multidisciplinary scientific research around the solar energy field, by using in particular new technologies and AI.

Profile of the candidate
Motivated candidate with an engineer's degree in computer science and/or signal processing. Strong programming skills in machine learning and/or signal processing (e.g., wavelets) are expected (Python, Tensorflow, PyTorch).

Information to apply
Send an extended CV, your best publication if any, a motivation letter and reference contacts to nicolas.meger@univ-smb.fr with copy to alexandre.benoit@univ-smb.fr and abdourrahmane.atto@univ-smb.fr

Practical information

- **Duration:** 6 months starting January 2021
- **Net Salary/month:** 1700€ depending on experience
- **Location:** LISTIC, Annecy
- **Supervisors:** Prof. Nicolas MEGER (LISTIC), Dr. Abdourrahmane Atto (LISTIC), Dr. Alexandre BENOIT (LISTIC), Leon Gaillard (HelioCity).