POST-DOC OFFER

Trustworthy AI for environmental monitoring: application to seismic monitoring.

Practical information

- Duration : 12 months (potentially extended, start before the end of 2021)
- Host laboratory: CEA Grenoble
- Contact: marielle.malfante@cea.fr, pierre.gaillard@cea.fr
- Procedure:
    - To apply, please send your resume, motivation letter and eventual recommendations to **both** marielle.malfante@cea.fr and pierre.gaillard@cea.fr
    - For more information on the subject, feel free to contact us too

Context

Among other activities, the Detection and Geophysics Laboratory teams of the CEA take the Earth's pulse on an ongoing basis: the smallest movements of the grounds, oceans and atmosphere are recorded through extensive networks of sensors. Those data are then analysed and authorities can then be alerted in case of strong earthquakes, tsunamis or nuclear events.
AI methods (including deep learning, machine learning and signal processing) are in use to automatically analyse the stream of data, thereby helping to monitor the Earth at large scales. A major limitation of state-of-the-art classifiers is a limited evaluation of the prediction confidence. The candidate selected for this position will address this issue.
This project is a collaboration between two different labs of CEA with complementary expertises: one with geophysics, the other with AI methods.

Subject

An extensive dataset is available to conduct this study: data are collected and recorded by 45 stations (real time transmission using satellites) since the 2000s.

The main objectives of the candidate will be:

- Getting to know, understand the existing tools.
- Development of an AI pipeline for the automatic classification of the data stream. In particular, events of interest will be detected and classified from the background noise.
- Development of an anomaly detection module, to improve the system robustness.
- Development of a clustering module, to help the experts analyse the data anomalies.
- Scientific valorization (patent, scientific paper, conferences, etc.).

The mission of this postdoc is highly rewarding and empowering for the candidate and his/her professional aspirations. Several approaches of machine learning will be manipulated (supervised, semi-supervised and unsupervised) and applied on real world data, for operational monitoring.

Candidate Profile

We are looking for a candidate with expertise on:

- Machine Learning methods with an interest on geophysics applications,
- Or expertise on geophysics with a strong interest and some experience on Machine Learning.
- Programming skills in Python, with knowledge of classic ML library (Tensorflow, scikit learn, PyTorch or others)
- Good communication skills in English (written and spoken)
- Motivation to work on real world data.