CA17137 Working group 2: Machine Learning for low-frequency seismic measurement

WG 2: Machine learning for low-frequency seismic measurement

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Abstract

The performance of Earth-based GW detectors is largely influenced by the ability of combating the low-frequency ambient seismic noise and other seismic influences. These tasks require multidisciplinary research in the fields of seismic sensing, signal processing, robotics, machine learning and mathematical modeling.

The working group 2, deals with acquisition, processing and interpretation of seismic data, with the goal of combating the seismic influences at GW detector site, using the multidisciplinary research, with a focus on advanced techniques available from state-of-the-art machine learning algorithms.

WG 2 Tasks

WG 2 is actively working on the following tasks

1. Nonstationary signal analysis

2. Deep learning for seismic time series

3. Newtonian noise detection and seismic sensor arrays

4. Probabilistic robotics for seismology and GW detection

More info: https://www.g2net.eu/wgs/WG 2-machine-learning-for-low-frequency-seismic-measurement

Maligning list: wg2-g2net@ego-gw.it

CA17137 MoU - WG2's main tasks

1. To assess the influence of seismic signals on GW records.

2. To learn current approaches to the issue of seismic noise and adapt appropriate

methods from the wide spectrum of seismological tools.

3. To participate in creating ML procedures to automate data processing.

4. To design a solution for the application of robots and seismic sensors to monitor

seismic noise around GW detectors and help in the Newtonian Noise suppression.

5. To investigate possible ML methods in seismological problems.

WG2 challenges: Network growing and knowledge sharing

Human resources management

- Strengthening of the internal WG2 research networks in order to support the project for adaptive robots for seismic noise monitoring and to further advance the projects for ML techniques for the noise analysis of gravitational wave detectors.

- Step 1: Better reallocation of tasks between and within working groups relying on wide set of multidisciplinary expertise that we have.

- Step 2: Inclusion of new young researchers in our network which would be allocated to the critical tasks. STSM missions and training programs we are continuously working on could represent an important motivation for new young members and solid base for achieving of this objective.

- News: ERA chair elected: https://aifors.fer.hr/

WG2 activities: challenges

WG2 networking

- Zoom meetings (8 in the previous year), seminars (3 in the previous year), (1 in this year). Regular 1 to 1 contact with WG2. Personal meetings: lack of motivation!

Document mannagement

- Templates: scheduling the meetings, agenda/minutes…
- Minutes available at Asana

Repository development

- Improvement of the repositories for datasets from members to be used for tasks and experimentation.
- Improvement of the library of literature: state of the art research papers, tutorial and textbooks on GW physics, geophysics, computer science and robotics.

Machine learning, artificial intelligence, and complex systems: the crucial role of multi-stakeholders' partnerships

Venue: Mathematical Institute of the Serbian Academy of Sciences and Arts (MISANU) Belgrade, Serbia

DD/MM/YYYY - DD/MM/YYYY (2 days)

Complex systems in the G2Net research

Recent talk: Velimir Ilić

CA17137 G2Net WG1 meeting, April 11, 2022,
Faculty of Mathematics of the University of Valencia

Thank you!