ID: **P3.5-812** Type: **E-poster**

Neural Networks for Seismic Yield Estimation

Thursday 22 June 2023 09:40 (1 minute)

The International Monitoring System includes waveform sensor stations connected to a centralized processing system in the International Data Center. Recent tools at the IDC use Bayesian analysis to detect and localize seismic events, such as NET-VISA. While the Bayesian approach to seismic monitoring can improve significantly on the performance of classical systems, this approach needs prior probability distributions and still relies on expert judgments, especially to incorporate environmental knowledge or attenuation. Inspired by recent works in applying graph neural networks (GNNs) in graph structured data, we developed an adaptive GNN for estimating earthquake locations and magnitudes. Our GNN uses a combination of autoencoders, convolutional neural networks, and an adaptive graph learning method. The proposed GNN is evaluated using CEA's seismic data sets, where the goal is to predict epicentral latitude/longitude, hypocentral depth and event magnitude for each event. Our findings demonstrate that our algorithm not only further improves the accuracy of yield estimation, with an average MSE reduction of 10% compared to the methods that are agnostic to graphs, but also effectively exploits the hidden correlations of the nodes.

E-mail

xavier.cassagnou@ens-paris-saclay.fr

Promotional text

An adaptive graph learning algorithm for yield estimation is proposed. The graph is dynamic according to a metric that exploits the similarity between recorded signals. This method can be used to provide priors for Bayesian analysis, such as NET-VISA.

Oral preference format

Primary author: CASSAGNOU, Xavier (ENS Paris-Saclay)

Co-authors: Mr MILLET, Christophe (Commissariat à l'énergie atomique et aux énergies alternatives (CEA)); Mr MOUGEOT, Mathilde (ENS Paris-Saclay, ENSIIE)

Presenter: CASSAGNOU, Xavier (ENS Paris-Saclay)

Session Classification: Lightning talks: P3.5, P5.1

Track Classification: Theme 3. Monitoring and On-Site Inspection Technologies and Techniques: T3.5 Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data