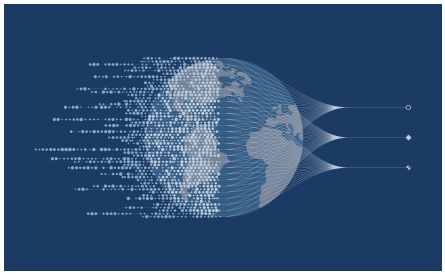

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# of explosion discrimination for monitoring efforts with machine learning

Global seismic monitoring allows for robust real-time analysis to provide useful information about seismic events to assist in earthquake emergency response and for international monitoring efforts of underground nuclear explosions (UNE) and nuisance events. Seismic explosion data is limited but is useful ground truth information for characterization studies and has been shown to be useful data labeling in machine learning (ML). Using P-wave seismograms from digital and historical (formerly-analog) seismograms and their derivative features like radiated earthquake energy, polarity, and dominant frequency, we expand on the efforts of Barama et al. (2023) and Kong (2022) for explosion discrimination at regional and teleseismic distances. We trained a seismic source classifier using a two-branch architecture to incorporate both waveforms and physics-based features to predict three classes per station: earthquake P-wave, UNE P-wave, and noise. Here we fine tune the discriminator, investigate performance limitations, and analyzing performance on unique explosion events that could confuse the model. We anticipate that machine-learning models like our classifier system can be robust tools for monitoring efforts and can help us gain insight on what drives the ML models' prediction determinations of explosive events.

E-mail

barama1@llnl.gov

In-person or online preference

Primary author: BARAMA, Louisa (Lawrence Livermore National Laboratory (LLNL))

Co-author: Dr KONG, Qingkai (Lawrence Livermore National Laboratory (LLNL))

Presenter: BARAMA, Louisa (Lawrence Livermore National Laboratory (LLNL))

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