World Academy of Science, Engineering and Technology
International Journal of Geological and Environmental Engineering
Vol:17, No:09, 2023

Analysis of Real Time Seismic Signal Dataset Using Machine Learning

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Abstract : Due to the closeness between seismic signals and non-seismic signals, it is vital to detect earthquakes using conventional methods. In order to distinguish between seismic events and non-seismic events depending on their amplitude, our study processes the data that come from seismic sensors. The authors suggest a robust noise suppression technique that makes use of a bandpass filter, an IIR Wiener filter, recursive short-term average/long-term average (STA/LTA), and Carl short-term average (STA)/long-term average for event identification (LTA). The trigger ratio used in the proposed study to differentiate between seismic and non-seismic activity is determined. The proposed work focuses on significant feature extraction for machine learning-based seismic event detection. This serves as motivation for compiling a dataset of all features for the identification and forecasting of seismic signals. We place a focus on feature vector dimension reduction techniques due to the temporal complexity. The proposed notable features were experimentally tested using a machine learning model, and the results on unseen data are optimal. Finally, a presentation using a hybrid dataset (captured by different sensors) demonstrates how this model may also be employed in a real-time setting while lowering false alarm rates. The planned study is based on the examination of seismic signals obtained from both individual sensors and sensor networks (SN). A wideband seismic signal from BSVK and CUKG station sensors, respectively located near Basavakalyan, Karnataka, and the Central University of Karnataka, makes up the experimental dataset.

Keywords : Carl STA/LTA, features extraction, real time, dataset, machine learning, seismic detection
Conference Title : ICMGPG 2023 : International Conference on Mathematical Geosciences and Planetary Geology
Conference Location : Singapore, Singapore
Conference Dates : September 04-05, 2023