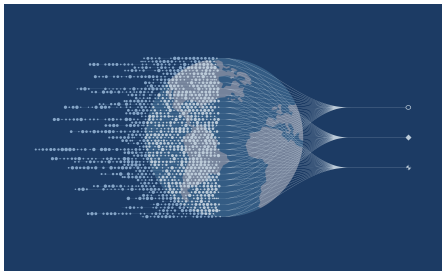

ID: **P3.5-207** Type: **E-poster**

: A Machine Learning Model for Earthquake Location in Permanent Seismic Network

We present NPLoc, a machine learning model designed to accurately locate earthquakes within a permanent seismic network. This model predicts earthquake origin time, hypocenter, magnitude and its associated uncertainties as rapidly as possible. This approach uses temporal patterns extracted from earthquakes within a seismic network and utilizes the Histogram-Based Gradient Boosting method. To validate the robustness of this approach, we generated a synthetic earthquake bulletin, based on standard seismic network configurations incorporating station distributions with varying amounts of P and S phases and amplitudes for each earthquake. Temporal patterns (relative differential P and S arrivals) and amplitudes from these events served as input data, with earthquake location, origin time, magnitude, uncertainties and azimuthal gap as label data. We constructed three datasets with varying levels of data completeness and assessed the model's performance using Mean Absolute Error (MAE) and Median Absolute Error (MedAE). Results demonstrated the model's accuracy in predicting event properties, with predicted values closely matching actual ones. Furthermore, statistical parameters such as uncertainties and azimuthal gap exhibited minimal MAE and MedAE, highlighting the model's reliability. These findings affirm that NPLoc is robust and effective, even in the presence of significant missing values, demonstrating the model's adaptability in handling incomplete data.

E-mail

saeed.sltm@gmail.com

In-person or online preference

Primary author: Mr SOLTANI MOGHADAM, Saeed (International Institute of Earthquake Engineering and Seismology (IIEES))

Co-authors: Mr ANSARI, Anooshiravan (International Institute of Earthquake Engineering and Seismology (IIEES)); Dr ETEMADSAEED, Leila (International Institute of Earthquake Engineering and Seismology (IIEES)); Dr TATAR, Mohammad (International Institute of Earthquake Engineering and Seismology (IIEES)); Dr MAHMOOD-ABADI, Meysam (International Institute of Earthquake Engineering and Seismology (IIEES))

Presenter: Mr SOLTANI MOGHADAM, Saeed (International Institute of Earthquake Engineering and Seismology (IIEES))

Session Classification: P3.5 Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data

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