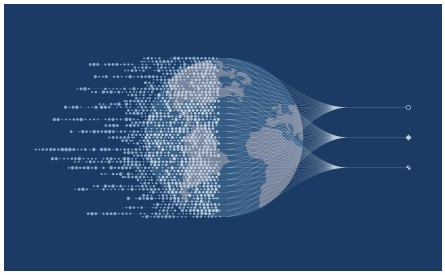

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# of famous Deep Learning Auto-Pickers on Large Earthquakes (M > 4.5): Insights from the IIEES Seismic Network

Given the increasing volume of data from seismic networks, manually analyzing and identifying earthquake phases is becoming unfeasible. This has led to the adopting of automated methods, particularly deep learning models, for accurate and efficient phase identification. This study evaluated the performance of four popular deep learning models (PhaseNet, EQTransformer, GPD, and BasicPhaseAE) alongside an energy detector (STA/LTA), comparing them against expert analysis. Seismic data were sourced from the International Institute of Earthquake Engineering and Seismology (IIEES) website, covering latitudes 24-44 and longitudes 44-65. The dataset included earthquakes from August 2004 to January 2023, all with magnitudes over 4.5. It consisted of about 900 earthquakes and 9000 seismic phases analyzed and reported by experts at the National Center of Broadband Seismic Network of Iran (BIN). Results showed that PhaseNet was the most effective model for determining P-type phases by identifying 75% of the reference phases and accurate enough that could be employed in automatic procedures by the National Center of Broadband Seismic Network of Iran. EQTransformer was the most effective for detecting S-type phases by identifying 46% of reference phases but requires manual expert verification.

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