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Learning Enhanced Deep Learning Phase Pickers for Monitoring Seismicity in Iran

Seismic wave detection and phase picking are the initial steps in most seismological studies. The increasing seismic data necessitates the development of capable auto-detection and precise auto-phase-picking algorithms. Deep learning approaches have played a crucial role in these tasks in recent years. EQTransformer and PhaseNet are among the most important models introduced for detection and phase-picking tasks.

We apply these models to Iranian seismic data to identify and pick earthquakes. Our findings show that the results are not as accurate as expected. We believe this is because the data from Iranian earthquakes and networks were not part of the training data for these models. Therefore, we aim to fine-tune some models with Iranian data to observe the effect on their performance.

We utilize transfer learning on the models to tune the weights using high-quality earthquake data from the IIEES network, called BIN, and low-magnitude data from various local networks. Our analysis of the test dataset shows that our models have improved phase identification capability by 5%. Additionally, the standard deviation and mean values of the time differences between experts-picked phases and our model have decreased compared to the original model.

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