

Events Classification Based on Feature Extraction and XGBoost Algorithm

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The classification of low magnitude seismic events is an important task in regional earthquake monitoring. This study focuses on the classification of earthquakes, explosions, and mining-induced earthquakes. A 36-dimensional feature extraction dataset was established through eight types of feature quantization methods, and two-classes and three-class models were respectively constructed by the Extreme Gradient Boosting (XGBoost) algorithm. The P/S amplitude ratio has long played an important role in earthquake/explosion classification, the importance scores of 36 features calculated by XGBoost and Random Forest differ slightly, but the high frequency P/S amplitude ratios all ranked higher. By comparing the performance of the classifiers based on the feature extraction dataset and the waveform spectrum dataset, it was obtained that the feature extraction method can effectively highlight the differences between different types of seismic events. The accuracies of the classifiers constructed on the feature extraction dataset can reach 90%, among which the accuracies of the earthquake/explosion, earthquake/mining-induced earthquake classifiers were as high as 97%. Finally, the generalizability of the classifiers was verified by using the data in the study area and outside the area, which showed that the classifiers constructed based on the feature extraction dataset had high test accuracies and strong generalizability.

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Promotional text

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