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simplified Fuzzy ARTMAP neural network based-approach for seismic signal discrimination between earthquakes and quarry blasts

Seismic source recognition based on acquired signals is a complex analysis and a difficult task to model using classical mathematical methods. In fact, seismic signals are affected by complex geological conditions and several types of noise sources. Nowadays, artificial intelligence techniques have attracted increasing attentions among scientists to handle real world problems which cannot be modeled using traditional mathematical techniques. The aim of this study is to propose a neural network based approach for discrimination between earthquakes and quarry blasts. This neural network, namely simplified Fuzzy ARTMAP, has several advantages over many other neural network models, which make it an attractive model for investigation into the problem of seismic signal classification. The performance of this approach was examined on a variety of real seismic data. Additionally, a comparative study with the mostly used multilayer perceptron neural network classifier was conducted. Each seismogram is represented by the most important features that are mainly used by seismic analysts. To further improve the Fuzzy ARTMAP performance, genetic algorithms were used. Classification results showed that this approach improves classification performance, training speed and generalization. Furthermore, it provides other appealing features, including flexible configuration and incremental learning capability.

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