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# of repeating seismic events using non-linear dimensionality reduction

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In this work, we develop an algorithm for automatic identification of repeating seismic events such as aftershocks and mine explosions. Identification of such events will help to improve the quality of automatic bulletins and to lighten the analysts' burden. The algorithm constructs a low-dimensional representation of the examined data by using a variant of a non-linear dimensionality reduction algorithm named diffusion maps.
The proposed methods begin with a pre-processing stage in which a time–frequency representation is extracted from each seismogram while capturing common properties of seismic events and overcoming magnitude differences. Then diffusion maps are used in order to construct a low-dimensional model of the original data. This enables to split the data into one cluster that contains the repeating events and another cluster that holds of the other processed waveforms, which are not related to the examined events of interest.
The algorithm's performance is demonstrated on several seismic data sets that were recorded at IMS stations. In particular, at the IMS station EIL we identify arrivals that were caused by the blasts at the nearby Eshidiya mine in Jordan. Identification and masking of such arrivals should reduce the number of false associations in the automatic bulletins.

Promotional text

We develop an algorithm for automatic identification of repeating seismic events such as aftershocks and mine explosions. Identification of such events will help to improve the quality of automatic bulletins and to lighten the analysts' burden.

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