Fingerprints of the seismogram's wavelet analysis results as a tool for creating a compact signal image for the purposes of neural network recognition

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Abstract One of the modern directions in solving the problem of recognizing the type of a seismic event from its seismogram recorded by a single seismic receiver is the method of obtaining and comparing signal fingerprints. This paper provides a historical overview of the experience of using this technique initially for the analysis of audio recordings, and then for seismic ones. The existing method for earthquake fingerprinting, which includes the use of a two-dimensional discrete decomposition of the signal spectrogram using the Haar wavelet, is proposed to be improved based on a more accurate creation of the initial time-frequency image of the signal using a continuous wavelet transform. On the example of seismograms of known earthquakes and explosions recorded by the stations of the Kola branch of the GS RAS, the effectiveness of this approach in relation to fixing the key frequency and time features of the signal is shown. The fingerprints properties are indicated, which make them convenient for recognizing the type of seismic event using artificial neural networks.

Keywords Wavelet transform, fingerprints, recognition, earthquake, explosion, artificial neural networks.

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