

Single Layer Recurrent Neural Network for detection of swarm-like earthquakes in W-Bohemia/Vogtland - the method

Jana Doubravová (1), Jan Wisniowski (2), and Josef Horálek (1)

(1) Institute of Geophysics, Czech Academy of Sciences, Prague, Czech Republic (doubravka@ig.cas.cz), (2) Institute of Geophysics, Polish Academy of Sciences, Warsaw, Poland

We present a new method of local event detection based on neural networks. The proposed algorithm uses a unique neural network architecture. It combines features used in other neural network concepts like Real Time Recurrent Network and Nonlinear Autoregressive Neural Network to achieve a good detection performance. We use the recurrence combined with various delays applied to recurrent inputs to make the network remember history of many samples. This method has been tested on data from local seismic network in West Bohemia with promising results. We found that unpicked phases in training data worsen the detection capability of the neural network and the good preparation of a training data is therefore fundamental. For training the network we define a parameter called learning importance weight of events and show that it affects the number of good solutions achieved by many trials of Back Propagation Through Time algorithm. We also compare the individual training of the stations with training all stations together and we conclude that for some stations the result of joint training could be better than individual one.