

# Deep-learning-based Earthquake Detection for Continuous Seismic Network Records

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Over the last decade, continuous seismic data have been enormously acquired on seismic networks consisting of multiple sensors at distributed locations. Analyzing these data efficiently and thoroughly offers substantial benefits to seismology. The first important step in the analysis is earthquake detection, that is, detecting earthquakes in continuous massive datasets.

In this talk, we present a deep-learning-based scheme for earthquake detection from continuous records in a seismic network. We work with a convolutional neural network (CNN), which is one of the most powerful supervised learning techniques, to capture features discriminating between earthquakes and noises. Our scheme has an advantage of utilizing multiple stations in a seismic network to discriminate between earthquakes and noises.

We apply our scheme to continuous data on Metropolitan Seismic Observation network (MeSO-net) from September 4, 2011 to September 16, 2011. We show our scheme improves on CNNs based on few stations especially in preventing mis-detection. In addition, the trained network in the last fully connected layer has quasi-sparsity, by which we identify features important for CNN to recognize earthquakes.

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