

Development of the seismic signal detection method under low SNR condition using an artificial neural network

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We have developed a community based MEMS sensor network, Citizen Seismic Network (CSN) to obtain the detailed strong motion data which closely linked to community's life. In this project, we developed a sensor unit which detects strong motion and process the data. The unit is composed of 12 bit MEMS sensor and Raspberry pi. Since we expect the unit is set under the high noise environment (e.g. inside of house), it is important to discriminate between the earthquake signal and the others. However, under the such environment, the conventional method, ratio of short time average and long time average (STA/LTA) which depends on the amplitude of the signal often mislead to pick noise as the signal. To overcome this problem, we developed a method to detect and identify a seismic signal using an artificial neural network (ANN) which utilize a pattern recognition. In the initial test, we used waveform data recorded at our sensor network as the training data to detect the other observed data. We found the discrimination was successful. However, at the moment, since we only have five earthquakes detected in our network, the amount of training data is not enough. So as the next step, we use the seismic data obtained at the Yokohama strong motion network and loaded noise obtained by our sensor to the seismic waves. Using the waveforms as training data we will show the synthetic test to check the ability of our ANN detection algorithm.

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