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## Phase Identification with Deep Learning in Frequency Domain

Identifying different seismic phase of a seismograph has been the cornerstone in earthquake processing and location. Most of the efforts of the seismic phase identification is the obligation of the analyst. Deep learning is offering a powerful tool for analyst experience transfer by learning from the events data already processed. Then, these gained knowledge can be used for upcoming processing and extract missing small events. Most of the previous seismic waveform processing for phase detection and identification were done in time domain. In this study we suggest using frequency domain in form of spectrogram of the event. Spectrogram is used to represent the varying of the seismic signal power for different frequency bands through time. Using frequency domain allows the deep learning to extract more sensitive, robust and stable features from the signal which can lead to better classification result. Earthquakes recorded by the SCSN (Southern California Earthquake Data Center) are used as training and validation data sets which were used in previous similar studies to provide a stable benchmark. The three channels waveform were used to enrich the deep learning algorithm and increase the ability for phase type discrimination.

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