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Detecting and Clustering Seismic Signals with Datasets from a Single Station located in Southern California by Unsupervised Deep Learning.

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Poster

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Abstract:
We present an automated deep-learning strategy for detecting and clustering seismic signals within continuous seismic data. The method consists of two steps; a deep scattering network used to extract relevant waveform features, and an unsupervised clustering algorithm used to infer classes of seismic signals (events and background noises). In this study, we consider datasets from a single seismic station located in the active seismic region of the San Jacinto Fault Zone, Southern California. We discuss the efficiency of our single-station approach with comparing the earthquake-related clusters to already-existing catalogs built from multiple seismic stations. In particular, we compare the detection quality of our technique with different routinely used earthquake detection methods such as template matching and array beamforming. We also provide an interpretation of other kind of background noises, such as air and road traffic, and other types of anthropogenic ground motions.

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