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Event Categorization Using Machine Learning and Deep Learning

It is nearly impossible for an analyst to categorize regional and global infrasound events by eye. Currently, categorizing these events requires removing false detections and using seismic or other forms of data as ground truth. We explore two machine learning approaches, support vector machine (SVM) and deep learning (Convolutional Neural Network) to determine their potential for high-accuracy automated infrasound event categorization. We leverage a training catalog of 36,000 events, detected and manually labeled by the International Data Centre (IDC). The catalog consists of events from a variety of both natural and anthropogenic sources located around the world. Features relating to the physical characteristics of the data are used in SVM, while for the deep learning approach we use both spectrograms and raw data as the model input. Performance of the two methods is compared using 10-fold cross validation to determine their individual advantages. Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

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Track Classification: Data Processing and Station Performance