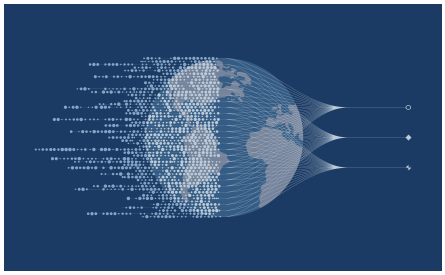

ID: **P2.1-861** Type: **E-poster**

Signal Classification Method Based on Time-Frequency Graphs and Convolutional Neural Network

The classification of infrasound signals has important application value in the fields of nuclear test monitoring, earthquake and other natural disaster warning. However, traditional infrasound signals classification methods are difficult to effectively extract the significant features that quantify event differences. To address this issue, this paper proposes an end-to-end infrasound signal classification method based on time-frequency graphs (TFGs) and convolutional neural network (CNN). Firstly, common time-frequency analysis methods, including short-time Fourier transform (STFT), wavelet transform (WT) and Hilbert-Huang transform (HHT), are used to convert six types of original infrasonic signals such as nuclear tests, chemical explosions and volcanic eruptions into TFGs. Then, a CNN model with multi-scale convolution layers was designed to automatically learn and extract the features of TFGs, achieving classification of infrasound signals. Finally, three TFGs were used as the input of CNN model for training and testing. The experimental results show that the classification accuracy of the three TFGs as model inputs exceeds 90%, with the STFT TFGs having the highest classification accuracy of 96.71%. In the case of small datasets and unbalanced number of samples, this model significantly simplifies traditional feature extraction process by integrating feature learning with signal classification and achieved better classification results.

E-mail

yinhao1207@163.com

In-person or online preference

Primary author: YIN, Hao (State Key Laboratory, NBC Protection for Civilian)

Co-authors: PANG, Xinliang (State Key Laboratory, NBC Protection for Civilian); Mr LU, Yu (State Key Laboratory, NBC Protection for Civilian)

Presenter: YIN, Hao (State Key Laboratory, NBC Protection for Civilian)

Session Classification: P2.1 Characterization of Treaty-Relevant Events

Track Classification: Theme 2. Monitoring events and Nuclear Test Sites: T2.1 Characterization of Treaty-Relevant Events