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Machine learning categorization of infrasound detections across the Central and Eastern European Infrasound Network

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The Central and Eastern European Infrasound Network (CEEIN) has been operational since 2019 as a collaboration of Czech, Austrian, Hungarian, Ukrainian and Romanian research institutes. For this study five infrasound arrays were selected from the CEEIN. Over 70,000 detections were processed by the Progressive Multi Channel Correlation method and classified manually afterwards using ground truth information. The classes include signals from thunderstorms, volcanic activity of Etna and sources associated with human activity – quarry blasts, powerplants as well as the war in Ukraine. A hybrid model that combines Convolutional Neural Networks and Random Forests is proposed for the automatic discrimination. To measure the performance of the model the f1 score was selected, also the confusion matrices are analyzed. The results over 0.9 f1 score show a great step in the direction of automatic signal classification in the scope of network processing.

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