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On automatic bioacoustic detection of stored product pests: the case of *Sitophilus oryzae*

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Abstract

The present work reports research efforts towards the development and evaluation of a unified framework for automatic bioacoustic recognition of specific insect pests. Our approach is based on capturing and automatically recognizing the acoustic emission resulting from typical behaviour, i.e., locomotion, feeding, etc., of the target pests. After acquisition the signals are amplified, filtered, parameterized and classified by advanced machine learning methods on a portable computer. Specifically, we investigate an advanced signal parameterization scheme that relies on variable size signal segmentation. The feature vector computed for each segment of the signal is composed of the dominant harmonic, which carries information about the periodicity of the signal, and the cepstral coefficients, which carry information about the relative distribution of energy among the different spectral sub-bands. This parameterization offers a reliable representation of both the acoustic emissions of the pests of interest and the interferences from the environment. We illustrate the practical significance of our methodology using *Sitophilus oryzae* (Rice Weevil – RW), (Coleoptera: Curculionidae). This approach led to 100% successful detection.

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