Dormouse acoustics: The use of artificial intelligence to detect and identify European dormouse species

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Abstract

Passive acoustic monitoring (PAM) is becoming increasingly popular for wildlife surveying due to the benefits it offers in terms of non-invasiveness, reduced field time and spatial scalabilty. Acoustic surveying protocols are well established for bat species, but the use of PAM for non-volant small mammals has been largely unexplored. Some dormouse species are highly vocal and are therefore potentially good candidates for acoustic surveying.

A landscape-scale acoustic survey is currently being carried out in Polesia, a vast lowland region in Eastern Europe. Three dormouse species have been recorded in this region: *Dryomys nitedula, Glis glis* and *Muscardinus avellanriu*s, with a fourth species *Eliomys quercinus* considered rare or locally extinct. Acoustic surveys at this scale generate may hours of recordings, however data analysis can be automated using species classifiers. Classifiers have achieved varying levels of accuracy, but recent advances in artificial intelligence, specifically deep learning has led to the development of acoustic classifiers with high levels of accuracy.

In this study, a convolutional neural network classifier was developed to identify *D. nitedula*, *M. avellanarius* and nine additional small mammal species. Overall, the classifier achieved 0.944 training accuracy and 0.943 test accuracy. During testing, the classifier achieved *D. nitedula* and *M. avellanarius* identification accuracies of 100% and 98% respectively. These preliminary results suggest that PAM could provide an effective, non-invasive method to survey dormice in large geographic areas. Further work will include expansion of the classifier to include *G. glis* and *E. quercinus* when sufficient acoustic data are obtained.

Keywords

Passive acoustic monitoring, convolutional neural network, *Muscardinus avellarius*, *Dryomys nitedula*, Polesia

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