Type

Oral Presentation

Title

RECOGNITION OF WOODPECKER CALLS USING A CONVOLUTIONAL DEEP NEURAL NETWORK

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Abstract

Seven of the eleven European species of woodpeckers use long-distance calls. These calls are series of 50 ms syllables repeated 5 to 50 times, with variations in pitch and intensity, and some syllables being stretched or shrunk. Exceptions are *Dendrocoptes medius* whose syllables last longer than 300 ms and *Dryocopus martius* whose contact call is a single 1 sec syllable. All calls are readily recognizable on spectrograms, which opens the door for their identification from images, through a convolutional Deep Neural Network (DNN), rather than from acoustic features. We thus designed a network with two convolutional layers for the image analysis and two dense layers to converge towards a diagnosis. The base images are standardized to 1 sec in duration and target the dominant frequency range for woodpeckers, 1–3.5 kHz. They capture high-energy moments within the calls. This approach focuses on recognizing syllables first, leaving call structure as a next step. The dataset is derived from Xeno-Canto and private recordings and comprises 12154 images, half of them woodpecker calls (9 classes). The perspicacity of the network is improved using dropout and data augmentation. We also expect the DNN to benefit from being co-trained on broader tasks such as distinguishing birdcalls from other sounds. However, early results speak against the straightforwardness of DNNs. The net assigns the highest probability to the correct class in only 36.4% of the cases. Considering the top three suggestions, the accuracy reaches 77.8%, standing above 90% for four calls (*Jynx torquilla*, *D. medius*, *D.martius* flight call, *Dryobates minor*) while *Picus canus* plummets at 14.3%.