Augmentation Methods for Biodiversity Training Data

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Abstract

The detection and identification of individual species based on images or audio recordings has shown significant performance increase over the last few years, thanks to recent advances in deep learning. Reliable automatic species recognition provides a promising tool for biodiversity monitoring, research and education. Image-based plant identification, for example, now comes close to the most advanced human expertise (Bonnet et al. 2018, Lasseck 2018a). Besides improved machine learning algorithms, neural network architectures, deep learning frameworks and computer hardware, a major reason for the gain in performance is the increasing abundance of biodiversity training data, either from observational networks and data providers like GBIF, Xeno-canto, iNaturalist, etc. or natural history museum collections like the Animal Sound Archive of the Museum für Naturkunde. However, in many cases, this occurrence data is still insufficient for data-intensive deep learning approaches and is often unbalanced, with only few examples for very rare species. To overcome these limitations, data augmentation can be used. This technique synthetically creates more training samples by applying various subtle random manipulations to the original data in a label-preserving way without changing the content. In the talk, we will present augmentation methods for images and audio data. The positive effect on identification performance will be evaluated on different large-scale data sets from recent plant and bird identification (LifeCLEF 2017, 2018) and detection (DCASE 2018) challenges (Lasseck 2017, Lasseck 2018b, Lasseck 2018c).

Keywords

data augmentation, deep learning, species identification, audio & image recognition

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