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A transfer learning approach to wildlife identification and classification

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Abstract

Global climate change is having a significant effect on ecosystems, causing species to vary their behaviour and migrate to more suitable regions. This will require more sustainable management of wildlife populations. Despite research conducted on the identification of wildlife through traditional and deep learning techniques, the challenge of large, labelled datasets required to perform these tasks still exists. In this study, a transfer learning approach is presented for wildlife classification applications. Four pretrained models were trained to identify wildlife in 48 species from the Snapshot Serengeti, Greenpeace and African Wildlife Foundation image datasets. This was done by using two transfer learning techniques, namely freeze-layer and fine-tuning, varying the learning rate and using different pretrained models, namely AlexNet, GoogLeNet, ResNet-101 and VGG-19. Results show that deeper, fine-tuned networks with lower learning rates result in higher classification accuracies. In addition, a comparison of the training times confirmed that the run times for the freeze-layer models were shorter than those of the fine-tuned models. The best result achieved a top-1 and top-5 accuracy of 100% for the ResNet-101 model.