Deep learning approach to classify Tiger beetles of Sri Lanka

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Abstract

Deep learning has shown to achieve dramatic results in image classification tasks. However, deep learning models require large amounts of data to train. Most of the real-world datasets, generally insect classification data does not have large number of training dataset. These images have a large amount of noise and various differences. The paper proposes a novel architectural model which removes the background noise and classify the Tiger beetles. Here object location is identified using contours by converting the original coloured image to white on black background. Then the remaining background is eliminated using grabcut algorithm. Later the extracted images are classified using a modified SqueezeNet transfer learning model to identify the tiger beetle class up to genus level. Transfer learning models with fewer trainable parameters performed well than the total number of parameters in the original model. When evaluating results it was identified that by freezing uppermost layers of SqueezeNet model better accuracy can be gained while freezing lowermost layers will reduce the validation accuracy. The proposed model achieved more than 90% for the test set in 40 epochs using 701,481 trainable parameters by freezing the top 19 layers of the original model. Improving the pre-processing to localize insect has improved the accuracy.

Keywords

Object localization
Transfer learning
Vision-based insect classification