

Computer-assisted identification of small Australian mammals in camera trap imagery

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Abstract

We investigated the feasibility of identifying Australian native small mammals via semi-automated analysis of camera trap imagery. A portion of the animal's pelage ('texture patches') was extracted from the upper body of three known small mammal species in colour camera trap images and used to identify two target rodent species (the bush rat *Rattus fuscipes* and the Hastings River mouse *Pseudomys oralis*) and dasyurids (*Antechinus* spp.), which are challenging to distinguish from one another in camera trap images. Numerical descriptors based on the differences of the means and standard deviations of each of the colour-space normalised texture patches (blocks of image pixels) were used to distinguish the species. A support vector machine classification model was developed using the numerical descriptors (from the original training data used to estimate the model), which correctly labelled species with $97.78 \pm 0.45\%$ accuracy. Model robustness was also assessed using 10-fold cross-validation, which estimated model accuracy in general as $91.11 \pm 0.45\%$. We demonstrate therefore that computer-assisted small

mammal identification is feasible and that the algorithm developed might be useful in assisting with recognition of small mammals in situations where it is difficult for the user to achieve this visually.

Introduction

Identifying fauna to species level is imperative in most scientific investigations and, despite the expertise of the practitioner, some species are challenging to identify even when in the hand. Reliable identification of animal species or individuals has a wide range of potential ecological applications including detecting the presence of a species, monitoring threatened populations, validating mark-recapture models and increasing the participation and/or effectiveness of citizen science programs. Photographic imagery has been used extensively to assist in this task with computer-assisted methods having been developed to facilitate rapid identification within large digital photographic databases. Select examples of the extensive research that has already been conducted in this field include the identification of marine mammal species from fin