

ENHANCED AUTOMATED RECOGNITION OF SRI LANKAN WILD CAT SPECIES UTILIZING FINE-TUNED DEEP LEARNING MODELS

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Conserving wild cat species in Sri Lanka relies heavily on precise species identification, a task traditionally handled by specialists. The morphological identification process is often lengthy and subject to errors. This study introduces a deep learning based automated identification system for wild cat species to assist biodiversity conservation efforts in Sri Lanka. Four distinct wild cat species in Sri Lanka: Leopard (*Panthera pardus kotiya*), Rusty-spotted cat (*Prionailurus rubiginosus*), Jungle cat (*Felis chaus*), and Fishing cat (*Prionailurus viverrinus*) were used for the study. Conservation of these species is crucial for maintaining the balance of the ecosystem. There is a significant research gap in transfer learning model utilization in the field of wild cat species conservation in Sri Lanka, and this research endeavoured to address that by fine-tuning DenseNet121, DenseNet169, InceptionV3, Xception, NASNetMobile, and InceptionResNetV2 models. The distinctive features of each species were identified using these models. A dataset comprising 400 images was distributed evenly, with 100 images allocated per species. This research marks the first application of deep learning for wild cat identification in Sri Lanka using fine-tuned convolutional neural network models, comparing several transfer learning models to determine the most effective method for species identification. The DenseNet121 model demonstrated a notable accuracy of 93.75% and F1-score of 93.49% on the augmented dataset. Even though data augmentation was used to mitigate this limitation, the size of the dataset may limit the generalizability of the results. These findings suggest that deep learning can greatly enhance the accuracy and efficiency of species identification, contributing to more effective conservation strategies.

Keywords: Convolutional Neural Networks, Deep learning, DenseNet121, Sri Lankan wild cats, Transfer learning