

## **ABSTRACT**

### **Snake Species Classification and Segmentation Using ResNet-50 and U-Net Architectures**

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Accurate snake species identification is crucial for ecological conservation, medical response, and public safety. However, challenges such as complex backgrounds, image quality, and species similarity complicate automated classification tasks. This research proposes a hybrid deep learning approach integrating ResNet-50 and U-Net architectures to enhance snake species identification through segmentation-assisted classification.

Using approximately 67,000 images from the Slithering Serpents dataset, images were preprocessed. Two models were evaluated: a baseline ResNet-50 classifier and a hybrid model that utilizes segmentation masks generated by a U-Net with a pretrained ResNet-50 backbone.

Experimental results demonstrate that integrating segmentation significantly decreases classification accuracy, particularly for challenging cases. Evaluation metrics results for the hybrid model include accuracy of 22.9%, average precision of 18%, average recall of 22.9%, and F1-score of 20.12%. These values underscore the value of segmentation in snake species identification, which negatively impacts the performance rather than enhancing it.

**Keywords:** Snake Species Identification, ResNet-50, U-Net, Image Segmentation, Deep Learning, Classification, Ecological Conservation