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**SerpIn: A Deep Learning approach for venomous & non-venomous
Serpents and Insect species Identification**

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Abstract

In recent years snake and insect attacks have become a huge problem worldwide. Most species have similar colors and shapes, which makes it hard to tell them apart using typical techniques. Similarly, identifying different species of bees and wasps can be challenging, especially for non-experts in the field. Therefore, developing a reliable and effective method for recognizing these animals is essential to reducing the issues caused by snake and insect attacks and supporting wildlife conservation efforts.

The proposed method in this research utilizes deep ensemble learning and transfer learning techniques to identify snakes, wasps, and bees accurately. Deep ensemble learning involves combining several machine learning models to make better predictions, and transfer learning is a technique that allows pre-trained models to be re-used for new tasks, saving time and computational resources.

The proposed method utilizes deep ensemble learning and uses three base transfer learning models, DenseNet201, MobileNetV2, and InceptionResNetV2, for classification. The study obtained a training accuracy of 93%. The research classified 11 types of snakes, four types of bees, and four types of wasps, including all 21 classes.

Moreover, the author developed a mobile application for user interaction and utilized Flask API for the logic tier. The mobile application enables users to take pictures or upload images of a snake, wasp, or bee and identify the species accurately. This feature makes the proposed method more accessible to people who encounter these animals daily.

Overall, this research represents a promising step towards developing an accurate and effective system for identifying snakes, wasps, and bees, with practical implications for human safety and biodiversity conservation.

Keywords: Image Classification, Convolutional Neural networks, Ensemble Learning, Transfer Learning, Deep Learning