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WILDLIFE ANIMAL DETECTION USING *YOLOv11* FOR MITIGATING HUMAN WILDLIFE CONFLICT

L. Ahamed Musanika[a*] and A. L. Hanees[a]

[a]*Department of Computer Science, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka.*

[*]*ahamedmusanik98@gmail.com*

Abstract

Human-wildlife conflict (HWC) in Sri Lanka is a significant issue, as elephants, monkeys, and peacocks often destroy crops and threaten livelihoods. Conventional control methods such as electric fencing and patrols remain expensive and reactionary. This research developed a real-time wildlife detection system based on YOLOv11s, a deep learning model trained on 5,000 hand-selected and curated images obtained from Sri Lankan habitats. Image augmentation was applied during data preprocessing, while a disambiguation pipeline incorporating both animal and human input was established to reduce false alarms. Validation results showed a mean average precision (mAP@0.5) of 92.1%, and species-specific accuracies of 94.8%, 96.0%, and 85.6% for elephants, peacocks, and monkeys, respectively. The system achieved real-time inference processing at 9.8 ms per frame and incorporated dual alert schemes using local audio alarms and Telegram messages. Compared to YOLOv8s, YOLOv11s demonstrated 20% higher accuracy and faster processing, making it suitable for resource-limited conservation applications. This research underscores the potential of deep learning-based monitoring to minimize agricultural losses, enhance rural safety, and promote human-wildlife coexistence in Sri Lanka.

Keywords: *Human Wildlife Conflict, YOLOv11, Object Detection, Deep Learning, Sri Lanka*