Intelligent Surveillance and Human-Like Messaging Agent for Early Warning of Wild Elephant Intrusions

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Abstract:

Human-elephant conflict continues to pose serious threats to communities near forested areas, with wild elephant intrusions endangering both personal safety and agricultural livelihoods. This study presents a real-time surveillance and alert system that combines AI-based object detection (YOLOv8), a localized CCTV network, and a conversational agent designed to mimic natural human communication behavior. Unlike commercial messaging platforms that require subscription fees, the system leverages a free and open communication channel (LINE) through a custom-built bot that acts as a human-like agent to deliver timely alerts directly to residents and local authorities. Trained on localized datasets, the system achieves a high detection accuracy of 98.9% under varying environmental conditions. Field tests demonstrate the system's rapid response capabilities, cost-effective implementation, and low dependency on stable internet connections. Furthermore, the system significantly reduces the cost of integrating external APIs, as the bot can be programmed to autonomously perform any action on the host machine—functioning as if a human operator were present. This approach offers a practical and scalable solution for mitigating human-elephant conflict in rural Thailand and similar regions, showcasing how AI-powered, human-inspired communication agents can enhance wildlife monitoring and community-driven alert systems.

Keywords:

Wild Elephant Intrusion, Human-Wildlife Conflict, Real-Time Detection, Machine Learning, CCTV Surveillance, Community Alert System.