ABSTRACT

The presence of pests such as rodents, snakes, and lizards in residential areas poses significant health and safety risks, necessitating effective monitoring and timely responses. Modern CCTV systems offer continuous visual surveillance, yet their effectiveness remains limited without advanced processing capabilities. However, pest detection in such environments presents challenges due to their small size, rapid movements, and the potential for noisy or low-quality images, which reduce detection accuracy. But, with AI integrations and computer vision technologies, these systems can be enhanced to automatically detect and alert residents about pest presence in real-time. Therefore, this study addresses these challenges by leveraging the SSD (Single-Shot Detector) MobileNet-v2 architecture, which combines the lightweight and efficient MobileNet-v2 with single-shot object detection to achieve fast and accurate pest detection. The proposed approach integrates a Feature Pyramid Network (FPN) to improve detection performance, particularly for small and noisy objects. Experimental results demonstrate that the model achieves an accuracy of 85.66% with the FPN backbone, significantly outperforming the 44.81% accuracy achieved without FPN. Additionally, optimizing the model with a lower learning rate further enhances its ability to detect small and noisy targets. These findings highlight the effectiveness of the proposed method in addressing the complexities of pest detection in residential environments. The contributions of this study include the development of a robust and efficient detection model, the integration of FPN for improved small-object detection, and insights into the impact of learning rate adjustments on model performance.

Keywords: pest, detection, CCTV, SSD, MobileNet-v2