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Wild Animal Intrusion Detection

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Abstract: *Animal Vehicle Collision, commonly called as roadkill, is an emerging threat to humans and wild animals with increasing fatalities every year. Amid Vehicular crashes, animal actions (i.e. deer) are unpredictable and erratic on roadways. This paper unveils a newer dimension for wild animals' auto-detection during active nocturnal hours using thermal image processing over camera car mount in the vehicle. To implement effective hot spot and moving object detection, obtained radiometric images are transformed and processed by an intelligent system. This intelligent system extracts the features of the image and subsequently detects the existence of an object of interest. The main technique to extract the features of wild animals is the Histogram of Oriented Gradient transform. The features are detected by normalizing the radiometric image and then processed by finding the magnitude and gradient of a pixel. As human populations expand and encroach upon natural habitats, conflicts between humans and wildlife become increasingly common. To mitigate the risks associated with wild animal intrusions into human settlements, an intelligent and proactive intrusion detection system is essential. This study proposes a novel approach to wild animal intrusion detection using deep learning techniques. The proposed system leverages Convolutional Neural Networks (CNNs) to analyze images captured by surveillance cameras placed in strategic locations. The deep learning model is trained on a diverse dataset of wildlife images to enable accurate identification and classification of different species. Transfer learning is employed to fine-tune the model for specific regions and scenarios, enhancing its adaptability and performance. Furthermore, the system integrates real-time image processing and edge computing to minimize latency and enable swift response to potential intrusions. The use of edge devices ensures that the intrusion detection system operates autonomously, reducing the need for constant human intervention. The effectiveness of the proposed approach is evaluated through extensive testing in real-world environments, including wildlife reserves, suburban areas, and agricultural landscapes. Performance metrics such as accuracy, precision, recall, and F1 score are employed to assess the system's ability to reliably detect and classify wild animal intrusions. The findings of this study demonstrate the feasibility and effectiveness of employing deep learning for wild animal intrusion detection. The proposed system not only enhances the safety of human populations but also contributes to wildlife conservation efforts by minimizing negative interactions between humans and animals. The scalability and adaptability of the system make it suitable for deployment in various geographic regions, thereby addressing the global challenge of human-wildlife conflicts.*

Keywords: Wild Animal Intrusion Detection System, Smart Protecting, Animal Detection , Precision Farms from Animals , Protection of Animals

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