

# Animal Species Detection Using Raspberry Pi and Deep Learning

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**Abstract:** *Animal species detection is a crucial task in various fields, including wildlife monitoring, conservation efforts, and research. Traditional methods of animal detection, such as manual observation or using physical traps, can be time-consuming, costly, and may cause harm to the animals. With the recent advancements in technology, computer vision and machine learning techniques have been used for animal species detection. In this project, we propose a real-time animal species detection system using Raspberry Pi and deep learning.*

**Keywords:** Raspberry Pi, Camera, Computer vision, Deep Learning

## I. INTRODUCTION

Identifying animal species is a critical undertaking in many sectors, such as research, wildlife monitoring, and conservation initiatives. Animals may be harmed by traditional means of animal identification, such as manual observation or the deployment of physical traps, which can be time-consuming and expensive. Recent technological developments have made it possible to identify different kinds of animals using computer vision and machine learning approaches. These methods might make it easier and more accurate to identify animals, which would be extremely helpful in many other sectors.

The vast diversity of species and their different physical traits is one of the biggest obstacles to animal species recognition. Further, animals may be partially or completely hidden by foliage or other environmental elements in complex habitats like woods or grasslands, making it difficult to identify them.

Deep learning methods have been employed for animal species detection to get around these difficulties. Artificial neural networks are used in deep learning, a type of machine learning, to analyse massive volumes of data and find patterns. These algorithms have demonstrated promising outcomes in a range of computer vision applications, including object and picture detection.

Deep learning algorithms have garnered more attention recently as a potential tool for real-time animal species recognition. These systems can offer a quick and precise method of seeing creatures in the present, which is very useful in many sectors, including wildlife.

Deep learning algorithms have garnered more attention recently as a potential tool for real-time animal species recognition. The ability to identify animals in real-time with the use of these devices may be extremely useful in a number of disciplines, such as research, wildlife monitoring, and conservation initiatives. One such system is the Raspberry Pi-based platform, a compact single-board computer used for prototyping and do-it-yourself applications. This technology offers a cheap and adaptable method for identifying species of animals in real-time.

The suggested method employs a USB camera to take live photos that are immediately analyzed to identify animals. For animal detection, a deep learning system that has already been trained on a variety of animal species is employed. everything to offer a quick and effective method of detection

## II. LITERATURE REVIEW

The goal of animal detection is to stop or lessen the frequency of collisions between animals and moving vehicles. These devices are particularly designed to target wild creatures that have the potential to harm, kill, or destroy human life.

The wild creatures are discovered by this technology before they cross the road.

In the past, animal-vehicle incidents have been prevented by posting signs alerting drivers to possible animal crossings. In some instances, wildlife fences or warning reflectors have been put in place to keep animals off the road. In certain particular locations, a number of wildlife crossing constructions have been integrated with wildlife fences.

Animal detection helps minimize animal-vehicle collisions and improves the safety of people and wildlife by seeing big animals before they cross the road and alerts drivers via auditory and visual cues. This assists in protecting farm produce from animals. This project includes a study of several object detection methods as well as methods for identifying objects as being those of animals, such as object matching, edge-based matching, and skeleton extraction. Following the survey, the best approach for locating animals is chosen, and its effectiveness is evaluated. The proposed system has a low rate of false positives and false negatives.

Finding tiny portions of a picture that match a template image is a technique used in digital image processing called "template matching." The idea of a normalized cross-correlation may be used to template matching.

First International Conference on Intelligent Digital Transformation ICIDT - 2019 (11–13 July 2019, Volume – I) Cross-correlation is a metric of signal processing, a time lag introduced to one of the waveforms influences how similar two waveforms are to one another.

A sliding dot product or sliding inner product are other names for this. It is frequently used to look for shorter, recognized features in long-duration signals. The pictures can first be normalized for image-processing applications where the brightness of the image and template might change depending on lighting and exposure circumstances.

### III. METHODOLOGY

This system will perform a deep learning algorithm for identifying animal species in real-time video using a Raspberry Pi device. It will give users a quick and easy method to keep track of animal populations by displaying the names of any animals that are discovered in the console. The system will be built around a Raspberry Pi device, which will enable the processing of the animal recognition algorithm and real-time picture processing. Use a USB camera to capture live video by connecting it to the Raspberry Pi. In order to find animals, the video stream will be analyzed in real-time. Construct a deep-learning algorithm that can distinguish between several animal species. Utilise labeled data to train the model, then tune it for use with the Raspberry

### IV. SYSTEM REQUIREMENT

- 1) Raspberry pi 4b+
- 2) USB Camera

### V. RESULT AND DISCUSSION

An economical and successful method for tracking and conserving animals is the deep learning and Raspberry Pi animal species detection system. The installation of the suggested system results in the expected performance. This system will run a deep-learning algorithm for identifying animal species in real-time video using a Raspberry Pi device. In order to find animals, the video stream will be analyzed in real-time. Construct a deep-learning algorithm that can distinguish between several animal species. The names of the identified animals will be shown in the console. The technology may be used in remote locations to track animal activity and movement, which can aid researchers and conservationists in better understanding and safeguarding wildlife species.

### VI. CONCLUSION

Deep learning and the Raspberry Pi are used in an intriguing way to identify animal species. Users of this system may interpret real-time video feeds from USB cameras, instantly identify various animal species, and monitor animal populations for scientific and conservation endeavours. The technique is suitable for managing and monitoring wildlife since it is straightforward, simple to use, and effective.

The creation of this system necessitates the fusion of a number of technologies, including deep learning, image processing, and hardware based on the Raspberry Pi. For implementation on the Raspberry Pi, which has constrained computational power, the deep learning algorithm has to be trained using labelled data and optimized. Model

architecture, hyperparameters, and data pre-treatment methods must all be carefully taken into account. The model may be used after training

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