

Animal Detection for Visually Impaired in Indian Scenario

Problem Statement

The problem of stray animals in developing Asian countries like India, Bangladesh, Nepal, Pakistan, and Bhutan, etc. is very common. We encounter these animals on the roads, near residential areas, and school/college campuses, etc. as shown in Fig1. Not only Visually Impaired (VI) but also persons with vision face difficulties while dealing with this problem. People gifted with vision are at lower risk than VI as VI can use their sense of sight to a limited extent or perhaps not at all. Therefore, they need an assistive solution that can help them in preventing a collision with stray animals.

Background

Although there have been many solutions developed to ease the lives of VI, access to those solutions is not available everywhere and to everyone. Taking reading as an example, braille is the solution for them. But, the reading materials in braille are available at only certain places like libraries, schools, and colleges, etc. There are many other places like railway and bus stations where magazines and novels are not available in braille. Prevention from collision while traveling is another problem that Visually Impaired (VI) faces which can sometimes be dangerous for them. If there are any pothole, animal, or any sharp items in the path, it can harm blind persons. Out of these, we intend to provide a solution for preventing collision with stray animals such as cow, dog, horse, monkey, goat, and cat as these are the commonly found animals and may be encountered by VI persons in their day-to-day lives.



Fig 1: Animal Encountered by VI

Methodology

Step 1: Data collection and dataset preparation

This will involve capturing and creation of images of stray animals commonly found in Indian scenario followed by pre-processing and extracting features.

Step 2: Developing a model for Animal Detection from the created dataset

In this step, a deep learning model is developed for animal detection from the dataset that is self-created and annotated

Step 3: Training and experimentation on datasets

Taring and testing is performed on using this model on the custom datasets to do the prediction accurately

Step 4: Deployment and analysis on real life scenario

The trained and tested object detection model will be deployed in a real-life scenario for further analysis.

Experimental Design

Dataset

The custom dataset has been developed by capturing videos from high and low-resolution cameras and then converting those videos into frames. This dataset contains 6 classes where each class has 5000 samples which lead to a total of 30,000 sample images.

Evaluation Measures

Evaluation is measured in terms of SENSITIVITY, SPECIFICITY, ACCURACY, F1 Score on the dataset.

Software and Hardware Requirements

Python based Computer Vision and Deep Learning libraries will be exploited for the development and experimentation of the project. Tools such as Anaconda Python, and libraries such as OpenCV, Tensorflow, and Keras will be utilized for this process. Training will be conducted on NVIDIA GPUs for training the object detection model on custom dataset.