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Drone Detection Using ML

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Abstract: *Autonomous drone detection systems offer a probable solution to overcoming the issue of potential drone misuse, such as drug smuggling, violating people's privacy, etc. Detecting drones can be difficult, due to similar objects in the sky, such as airplanes and birds. The objective of the project is to evaluate state-of-the-art models and training strategies for drone detection.*

Keywords: drone detection, airplanes, drug smuggling

I. INTRODUCTION

The rapidly increasing number of drones in the national airspace, including those for recreational and commercial applications, has raised concerns regarding misuse. Autonomous drone detection systems offer a probable solution to overcoming the issue of potential drone misuse, such as drug smuggling, violating people's privacy, etc. Detecting drones can be difficult, due to similar objects in the sky, such as airplanes and birds.

Drones are increasing in popularity and are reaching the public faster than ever before. Consequently, the chances of a drone being misused are multiplying. Automated drone detection is necessary to prevent unauthorized and unwanted drone interventions. In this research, we designed an automated drone detection system using YOLOv4.

Drone intrusions have been reported more frequently these years as drones become more accessible in the market. The abuse of drones poses threats to public and individual safety and privacy. Traditional anti-drone systems use radio-frequency sensors widely to get the position of drones. In this thesis, deep-learning-based detection algorithms on surveillance cameras have been investigated to be integrated into the RF anti-drone system.

II. METHODOLOGY OF SYSTEM

Title	Author Name	Gap identified
Automated Drone Detection Using YOLOv4	Subroto Singh	capturing high-quality pictures or videos using the most advanced drones requires precise manual control and is very error-prone.
Deep Drone: Object Detection and Tracking for Smart Drones on Embedded System	Song Han	They have used FPS as the evaluation metric to evaluate the speed of detection in the videos. It is very slow and takes time. Accuracy is 50% of this paper.
Drone Detection Using CNN	**Burchan Aydin**	Using deep learning for the detection of drones has become a common topic in the research community, due to the substantial importance of restricting drones in unauthorized regions; however, improvement is still needed. The authors proposed a drone detection methodology using YOLO.

III. MODULE IDENTIFICATION

1. Hardware set up:

Connect Raspberry with a camera and install drivers.

2. Image Capture:

Capture real-time images and send them for processing.

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3. Apply YOLO Algo
4. Detect Drone

In this module, work will be done on the principle of deep learning through the use of an algorithm (you only look once or (YOLO)). The primary objective of the proposed system is to identify drones in more complicated environments and at greater distances, as well as to teach the model to distinguish between drones, birds, and planes.

Data collection:

The proposed system in general proposes collecting many different photos with different distances, lighting, and weather conditions to help our model learn better about our objects.

Pre-processing

the image dimension was converted to (512 ×512) as it's an ideal size, does not cause high processing and training time and it's memory efficient.

Classification by using the YOLO algorithm

Download and build darknet.

Download, build, and install the tools needed for GPU training and for preprocessing (OpenCV, CUDA, Cudnn)

Collect datasets from various datasets.

Install the annotation tool used to create labeled images for YOLO (Annotation), those labeled images are used during training and testing.

IV. SYSTEM BLOCK DIAGRAM

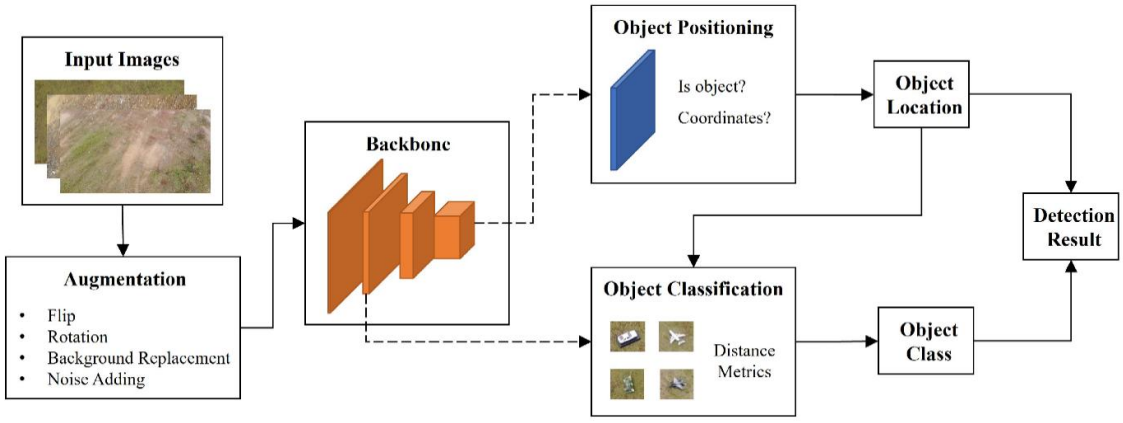

Fig 1. System Architecture

The system will take video as input and will extract images from the video. Once the image is extracted it will be augmented, flipped, rotated, and Noise added or removed. This will help to make the image clear. Once this is done object classification will be done using Yolo and the position of that object will identified. Object class means what type of object is detected like a drone, bird, etc.

V. PROPOSED SYSTEM

- Our system consists of two components.
- The first component is a detection algorithm running Yolo
- The second part is a tracking algorithm using the HOG feature.
- These two algorithms are seamlessly integrated to ensure smooth and real-time performance.
- The detection algorithm Yolo has lots of speed per frame and is only called to initialize a bounding box for key objects in the scene.

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VI. PROJECT TESTING

VII. CONCLUSION

Drones will be increasingly employed for communications and security in future smart cities. Drones are commonly employed in military operations. Drone identification is crucial, just as security concerns are. In this project, we provided a unique approach and demonstrated how to deal with drone photographs and extract information from them to detect and identify drones.

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