UNMANNED AERIAL VEHICLE OBJECT DETECTION USING MULTI-SENSOR FUSION IN REAL TIME WITH GAN

Project Reference No.: *45S_BE_4349*

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Keywords:
Histogram Algorithm, Object Recognition, GAN Feature Selection, Creating Integral Images, OCR, Cascading Feature, Image filtering, Feature Extraction.

Introduction:

1. Unmanned aerial vehicles also called as a drone, comprises a controller from the base station along with a communications system with the UAV.
2. The systems used in the military or rescue services to identify dangerous objects must have a correctly planned flight trajectory in the neighborhood of the recognized object.
3. The goal of our use case is to analyze the object near atmosphere between 50m to 100m above Surface level.
4. It can be precisely controlled by a machine operator, similar to remotely directed aircraft.
5. The purpose of the proposed architecture is to create a drone which can detect the object more accurately.
6. For tiny object detection, we recommend a novel Perceptual Generative Adversarial Network method that bridges the representation gap between small and large objects
7. In this project we are using YOLO (You Only Look Once) real-time object detection algorithm, which is one of the most effective object detections.
8. YOLO Object detection is to check the different objects available in the image.

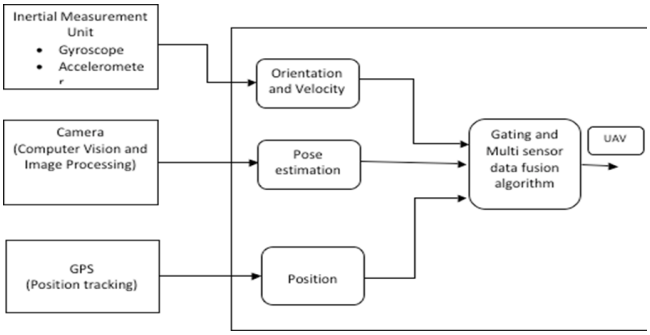
Objectives:

1. GAN networks are not tried much for object detection systems. So, this will be a new attempt to see the behavior across different datasets.
2. Most GAN networks use only minimax loss function to replicate a probability distribution. So, the idea of using Wasserstein Loss function in GAN network for a object detection system can bring in better results than the existing systems.

3. There will be two loss functions in a GAN: one for generator and the other for discriminator exercise. So, we can try different combinations of loss functions (minimax vs. Wasserstein) to see which one behaves better for a given data set.

Methodology:

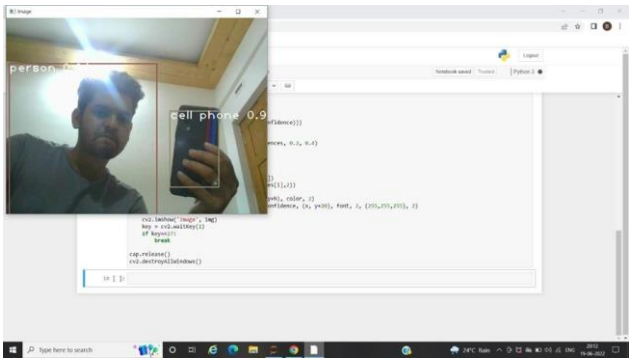
1. We present YOLO, a new approach to object detection. Prior work on object detection repurposes classifiers to perform detection.
2. Instead, we frame object detection as a regression problem to spatially separated bounding boxes and associated class probabilities.
3. A single neural network predicts bounding boxes and class probabilities directly from full images in one evaluation.
4. Our base YOLO model processes images in real-time at 45 frames per second. A smaller version of the network, Fast YOLO, processes an astounding 155 frames per second.

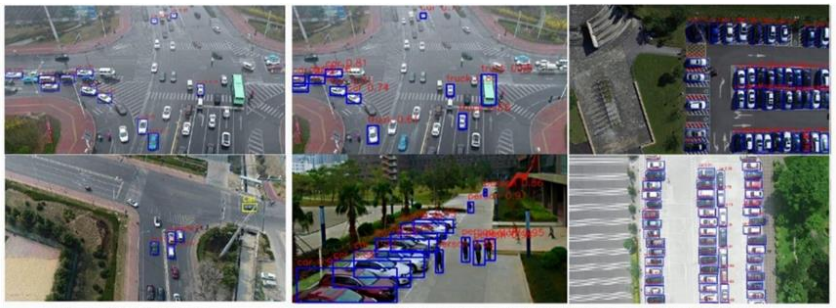


Results and Conclusion:

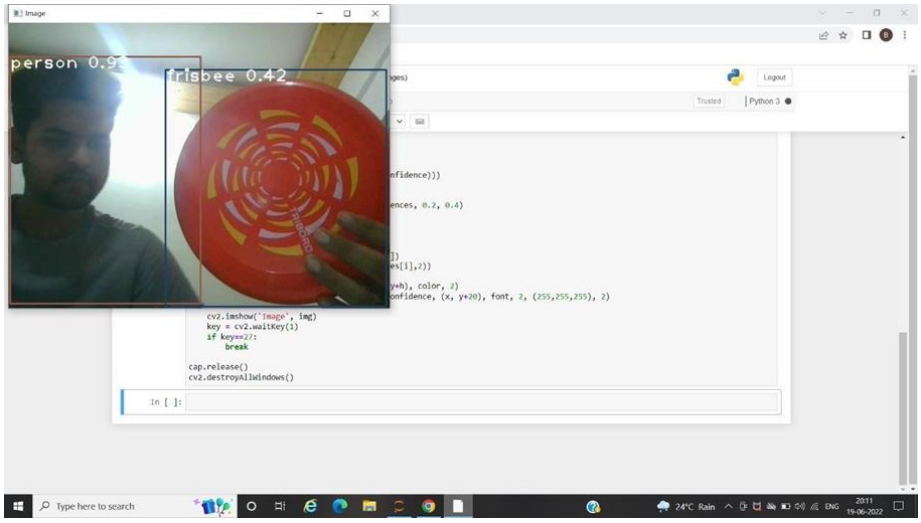
Object recognition objective in the small data area with reproductive modelling, learning to produce new pictures with bounding boxes.

When compared to existing techniques, the performance results obtained utilizing GAN-object detection on various datasets shows improved robustness to fluctuating image quality and a higher mean average precision.





(a) Initial YOLOv3 (b) Retraining YOLOv3 for dense object detection



Future Scope:

While our project provides promising results, it can still be upgraded in the coming future. According to the Drone Industry Insights Report 2020, the worldwide drone industry is predicted to increase at a 13.8 percent CAGR to $42.8 billion by 2025. With Ministry of Civil Aviation updating the Drone Rules 2021, efforts are to make India a global drone hub by 2030.

In future, drones will transport supplies to the remote or inaccessible areas. They will deliver medical supplies and vaccines to remote locations, dangerous places, inaccessible.