**Detecting Humans in Search and Rescue Operations Based on Ensemble Learning**

**Alternative Title:**

Detecting humans in rescue operations based on ensemble learning.

**Aim:**

To develop deep learning models to detect and track humans in aerial images

**Abstract:**

Detecting humans in aerial images remains a tedious task for the application based on Search And Rescue operation (SAR). The prime goal of SAR is to detect and assist people who were met accident in mountain or other hazardous environment. For detecting people in SAR application, aerial image of mountain landscapes is utilized. The major challenges in detecting human in aerial images are pose and scale variations of humans, low visibility, camouflaged environment, adverse weather conditions, motion blur, and high-resolution aerial images. Due to imaging from high altitudes, only 0.1 to 0.2 percentage of the image represents humans. To solve the problem of low coverage of the object of interest in high-resolution aerial images, we propose to implement a deep learning-based object detection model. In this model, we propose a novel method for the detection of humans in aerial images based on Deep learning architecture.

**Synopsis:**

Object detection is one of the most researched areas in computer vision. It is the process of determining where exactly the object is in the scene or image and what object has been detected. Object detection in aerial images depends on several factors such as low visibility due to varying altitudes, the object-of-interest, variations in pose and scale, camouflaged environment with rocks and trees, and high-resolution aerial image.

**Existing System:**

Object detection is one of the most researched areas in computer vision. It is the process of determining where exactly the object is in the scene or image and what object has been detected. Object detection refers to finding different types of objects in the scene such as peoples, cars, animals or other existing objects present in the scene. Detecting objects in aerial imagery is still considered a difficult task. One such important task is to rescue people in search and rescue (SAR) operations from aerial images without loss of life. SAR operations are conducted in wide-open spaces, such as mountains, lowlands, cities, disaster scenarios and marine rescue. search and rescue operations need to be conducted as quickly as possible to identify missing persons. It can be highly expensive and requires distinct types of activities such assending people in large groups, sniffer dogs and various types of ground and air vehicles such as cars and helicopters. Object detection in aerial images depends on several factors such as low visibility due to varying altitudes, the object-of-interest, variations in pose and scale, camouflaged environment with rocks and trees, and high-resolution aerial images. It is expensive and time-consuming to capture aerial images based on these parameters. To avoid high cost and time commitments associated with traditional SAR methods

1. Machine learning based human detection in aerial image is facilitated.
2. To train and detect human in ML, requires large amount of aerial images
3. Detect human in aerial images using thermal infrared cameras
4. Detecting people with thermal camera is not reliable with weather conditions.

**Problem Definition:**

The problem at hand is to develop a human detection system using YOLOv5 specifically designed for aerial images. The system should be capable of detecting humans under various challenging conditions typically encountered in aerial imagery, including small target sizes, occlusions, and variations in appearance due to viewpoint changes.

**Proposed System:**

In the proposed system, we have used yolo model v5 in this project. It gives better accuracy compared to other and we have able to predict it better in aerial images. YOLO V5 is fast and accurate compared to other models.

**Advantage:**

YOLOv5 is a modern object detection algorithm, that has been written in a PyTorch, Besides this, it's having, fast speed, high accuracy, easy to install and use

**YOLO V5:**

YOLOv5 is a model in the You Only Look Once (YOLO) family of computer vision models. YOLOv5 is commonly used for detecting objects. YOLOv5 comes in four main versions: small , medium, large, and extra large, each offering progressively higher accuracy rates. YOLO v5 uses a new method for generating the anchor boxes, called "dynamic anchor boxes." It involves using a clustering algorithm to group the ground truth bounding boxes into clusters and then using the centroids of the clusters as the anchor boxes.

**Module Description:**

It consists of training, testing, and detection file with collection of datasets.

**Hardware Requirements:**

* Hard Disk : 500GB and Above
* RAM : 4GB and Above
* Processor : I3 and Above

**Software Requirements:**

* Operating System : Windows 10 (64 bit)
* Software : Python
* Tools : Anaconda

**Architecture Diagram For Testing**

Video

Video Slice

Real time

User input

Detection of humans in aerial view

**Conclusions:**

We can save many individuals who are involved in mountain accidents by detecting humans in SAR missions. We can minimize the cost and time involved in traditional SAR operations by using drones. We have examined the state-of-the-art person detectors implemented on the HERIDAL dataset and proposed an ensemble learning-based method for detecting humans for our research.

**Future Work:**

We can try with next yolo version and try to detect even more accurate and predict and also we can implement this with medical drones.