Object Detection Model Based on Resnet-50 Within the Effective R-CNN Framework

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Abstract:

The increasing use of unmanned aerial vehicles (UAVs), commonly referred to as drones, in various industries such as surveillance, logistics, and environmental monitoring has raised significant concerns regarding privacy, security, and aviation safety. This study focuses on addressing these concerns by developing a robust drone detection system using the Faster RCNN model with a ResNet-50 backbone, implemented in TensorFlow 2. The primary objective is to accurately detect and localize drones in aerial images containing drone objects. Data augmentation techniques, including Mosaic and Cutout, will be applied to enhance the model's ability to detect small and occluded drones within complex image scenes. The research follows an iterative approach encompassing model training, validation, and continual improvement through error analysis. The expected outcomes include improved accuracy and robustness in drone detection across diverse aerial image datasets. These results have potential applications in enhancing image-based drone detection systems for surveillance, environmental monitoring, and airspace management.

Keywords:

Drone Imagery Analysis, Faster R-CNN, Object Detection, ResNet-50.